

November 13, 2020

**VIA EMAIL**

Benjamin Davidson, Esq.  
Law Offices of Benjamin Davidson, P.C.  
8383 Wilshire Blvd., Suite 830  
Beverly Hills, CA 90211  
Email: [bdavidson@bendavidsonlaw.com](mailto:bdavidson@bendavidsonlaw.com)

Re: Deposition Subpoena for Production of Business Records to University of Southern California re Case No. BC709376

Dear Mr. Davidson:

This letter and the accompanying records, bates-stamped USC00001 through USC000488, constitute the University of Southern California's (USC) objections and production of documents in response to the deposition subpoena for production of business records dated Sept. 18, 2020 in connection with Los Angeles Superior Court Case No. BC709376 (the "Subpoena"). Pursuant to the email correspondence received from you and from Mr. Adam Zaffos on November 12, 2020, USC is producing these objections and documents to you directly and exclusively, and through electronic delivery.

**GENERAL OBJECTIONS**

Any document that USC produces or makes in response to the Subpoena is produced subject to all objections of competence, relevance, materiality, propriety, admissibility, and any other objection on any ground that would require the exclusion of the document or other item, or any portion of the document or other item, if offered into evidence. All such objections are continuing in nature, incorporated into each specific response to the Subpoena's specifications, and are expressly reserved and may be interposed in connection with any motion or at the time of any trial. The fact that USC agrees to produce documents or provide information in response to any particular Subpoena request is not intended and shall not be construed as a waiver by USC of any objection to such request or of any general objection made in this Subpoena response.

No incidental or implied admissions are intended by USC's response to the Subpoena. The fact that USC agrees to produce documents or other items in response to a particular Subpoena request is not intended and shall not be construed as an admission that it accepts or admits the existence of any facts set forth in, or assumed by such request, or contained in any such documents or other items, or that any produced document or other item is admissible in evidence.

USC objects to the Subpoena and each of the Subpoena requests to the extent that they encompass documents protected by the attorney-client privilege and/or the work-product doctrine. USC further objects to the Subpoena and each of its requests to the extent they (a) seek irrelevant information not reasonably calculated to lead to the discovery of admissible evidence; (b) seek cumulative

evidence; (c) are overbroad and unduly burdensome; (d) seek confidential, proprietary or trade secret information; (e) seek information that, if disclosed, would constitute an unwarranted invasion of personal privacy, and (f) seek information equally accessible to the parties or information within the public domain. All such objections are continuing in nature, incorporated into each and every response below, and are expressly reserved and may be interposed in connection with any motion or at the time of any trial.

This response represents USC's diligent and best efforts to respond to the Subpoena based upon the factual investigation done by USC to date. There may exist additional documents responsive to the Subpoena that are not within the present knowledge of, or reasonably available to, USC, or that USC has not yet located, identified, or reviewed. USC will continue to produce responsive documents if and when such materials are located, identified, or reviewed; however, this response to the Subpoena should not be construed as an admission or representation by USC that additional responsive documents or other information do or do not exist.

### **USC RESPONSE TO SUBPOENA REQUESTS**

#### **SUBPOENA REQUEST NO. 1:**

Any and all DOCUMENTS that RELATE TO any investigations made by USC CONCERNING HAO LI's representations during ACM SIGGRAPH Real-Time Live on August 1, 2017.

#### **RESPONSE TO SUBPOENA REQUEST NO. 1:**

USC objects to Request No. 1 to the extent that it requests information, the disclosure of which would constitute an unwarranted invasion of the affected persons' constitutional, statutory and/or common law rights to personal privacy and confidentiality. USC further objects to Request No. 1 on the ground that the terms "investigations" and "representations during" are vague and ambiguous. USC further objects to Request No. 1 on the ground that it seeks documents protected by the attorney-client privilege and/or the work-product doctrine. Subject to the General Objections stated above, which are incorporated by reference as though fully set forth herein, and without waiving any of them, USC responds that it will produce all responsive, non-privileged documents within its possession, custody, or control.

\* \* \*

Please give me a call or email me if you have any questions about USC's response and objections to the Subpoena.

Best regards,

Michael J. Stephan

Enclosures



**PRINCIPALS:**

**COMPLAINANT(S):**

Iman Sadeghi, Ph.D.  
Former Vice President, Pinscreen

**RESPONDENT:**

Hao Li, Ph.D.  
Associate Professor  
Viterbi School of Engineering

Director of the Vision and Graphics Lab  
*USC Institute for Creative Technologies*

**INSTITUTIONAL OFFICIALS:**

Dr. Charles Zukoski  
Provost  
University of Southern California  
3551 Trousdale Parkway  
Los Angeles, CA 90089

Dr. Maja Matarić  
Interim Vice President of Research  
Office of Research  
University of Southern California  
3720 S Flower Street  
Los Angeles, CA 90089

Dr. Kristen Grace  
Research Integrity Officer  
Office of Research  
University of Southern California  
3720 S Flower Street  
Los Angeles, CA 90089

**INVESTIGATION COMMITTEE:**

[REDACTED]

[REDACTED]



## **INTRODUCTION**

The USC Office of Research and the USC Research Misconduct Investigation Committee assigned to review this matter have reviewed allegations of research misconduct on the part of Dr. Hao Li, Ph.D., Associate Professor in the Computer Science Department, Viterbi School of Engineering and Director of the Vision and Graphics Lab, Institute for Creative Technologies, University of Southern California. He began his employment with USC in August, 2013. In addition to his role at USC, Dr. Li has served as Founder and CEO of Pinscreen Inc. since 2015. Pinscreen is a computer animation company focused on avatar development. The company website claims to develop “the most advanced artificial intelligence driven personalized avatars”. Their website further claims to generate a personalized 3-D avatar in seconds.

On July 11, 2018, the Vice President of Research and the Office of Ethics and Compliance met with Dr. Iman Sadeghi, Ph.D., at which time he presented allegations of falsification and/or fabrication on the part of Dr. Li regarding two submitted manuscripts, an abstract submission and a live technology demonstration. Dr. Sadeghi was employed by Pinscreen as Vice President of Computer Graphics from February 2, 2017 through August 7, 2017 at which time he was terminated by Dr. Li. Dr. Sadeghi claims his termination was an act of whistleblower retaliation regarding the falsification of avatar generation capabilities developed by Dr. Li and his team (Att. 1). On June 11, 2018, Dr. Sadeghi filed a complaint with the Superior Court of California, County of Los Angeles alleging multiple counts of fraud, violation of employment law and contracts, wrongful termination, assault and battery, and research misconduct. A Second Amended Complaint was filed on October 5, 2018. This lawsuit is pending.

On or about July 14, 2018, an Inquiry Panel was charged by USC to review the allegations for credibility and to carry out an initial review of evidence. The Inquiry Panel interviewed the Complainant on November 9, 2018, and the Respondent on September 25 and October 26, 2018. An Inquiry report was drafted and sent to Dr. Li for comment. Dr. Li responded to the Inquiry Report on January 24, 2019 (Att. 3).

The final inquiry report (Att. 2) was forwarded to the USC Provost on January 29, 2019 and approved January 30, 2019. An Investigation Committee was charged by USC with the investigation on or about February 26, 2019.

## **SUMMARY OF ALLEGATIONS**

Four allegations of research misconduct were identified based on the Amended Report and further information from Dr. Sadeghi. The four allegations reviewed by the Investigation Committee are as follows:

1. Dr. Li knowingly and intentionally fabricated data, and/or instructed others to do so, in a manuscript submitted to SIGGRAPH 2017, a manuscript submitted to and published in

SIGGRAPH Asia 2017, and an abstract to SIGGRAPH Real-Time Live 2017 by representing manually prepared avatar hair shapes as being automatically generated.

2. Dr. Li knowingly and intentionally falsified data, and/or instructed others to do so, in a manuscript submitted to SIGGRAPH Asia 2017 by representing manually “fixed” avatar eye color, while the paper represented that eye color generation was accomplished through technology he developed based on advances in deep learning.
3. Dr. Li knowingly and intentionally falsified claims, and/or instructed others to do so, in an abstract submitted to SIGGRAPH Real-Time Live 2017 (Heretofore referred to as RTL abstract) by stating newly developed technology would be presented, when, in fact, Dr. Li and his team did not have the ability at the time to demonstrate these claims.
4. Dr. Li knowingly and intentionally falsified a presentation, and/or instructed others to do so, made at SIGGRAPH Real-Time Live demonstration 2017 (heretofore referred as RTL 2017) by claiming the demonstration to be a real-time presentation of newly developed computer graphics technology to create an avatar in a matter of seconds from a single photo, when in fact the avatars were manually created and pre-loaded.

This report of the committee refers only to allegations 3 and 4. The committee continues to review allegations 1 and 2.

#### **FUNDING AND JURISDICTION**

Dr. Li, as full-time faculty member at USC, received the following funding for the work presented in the abstract for, and the presentation at, SIGGRAPH RTL live:

- Office of Naval Research, Award No. N00014-15-1-2639; to USC, Dr. Hao Li, P.I. (Att. 4)
- U.S. Army Research Laboratory under contract W911NF-14-D-0005; to USC Institute for Creative Technologies, Randy Hill, P.I. (Att. 4)

The RTL abstract is entitled “Pinscreen: Creating Performance-Driven Avatars in Seconds”. However, Dr. Li represents himself solely as associated with the University of Southern California. The work presented at SIGGRAPH RTL is a public presentation developed from the published work cited below. (Att. 6, 7)

- [REDACTED] 2017.  
Avatar Digitation From a Single Image For Real-Time Rendering. SIGGRAPH Asia. 36 (6).

This work cites the above two mentioned grants, awarded to USC.

[REDACTED] are authors on both the SIGGRAPH Asia paper as well as the RTL abstract. All were USC Graduate students at the time of the above under Dr. Li’s supervision. [REDACTED] also an author on both, was a former Masters student under Dr Li’s direction as a BSc Student in 2014. As author, Dr. Li is credits himself both to Pinscreen and USC in the SIGGRAPH Asia paper and the RTL Presentation, and solely USC in the RTL abstract.

### **SCIENTIFIC BACKGROUND**

The area of research in question is computer graphics. Computer graphics is a sub-discipline of computer science that focuses on capturing, storing, rendering, and manipulating digital images and video. The objective is to use computer hardware and software (in the form of algorithms and data structures) to create virtual environments that are reflective of the real world or that portray imaginary worlds. In fact, computer graphics have been used to produce visualizations of phenomena (e.g., computer-generated visualizations of a black hole bending spacetime) *before* such phenomena were actually observed in the real world; graphics have also been used to help create very realistic artificial worlds (e.g., in video games, movies, amusement parks, etc.).

Doing all of this is very challenging in a number of ways. The desired levels of detail mean that massive amounts of information need to be processed, very often in extremely short time spans. This requires optimizations both in the hardware and in the software. Since modern hardware is capacious and fast but ultimately bounded in its ability to perform computations, computer graphics researchers devote a lot of attention to developing improved software techniques for processing the needed information. The objective often boils down to driving up the quality at an acceptable cost. For example, in certain applications, this may mean, cutting down the time to render an image from weeks to hours; in other applications, it may mean, generating and processing series of high-quality images nearly instantaneously as the relevant information for them becomes available.

Dr. Li's own work has focused on such problems. Specifically, he has worked on such computationally expensive tasks as 3D human digitization from 2D artifacts (e.g., photographs), animation of digitized human faces, and developing models and algorithms that enable rendering of real world-like hair. Being able to drive down the computation time while improving the quality of the rendered results is a critical goal of this line of research, and is at the heart of this case.

### **RESPONDENT** (Full Curriculum Vitae for Dr. Li, Att. 8)

Dr. Li started at USC in August, 2013 as Assistant Professor. In October, 2015 he co-founded Pinscreen where he has held the position of CEO to date. In August, 2016 he became Director of the USC Institute for Creative Technologies, Vision and Graphics Lab. Dr. Li became Associate Professor (with tenure) in the USC Computer science Department in May, 2019.

Dr. Li lectured graduate level courses in the USC Computer Science Department and was a guest lecturer for numerous other computer science courses at USC.

At the time of the investigation Dr. Li oversaw 13 post-doctoral trainees and has mentored 9 additional trainees here at USC.

At the time of this investigation Dr. Li held two active awards, one a corporate grant as well as a grant from the Office of Naval Research.

Dr. Li has published 9 first and 24 senior authored peer-reviewed journal and conference papers.

REDACTED

## **INVESTIGATION**

### **Specific Allegations**

That Dr. Li:

1. Dr. Li knowingly and intentionally falsified claims, and/or instructed others to do so, in an abstract submitted to SIGGRAPH Real-Time Live 2017 (Heretofore referred to as RTL abstract) by stating newly developed technology would be presented, when, in fact, Dr. Li and his team did not have the ability at the time to demonstrate these claims.
2. Dr. Li knowingly and intentionally falsified a presentation, and/or instructed others to do so, made at SIGGRAPH Real-Time Live demonstration 2017 (heretofore referred as RTL 2017) by claiming the demonstration to be a real-time presentation of newly developed computer graphics technology to create an avatar in a matter of seconds from a single photo, when in fact the avatars were manually created and pre-loaded.

### **Investigation Committee Analysis**

For the purposes of this report the Investigation Committee reviewed the following evidence:

- Dr. Iman Sadeghi vs. Pinscreen, Inc., *et.al.*; Verified Second Amended Complaint filed on October 5, 2018. (Att. 1);
- The January 8, 2019 USC Inquiry Report. (Att 2);
- Dr. Li's response to the draft Inquiry Report. (Att 3);
- USC Institute of Creative Technologies, Information Security Summary, July 8, 2019. (Att. 9);
- USC Institute of Creative Technologies, Information Security Summary, July 29, 2019. (Att. 10);
- Report by an Quandary Peak Research, outside consultant, reviewing the code supplied by Dr. Li and the RTL Presentation. (Att. 11);
- YouTube SIGGRAPH RTL Presentation August 1, 2017 ([https://www.youtube.com/watch?v=hpuEdXn\\_M0Q](https://www.youtube.com/watch?v=hpuEdXn_M0Q));
- [REDACTED] 2017. Avatar Digitation From a Single Image For Real-Time Rendering. SIGGRAPH Asia. 36 (6) (Att. 6);
- Pinscreen: Creating Performance-Driven Avatars in Seconds (SIGGRAPH RTL 2017 abstract) (Att. 12);
- Dr. Li's April 6, 2020 response to the draft Investigation Report through his attorney (Att. 18)

Background:

1. ACM SIGGRAPH (Association for Computing Machinery's Special Interest Group on Computer Graphics and Interactive Techniques) is made up of members involved in a wide variety of fields, including scientific research, computer graphics research, software development, scientific visualization, digital art, interactive technology, game design, visual effects, graphic design, computer science, education, engineering, film and television production, and more (AMC SIGGRAPH website).
2. SIGGRAPH is the world's largest conference on computer graphics. It takes place once a year in a city somewhere in the U.S. or Canada, and is attended by tens of thousands of computer graphics professionals. SIGGRAPH claims to be one of the most highly respected venues for the presentation of new computer graphics technology and research (AMC SIGGRAPH website).
3. Real Time Live (RTL) is a showcase of new technology to the SIGGRAPH community of scientists, developers and enthusiasts. A panel of judges awards a best-in-show based on the presentations given during the 1.5 hour showcase.
4. In order to qualify for entry into the 2017 RTL show an abstract needed to be submitted in April and approved by SIGGRAPH for the mid-summer conference.

#### Observations:

5. For SIGGRAPH RTL 2017:
  - a. Dr. Li's group submitted their abstract (Att. 12) on the 4/4/2017 deadline;
  - b. Reviewers' comments were available on 5/17/2017 (Att. 13);
  - c. Dr. Li's abstract was accepted on 6/02/2017;
  - d. The RTL demonstrations were held on 8/01/2017.
6. The submitted and accepted abstract states:
  - i. "With this fully automatic framework for creating a complete 3D avatar from a single unconstrained image, users can upload any photograph to build a high-quality Head model within seconds..."
  - ii. "This system integrates state-of -the-art advances in facial-shape modeling, appearance inference, and a new pipeline for single-view hair generation based on hairstyle retrieval from a massive database, followed by a strand-to-hair-strip conversion method..."
  - iii. "This live demonstration shows that compelling avatars and animations can be generated in very little time by anyone, with minimal effort."
7. The abstract and presentation were based on work described in a paper entitled "Avatar Digitization From a Single Image For Real-time Rendering" submitted to SIGGRAPH Asia on May 23, 2017.
8. Along with the abstract, the following video was submitted:  
<https://www.youtube.com/watch?v=OZ2O3SXF0tE>
9. No computer code was submitted along with the abstract, since code submission is not required for abstracts.
10. On May 17, 2017 Dr. Li received reviewer comments regarding the SIGGRAPH RTL 2017 abstract (Att. 13). In general, the reviewers were impressed at the speed of

- the technology, but expressed concern regarding the overall avatar image quality, specifically as it relates to hair shape reconstruction and eye socket fitting.
11. The SIGGRAPH RTL 2017 Presentations (heretofore referred to as RTL 2017) can be found on YouTube at: [https://www.youtube.com/watch?v=hpuEdXn\\_M0Q](https://www.youtube.com/watch?v=hpuEdXn_M0Q). The portion of this video relevant to this report can be found from 31:06-40:18.
  12. On July 7, 2017 Dr. Li and others in his group participated in the RTL virtual rehearsal. At this time the SIGGRAPH RTL crew asked Dr. Li and others extra bandwidth or special equipment was needed to ensure that the Real-Time presentations would be executed smoothly. (Att. 14).
  13. At the outset of the August 1, 2017 RTL presentations the moderator states; “All the presentations tonight will demonstrate amazing technology rendering beautiful graphics, and interactively controlling them in real-time live. Like I said, real-time, nothing pre-rendered, nothing pre-recorded.” (RTL 2017 01:32)
  14. Dr. Li’s group was introduced, informing the audience that they would be demonstrating the creation of “performance-driven avatars in seconds” (RTL 2017 31:27 )
  15. Dr. Li introduces the production by stating “We are going to show you how to build a high-quality 3D avatar from a single image, fully rigged and animatable...” (RTL 2017 32:32)
  16. Dr. Sadeghi, presenting on behalf of Pinscreen, further states “we’ve been working on developing a fully automated pipeline to create a 3D avatar from a single image in a matter of seconds. And today I’m going to show you how it works.” (RTL 2017 32:55)
  17. Dr. Sadeghi continues to take a picture of himself with the computer camera, he waits 6 seconds while a progress bar rapidly moves across the screen and then presents the 3D avatar to the audience’s applause.
  18. He further illustrates animation, mesh, and skeletal view, and states that the avatars are “fully rigged, ready to be used in VR, games and animated movies.” (RTL 2017 33:55).
  19. Dr. Sadeghi claims to instantly generate three other instantaneously generated avatars from single stored images.
  20. “We run multiple neural networks and pixel-wise optimizations to calculate hairstyle, geometry of the hair, polystrips, the facial geometry, textural map, the lighting, eye color, and so-on.”
  21. No information is presented to the audience that this is merely an illustration or “movie” of the technology or that the presentation has been pre-“cached” (recorded) for ease of presentation or to avoid any internet bandwidth issues.
  22. There is no evidence during the presentation that there was any internet connectivity issues or that Dr. Li’s team attempted their live presentation and then reverted to a cached presentation as a last resort.

#### Analysis:

23. At the request of the USC Office of Research, Dr. Li provided access to the code utilized to run the RTL 2017 demonstration. This code was housed on GitLab, an online code repository. It was not publicly accessible.
24. The Complainant and presenter of the code, Dr. Sadeghi, has stated that this was the code that he presented and the only code available to present (Att. 14)



25. At the request of the Committee, USC hired an outside, independent consulting firm to analyze this code in relation to the Dr. Li's claims, the allegations at hand, and the RTL presentation. The consultant's report ("Report") is attached. (Att. 11)
26. The summary of findings from this Report are as follows:
- a. The Demo Software does not include functionality for creating a 3D avatar from an image, either fully automatically or otherwise.
  - b. The Demo Software includes at least eleven pre-built, pre-stored avatars. Four of these avatars – "Iman", "Hao", "JohnRoot", and "Christobal" – were displayed by Dr. Sadeghi during the Demo.
  - c. The Demo Software allows the user to take a picture using an attached webcam. No matter what picture is taken with the webcam, the rtl-app will then display the pre-built "Iman" avatar.
  - d. The Demo Software also allows the user to select a previously captured picture file. If the name of the picture file corresponds to one of the pre-built avatars (e.g., "JohnRoot.jpeg"), then the app displays the corresponding pre-built avatar. If the name of the picture file does not correspond to one of the pre-built avatars (e.g., "GeorgeEdwards.jpg"), no avatar is displayed.
  - e. The Demo Software is designed to mislead the viewer. For example, the Demo Software includes a "progress bar" that appears to show the progress of an underlying computation to generate an avatar, when in fact there is no corresponding underlying computation and the progress bar simply fills up according to a timer. (Att. 11, P.2)
27. Specifically, the Report finds:
- a. The C# source code of the Demo Software shows that the first feature presented in the demo – the ability to generate an avatar in a few seconds from a webcam picture – did not actually exist in the software.
    - i. After the user has taken a picture the function **GenerateAvatar** is called (line 24).
    - ii. At line 96, the function **SetAvatar** is called with the hardcoded parameters `avatarData["Iman"].Texture, "Iman"`.
    - iii. At line 125 the **SetAvatar** function displays a progress bar on the screen. The progress bar's **update** function at line 70 shows that the progress bar is filled based on a timer, not based on the actual progress of any underlying computation.
    - iv. Git repository logs indicate that specific efforts were made to make the progress bar more believable: code was added to the file on July 22, 2017, with the commit comment "replace Trump animation, make progress more natural". This revision caused the progress bar to increase at a variable speed, rather than increasing at a uniform speed.
    - v. At line 202, a lookup is performed to retrieve an avatar **Transform** object from a collection of pre-built avatars. In this case, the value of the name parameter is "Iman" so the avatar named "Iman" is retrieved.



pre-record the presentation as a “fallback” plan in the event internet connectivity became problematic. (Att. 3; P. 8). Dr. Li stated that not only was this an acceptable practice, but encouraged by conference organizers. The Committee rejects this argument based on the following:

- a. In an email provided to the Committee by Dr. Hao Li, the RTL 2018 chair explains that it is valid for presenters to prepare “cache” as a fallback plan, and to perform their cache with explanation in case of some troubles.” (Att. X)
  - b. The YouTube video provides no evidence that there were any technical difficulties in the presentation or any other presentation during the RTL 2017.
  - c. In an email conversation with Dr. Grace (Att. 14), Dr. Sadeghi, the RTL presenter of the technology expressly states:
    - i. “There were no connectivity issues and all presentations were supposed to be in Real-Time and Live.”
    - ii. “In fact, SIGGRAPH RTL crew asked during the RTL Virtual Rehearsal, on July 7, 2017, if extra bandwidth was needed or special equipment to ensure that the Real-Time presentations would be executed smoothly.”
    - iii. “Pinscreen had no alternative code other than the <https://gitlab.com/pinscreen/rtl-app.git> for its avatar generation demo.”
    - iv. “Pinscreen intentionally misrepresented these manually prepared and pre-built avatars as autogenerated and in Real-Time.”
28. Dr. Sadeghi further testified that there was no code available at the time that had the capability to do that which was being presented at RTL 2017.
- i. “There was no alternative code that would be able to actually autogenerate the avatars since Pinscreen did not have the capability: The actual autogenerated avatars would take around 90 seconds and would likely result in inaccurate hairstyles.” (Att. 1, Paragraphs 184-188) Dr. Sedeghi confirmed this assertion in an e-mail conversation with Dr. Grace (Att. 14)
29. Skype conversations between Dr. Li and his team confirm Dr. Sadeghi’s testimony and illustrate the fact that the technology was unable to accomplish what they were claiming at the time of the RTL 2017 abstract submission.
- a. One week before the RTL abstract submission regarding the RTL Demo Dr. Li had a discussion with 9 members of his team. (Att. 1, P.135)
    - i. [03/27/17] Li: the issue is we don’t have time we should start the collection asap  
Items are:
      - 1)classification  
we have never done this before, so no idea how long that will take
      - 2)we dunno if handpicked are good
      - 3)we still need hair rendering
      - 4)we also need some trackingit’s basically one day per task  
if we don’t parallelize it, there is no way we can make it  
even if we fake things there is no time



- b. Just following Dr. Li had a conversation with 6 team members (P. 135)
    - i. [03/27/17] [REDACTED] maybe jens and I can setup meeting to see if it's even doable
    - ii. [03/27/17] Li: yes we need a feasibility discussion first. I have doubts for now we could build the model on time (via cheating)
  - c. Regarding hair modeling for the RTL 2017 presentation Dr. Li had the following conversation with 6 team members (P. 140)
    - i. [03/27/17] Li: it s even better to have not good looking hair real-time than good looking non real-time hair  
But we should try to have some hair if we want to try to aim for it  
The reconstruction part we probably have no choice but to cheat.
  - d. Two months before the RTL 2017 presentation:
    - i. [06/29/17] Li: I'm really worried that nothing will work by the rehearsal and we have to [do] sic. some shitty cheating again. (P.137)
    - ii. [05/05/17] Sadeghi: For the rehearsal, if we don't generate a brand new avatar then we have full control and everything can be cached. ( P.190)
30. In his interview with the Inquiry Committee, Dr. Li presented the code he contends would reproduce the results presented at RTL 2017. This was the code he claims was used in the preparation for the May 23, 2017 SIGGRAPH Asia submission, *over two months after the RTL 2017 abstract submission*. This code took 5 minutes to generate an avatar and was reported as such in the SIGGRAPH Asia manuscript.
31. Allegations of falsifications regarding SIGGRAPH Asia 2017 are still under review and will be reported separately. However, Skype transcripts reveals that the technology for this manuscript (the basis for RTL 2017) was not available at the time of the manuscript submission.
- a. The following conversation was also shared with [REDACTED] (Att. 1, P.138)
    - i. [05/15/17] Li: our eyes are wrong, the colors, we need to use a deep neural net for that
    - ii. [05/15/17] [REDACTED]: for the SIGAsia paper
    - iii. [05/15/17] Li: or we just do it manually for siggraph asia for now
    - iv. [05/15/17] [REDACTED]:do you need unity rendering
    - v. [05/15/17] Li: let s do it manually for now, i think it s the only way
32. At the end of a lengthy skype conversations with Dr. Li and his team regarding software problems, just one day before submission was due, Dr. Li writes:
- a. [05/22/17] Li: if in an hour it s not working let s do it manually and give up on it I don't think we can make it automatic. (P. 141-143).

### Aggravating and/or Mitigating Factors

On June 21, 2019 [REDACTED], requested of Dr Li access to his laptop and other hard drives or servers where the program codes relevant to the allegation may be found (Att. 16). On June 27, 2019 Dr. Li handed over a MacBook PRO serial number C02V20C9J93D to ICT Information Security (ICT IS). A report by ICT IS dated July 8, 2019 (Att. 9) found that the

machine contained very little data and appeared to have been reformatted just days earlier. This laptop serial number is not registered as a USC Asset. As the folder copied to the laptop contained last modified times pointing back to June 24, 2019 there was no way for ITC IS to gain visibility into the original creation time because the items had been tampered with since the copy was made from another media source to this laptop. Thus, the information contained on this laptop was useless to the investigation at hand.

On July 2, 2019, Dr. Grace sent a follow-up e-mail to Dr. Li (Att. 17) requesting that he turn in his University Laptop for copying. On July 10, 2019 Dr Li dropped off a MacBook Pro, serial Number C02XE11GTF1 and a Western Digital Elements External Hard Drive, Serial Number WXS1EC7EKWMF to ICT IS. A report by ICT IS dated July 29, 2019 finds a similar scenario to the first, where recent imaging also had taken place, making any data found on the computer impossible to verify (Att. 10).

USC Policy states that the subject of an allegation has the duty to furnish data, records and other documents as requested by the university so that a thorough review can be completed. The destruction, absence of, or any failure to provide research records adequately documenting the questioned research at any point in the process is evidence of research misconduct where it is established by a preponderance of the evidence that the subject of an allegation intentionally, knowingly, or recklessly had research records and destroyed them, had the opportunity to maintain the records but did not do so, or maintained the records and failed to produce them in a timely manner.

#### **Investigation Committee Findings**

The Committee finds that Dr. Hao Li, Associate Professor, Viterbi School of Engineering, USC, falsely presented his research in an abstract submitted to, and in a presentation at, SIGGRAPH Real-Time-Live 2017. Specifically, Dr. Li:

- Knowingly and intentionally submitted an abstract falsely claiming that he and his colleagues had developed software to automatically generate an avatar from a head shot in seconds and that it would be demonstrating such software at the SIGGRAPH Real-Time-Live show on August 1, 2017.
- Knowingly and intentionally presented a falsified demonstration of his software at the SIGGRAPH Real-Time-Live show on August 1, 2017 with the intention to mislead the audience into believing that they were viewing a real-time demonstration of the automatic avatar-generating software that he and his team claimed to have developed, when in fact, Dr. Li and his team presented pre-programmed, manually produced avatar generation.

#### **Investigation Committee Recommendations**

The Investigation Committee declines to recommend professional sanctions, as they will leave this to the appropriate sanctioning committee's discretion. REDACTED



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In addition, it is recommended that USC forward a copy of any final findings to SIGGRAPH. Final findings will be communicated to all relevant federal agencies.

**Summary**

The Investigation Committee recommends findings of Research Misconduct regarding the two allegations it has investigated. The Committee has reviewed the responses of Dr. Li to the draft investigation report (Att. 18) and holds to its findings. See the addendum to this report for the Committee's rebuttal to Dr. Li's responses.

1 FERNALD LAW GROUP APC  
2 Brandon C. Fernald (Bar No. 222429)  
3 Adam P. Zaffos (Bar No. 217669)  
4 Address: 510 W 6th Street, Suite 700  
5 Los Angeles, California 90014  
6 Telephone: (323) 410-0300  
7 Facsimile: (323) 410-0330  
8 E-Mail: brandon@fernaldlawgroup.com  
9 adam@fernaldlawgroup.com

10 Attorneys for Plaintiff  
11 DR. IMAN SADEGHI

**CONFORMED COPY  
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Superior Court of California  
County of Los Angeles**

**OCT 05 2018**

**Sherri R. Carter, Executive Officer/Clerk of Court  
By: Marlon Gomez, Deputy**

12 **SUPERIOR COURT OF THE STATE OF CALIFORNIA**  
13 **COUNTY OF LOS ANGELES—CENTRAL DISTRICT**

14 DR. IMAN SADEGHI, an individual,

15 Plaintiff,

16 v.

17 PINSSCREEN, INC., a Delaware Corporation;  
18 DR. HAO LI, an individual;  
19 YEN-CHUN CHEN, an individual;  
20 LIWEN HU, an individual;  
21 HAN-WEI KUNG, an individual;  
22 and DOES 1-100,

23 Defendants.

Case No.: BC709376

**VERIFIED AMENDED COMPLAINT FOR  
DAMAGES AND INJUNCTIVE RELIEF:**

1. **Fraudulent Inducement of Employment Contract by Intentional Misrepresentation**
2. **Fraudulent Inducement of Employment Contract by Intentional Concealment**
3. **Battery**
4. **Violation of Cal. Labor Code § 1102.5 - Retaliation Against Whistleblowing**
5. **Breach of Employment Contract**
6. **Breach of Implied Contract for Research Integrity**
7. **Wrongful Termination in Violation of Public Policy**
8. **Intentional Interference with Contract**
9. **Intentional Infliction of Emotional Distress**
10. **Negligent Hiring, Supervision or Retention**
11. **Violation of Cal. Labor Code § 2802**
12. **Violation of Cal. Labor Code § 203**
13. **Breach of Constructive Bailment**
14. **Invasion of Privacy**
15. **Violation of Cal. Unfair Competition Law (UCL), Bus. & Prof. Code § 17200 et seq.**

**DEMAND FOR JURY TRIAL**



1 Plaintiff Dr. Iman Sadeghi (“Sadeghi”) alleges the following against defendants Pinscreen,  
2 Inc. (“Pinscreen”), Dr. Hao Li (“Li”), Yen-Chun Chen, Liwen Hu (“Hu”), Han-Wei Kung  
3 (“Kung”), and Does 1-100 (collectively “defendants”).

#### 4 CASE SUMMARY

5 1. Sadeghi holds a doctorate in Computer Science/Computer Graphics from the  
6 University of California, San Diego (“UCSD”). He developed, published, and patented a novel  
7 digital hair appearance framework for Walt Disney Animation Studios’ movie *Tangled* and has  
8 presented his work in prestigious scientific forums. After having worked at Google as a Software  
9 Engineer for more than five years, Sadeghi was solicited by Pinscreen to join the company’s  
10 leadership.

11 2. Pinscreen is a software start-up specializing in automatically generating animated  
12 3D face models, called *avatars*, using only a photograph of a person. Li, an assistant professor at  
13 University of Southern California (“USC”), is one of the co-founders and the Chief Executive  
14 Officer (“CEO”) of Pinscreen.

15 3. Defrauding Sadeghi, Pinscreen, through Li, knowingly misrepresented Pinscreen’s  
16 avatar generation capabilities to Sadeghi and concealed its various illegal practices from him.  
17 Pinscreen’s and Li’s unlawful conduct involved a variety of fraudulent activities including  
18 misrepresenting manually prepared avatars as automatic, which is at the heart of Pinscreen’s  
19 technical claims.

20 4. In reliance on Li’s fraudulent misrepresentations to him, Sadeghi resigned from  
21 Google and joined Pinscreen as its VP of Engineering. While working to improve the quality of  
22 Pinscreen’s infrastructure and avatars, Sadeghi gradually discovered Li’s and Pinscreen’s various  
23 illegal practices, including deliberately misreporting purportedly scientific experiments or their  
24 results (data fabrication), academic misconduct, fraud on investors, labor law violations, and  
25 immigration law violations.

26 5. When confronted by Sadeghi regarding the data fabrication and academic  
27 misconduct, Li asserted that Pinscreen would achieve its inflated claims in time for subsequent  
28 publications, which Li considered to be crucial for Pinscreen’s industry exposure and success. Li

1 promised Sadeghi that Pinscreen would never fabricate its results in public representations.

2 6. Li broke this promise on August 1, 2017, when Pinscreen and Li publicly  
3 misrepresented fabricated avatars on the stage of ACM’s SIGGRAPH 2017 Real-Time Live  
4 (“RTL”) to an audience of thousands.

5 7. In retaliation for Sadeghi’s objections and whistleblowing regarding Li’s data  
6 fabrication, academic misconduct, fraud on investors, labor law violations, immigration law  
7 violations, and other unlawful practices, Pinscreen illegally terminated Sadeghi, on August 7,  
8 2017, within Sadeghi’s first working hour after Pinscreen’s fabricated demo at RTL.

9 8. On the day of the wrongful termination, various defendants committed multiple  
10 other torts against Sadeghi, including assault and battery and invasion of privacy. As a result of  
11 the battery, Sadeghi has suffered severe physical, mental, and emotional distress as well as  
12 physical injuries requiring medical attention, physical therapy, and psychotherapy.

13 9. Following the wrongful termination, Pinscreen committed additional breaches of  
14 contract and engaged in other unlawful conduct, such as withholding business expense  
15 reimbursements, withholding the check for penalties for late wage payments, and damaging  
16 Sadeghi’s personal property.

17 10. Sadeghi brings this action to vindicate his legal rights, and more importantly, to  
18 benefit the public; to preserve the integrity of scientific research; to safeguard Computer Science,  
19 Computer Graphics, ACM and SIGGRAPH communities; and to protect Pinscreen’s employees  
20 and investors, while preventing Li, Pinscreen, and other defendants from engaging in further  
21 unlawful practices.

22 **THE PARTIES**

23 11. Sadeghi is an individual who, at all times relevant to the verified amended  
24 complaint, resided in Marina del Rey, in the County of Los Angeles, in the State of California.  
25 Sadeghi was employed by Pinscreen in the County of Los Angeles, in the State of California from  
26 February 2, 2017 to August 7, 2017.

27 12. On information and belief, Pinscreen is, and at all times mentioned was, a  
28 Delaware corporation with its principal place of business in the County of Los Angeles in the

1 State of California.

2 13. On information and belief, Li is, and at all times mentioned was, an individual  
3 residing in the County of Los Angeles in the State of California and was and is the Chief  
4 Executive Officer (“CEO”), co-founder, and a board member of Pinscreen.

5 14. On information and belief, Yen-Chun Chen, also known as Frances Chen is, and at  
6 all times mentioned was, an individual residing in the County of Los Angeles in the State of  
7 California and was and is the Chief Financial Officer (“CFO”), co-founder, and a board member  
8 of Pinscreen.

9 15. On information and belief, Li and Yen-Chun Chen are married.

10 16. On information and belief, Hu was and is a full-time student at USC and was  
11 employed at Pinscreen as an intern during the summer of 2017.

12 17. On information and belief, Kung was and is a full-time student at University of  
13 California, Santa Barbara (“UCSB”) and was employed at Pinscreen as an intern during the  
14 summer of 2017.

15 18. Pinscreen’s other employees and affiliates relevant to this complaint include  
16 Stanley Kim (“Kim”), a co-founder and a board member of Pinscreen; Jens Fursund (“Fursund”),  
17 Pinscreen’s Chief Technical Officer (“CTO”); Dr. Jaewoo Seo (“Seo”); Dr. Koki Nagano  
18 (“Nagano”); Dr. Lingyu Wei (“Wei”), also known as Cosimo Wei; Shunsuke Saito (“Saito”);  
19 Carrie Sun (“Sun”); Stephen Chen; Ronald Yu (“Yu”); Sitao Xiang (“Xiang”); Yi Zhou (“Zhou”);  
20 Dr. Jun Xing (“Xing”); Kyle Morgenroth (“Morgenroth”); and Bilal Zuberi (“Zuberi”),  
21 Pinscreen’s partner at Lux Capital investment firm.

22 19. On information and belief, Does 1-100 participated in the wrongful acts alleged, are  
23 liable for those acts, and knew and participated in one or more of the specific acts committed by  
24 the defendants.

25 20. On information and belief, in doing the acts alleged, each of the defendants were  
26 the agent, principal, employee, or alter ego of one or more of the other defendants and acted with  
27 the other defendants’ knowledge, consent, and approval. Each of the defendants is responsible for  
28 the liabilities of the other defendants.

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**JURISDICTION AND VENUE**

21. This Court has jurisdiction over the subject matter because, on information and belief, each defendant is either a resident of California, has sufficient minimum contacts in California, or otherwise intentionally avails themselves of the California market. The nature of the claim as well as the amount in controversy, as delineated within this verified complaint, meet the requirements for the unlimited jurisdiction of this Court.

22. Venue is proper in this Court because Pinscreen resides, transacts business, and has offices in the County of Los Angeles, and most of the unlawful practices that caused Sadeghi’s damages as alleged herein occurred in the County of Los Angeles.

**FACTS RELATED TO CAUSES OF ACTION**

**Sadeghi’s Qualifications**

23. Sadeghi earned his B.Sc. degree in Computer Engineering in 2006 and graduated first in class from Sharif University of Technology. Shortly after, Sadeghi started graduate school at the University of California, San Diego (“UCSD”) in the field of Computer Science.

24. In 2007, Sadeghi was awarded the Grand Prize in UCSD’s Rendering Competition. Rendering is the process of automatically generating the appearance of digital objects using computers. In 2008, Sadeghi collaborated with Walt Disney Animation Studios (“Disney”) on hair rendering (i.e. digital hair appearance) and received his M.Sc. degree in Computer Science/Computer Graphics on the topic. (Exhibits A1, A2)

25. Sadeghi worked at Disney during 2008 and 2009 and developed a novel hair rendering framework for the production of the movie *Tangled*. In 2010, Sadeghi presented the framework at the Association for Computing Machinery’s SIGGRAPH conference. The Association for Computing Machinery (“ACM”), is the world’s largest scientific and computing society and the organizer of annual conference SIGGRAPH, widely recognized by experts as the most reputable conference in the field of Computer Graphics. Sadeghi is also a co-inventor of the patent on the framework filed by Disney. The following figure features some of the results of the hair rendering framework: (Exhibits A2, A3, A4)



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6 26. Li later introduced Sadeghi as “the guy behind all the hair rendering tech for  
7 Disney and DreamWorks” and, on information and belief, referred to Sadeghi as “the best hair  
8 rendering guy.” (Exhibits A5, A6)

9 27. [April 18, 2017] Li: “Please meet Iman [Sadeghi], the guy behind all the hair  
10 rendering tech for Disney and DreamWorks (incl. Tangled)”

11 28. [June 1, 2017] Li: “We have the best hair rendering guy”

12 **Hao Li**



13 hey leszek

14 please meet iman, the guy behind all the hair rendering tech for disney and  
15 dreamworks (incl. tangled)

16 [...]

17 we have the best hair rendering guy

18 29. In 2010, Sadeghi worked at Industrial Light & Magic (“ILM”) and became  
19 acquainted with Li. On information and belief, Li was attending graduate school also in the field  
20 of Computer Graphics. During the same year, Li requested that Sadeghi connect with him on  
21 Facebook and LinkedIn. Sadeghi and Li stayed in touch over the years and referred to each other  
22 as good friends. (Exhibits A7, A8)

23 30. On June 11, 2011, Sadeghi was ceremonially honored when he received his Ph.D.  
24 from UCSD in Computer Science/Computer Graphics. Later, Sadeghi presented his scientific  
25 research from his Ph.D. dissertation, in the field of rendering and appearance modeling, at  
26 SIGGRAPH 2012 and SIGGRAPH 2013. (Exhibits A9, A10, A11)

27 31. Sadeghi joined Google as a Software Engineer on August 15, 2011 and gained  
28 experience with Robust Software System Architectures, Reliable Scalable Distributed Systems,

1 and Deep Convolutional Neural Networks. Among other achievements, Sadeghi is also a co-  
2 inventor of five patents filed by Google.

3 32. On information and belief, Li received his M.Sc. from Universität Karlsruhe in  
4 2006, received his Ph.D. from Eidgenössische Technische Hochschule Zürich (“ETH Zurich”) in  
5 2010, became an assistant professor at University of Southern California (“USC”) in 2013, co-  
6 founded Pinscreen in 2015, and solicited Sadeghi to join Pinscreen’s leadership in 2016.

7 33. Li praised Sadeghi and told him, “I do believe that you will bring a lot to the  
8 company,” “I think if you join us, you would bring a lot of energy with you,” and that “you bring  
9 in exceptional potential, knowledge and leadership.” Li told Sadeghi that he thinks Zuberi “likes  
10 you a lot;” Fursund “thinks u [sic] are awesome;” and Kim and Zuberi “really like you and we  
11 really want you to join us.” Li also stated that “we have been really impressed by you and are very  
12 thrilled with the possibility of having you,” as well as “we love to work with you if there is a  
13 chance.” (Exhibits B6, B8, B9, B14, B15, B16)

14 34. Even on the last day of Sadeghi’s employment at Pinscreen, on August 7, 2017, Li  
15 praised Sadeghi and told him:

16 35. [August 7, 2017] Li: “You bring a lot of positive energy and did a lot of things that  
17 brought us so far.”

18 36. [August 7, 2017] Li: “As a person I really think you bring the most to this  
19 company.”

20 37. [August 7, 2017] Li: “I think you have charisma, you bring a lot of people to work  
21 together, you motivate people. People like you as a person.”

22 **Li’s and Pinscreen’s Solicitation of Sadeghi**

23 38. In early October of 2016, during a scientific conference in Amsterdam,  
24 Netherlands, Li, the CEO and co-founder of Pinscreen, and Fursund, the CTO of Pinscreen,  
25 approached Sadeghi and invited him to join the company, which Li followed up through Facebook  
26 messages, in November of 2016. Pinscreen’s solicitation of Sadeghi included dining with Kim in  
27 Seattle, dining with Li in Santa Monica, a remote video conference call with Fursund who was in  
28 Denmark, as well as a phone conversation with Zuberi. Li’s continual attempts to persuade

1 Sadeghi to join Pinscreen lasted until late January of 2017. (Exhibits B1, B2, B3, B4, B7, B12,  
2 B13, B17)

3 39. [November 8, 2016] Li: "Join us!"

4 40. [December 1, 2016] Li: "We all want you to join, we are working out [sic] on a  
5 good offer"

6 41. [December 26, 2016] Li: "However, I think if you join us, you would bring a lot of  
7 energy with you"

8 42. [December 26, 2016] Li: "I think we can increase a bit"

9 43. [December 26, 2016] Li: "How can I hire you?"

10 44. [December 26, 2016] Li: "Tell me a number"

11 45. [December 26, 2016] Li: "But we would love to work with you if there is a chance"

12 46. [January 19, 2017] Li: "☹️"

13 47. [January 19, 2017] Li: "Please sleep over it"

14



**Hao Li**  
ahahaha  
join us!

Nov 8, 2016 · Sent from Web

15

16

17



[...]  
we all want you to join, we are working out on a good offer  
[...]

18



**Hao Li**  
however, I think if you join us, you would bring a lot of energy with you  
I think we can increase a bit

19

20



**Hao Li**  
How can i hire you?

21

22



tell me a number

23

24



[...]  
But we would love to work with you if there is a chance.  
[...]

25

26



**Hao Li**  
☹️  
please sleep over it

27

28

Jan 19, 2017 · Sent from Web



1           48.     Li offered Sadeghi the “leadership role” of “VP of Engineering” and described it as  
2 “potentially having a more important role than CTO.” Li told Sadeghi that his responsibilities  
3 would be to “make sure other people work,” “coordinate teams and also ensure efficient  
4 deliverables,” and to “oversee the technology development of everyone and push it to the next  
5 level.” (Exhibits B18, B19)

6           49.     In response to Sadeghi’s concern for potential risks, Li stated “I don’t think there  
7 are any risks” for Sadeghi in joining Pinscreen, and that “I’m quite sure the reward is bigger than  
8 what [sic] the other companies, not only in terms of impact but also financially.” (Exhibits B10,  
9 B12)

10          50.     After claiming that “for startup at our stage the biggest benefit is in stock options,”  
11 Li offered Sadeghi \$165,000 in salary and 2.3% of Pinscreen’s shares. Sadeghi’s employment  
12 contract stated that Pinscreen shall provide Sadeghi equity awards equal to 2.3% ownership of  
13 Pinscreen over a four-year vesting period, plus additional stock options to “counteract the dilutive  
14 effect” of company’s Series A round of financing on Sadeghi. (Exhibits B5, B11, B20, G)

15          51.     [December 26, 2017] Li: “❤️”

16          52.     [December 26, 2017] Li: “I can discuss again with the board, but I would like to  
17 offer you for the polar bear heart: 165K + 2.3%”



18           **Hao Li**  
19           OMG



20           do you think you will be able to join us in january already?  
21           we are aiming for a beta launch in late january

22           Dec 26, 2016 · Sent from Web



23           **Iman Sadeghi**

24           Hmmm ... The yearly Google bonus is out Jan 20th.

25           Dec 26, 2016 ·



26           **Hao Li**

27           so u could start in feb?

28           Dec 26, 2016 · Sent from Web

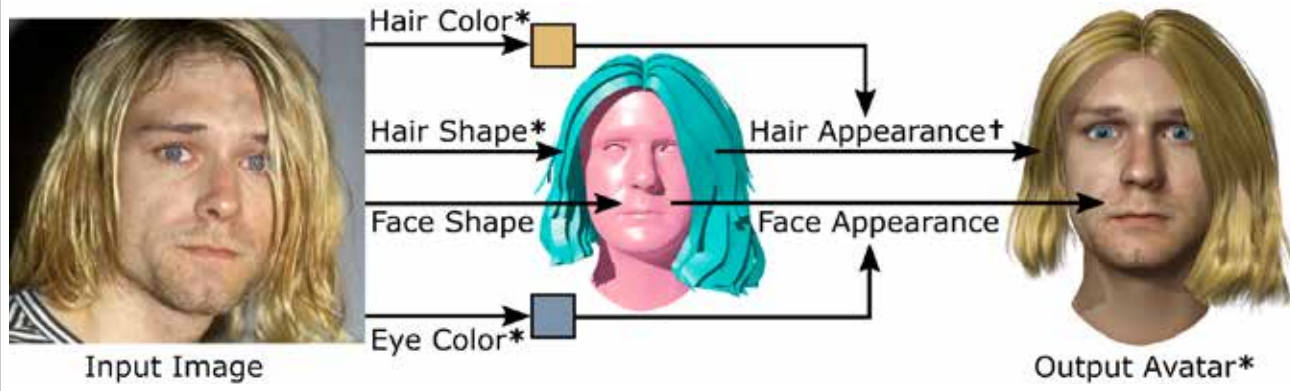


**Hao Li**

          that will be still before we launch a PR thing

          I can discuss again with the board, but I would like to offer you for the polar bear heart:  
          165K + 2.3%





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57. Relevant components of Pinscreen’s technology include the following:

58. **Input Image:** Digital photograph of a person used to generate the output avatar.

59. **Hair Shape\*** or **Hair Reconstruction\***, **Hair Fitting\***: The process of automatically estimating the shape of the hair (turquoise area) from the input image. This process has been fabricated by Pinscreen multiple times.

60. **Face Shape** or **Face Reconstruction, Face Fitting:** The process of automatically estimating the shape of the face (coral area) from the input image.

61. **Hair Color\*:** The process of automatically estimating the hair color from the input image. This process has been fabricated by Pinscreen.

62. **Eye Color\*:** The process of automatically estimating the eye color from the input image. This process has been fabricated by Pinscreen.

63. **Hair Appearance†** or **Hair Rendering†, Hair Shading†:** The process of automatically generating the hair appearance from the estimated hair shape (turquoise area) and hair color. As an expert in hair rendering, Sadeghi significantly improved the quality of Pinscreen’s digital hair appearance.

64. **Face Appearance:** The process of automatically generating the appearance of the face from the estimated face shape (coral area) and eye color.

65. Relevant terminology to this complaint includes the following:

66. **Speed of Avatar Generation:** The time it takes to generate an avatar in real-time.

67. **Pre-Cached** or **Pre-Built Avatar:** Avatar that has been previously generated.

68. **Brand-New Avatar:** Avatar generated from a brand-new input image, e.g. an

1 image from the webcam, which cannot be pre-cached and has to be generated in real-time.

2 69. **Fabricated Avatar:** Pinscreen’s avatar fabrication included:

- 3 • A manually prepared avatar misrepresented as automatic.
- 4 • A pre-cached avatar misrepresented as brand-new and/or in real-time.

5 **Li’s and Pinscreen’s Fraud and Deceit of Sadeghi**

6 70. Li deceived Sadeghi by intentionally misrepresenting Pinscreen’s technical  
7 capabilities to Sadeghi and intentionally concealing its numerous illegal practices from him.

8 71. On information and belief, Li persuaded Sadeghi to join Pinscreen in order to gain  
9 access to Sadeghi’s expertise and experience in digital hair appearance and software engineering.

10 72. On January 22, 2017, before Sadeghi had signed the contract to join Pinscreen, Li  
11 sent him, through Facebook messages, two examples of purportedly automatically generated  
12 avatars. Sadeghi specifically inquired of Li as to whether the hair of the presented avatars had  
13 been automatically generated (“autogenerated”), to which Li responded “yes.” (Exhibit C1)

14 73. [January 22, 2017] Sadeghi: “Autogenerated hair?”

15 74. [January 22, 2017] Li: “Yes”



16 **Iman Sadeghi**

Omg! So good! This is well done!

17 Pre defined models for eyes and teeth? Autogenerated hair?

18 Jan 22, 2017 ·



19 **Hao Li**

20 yes

21 75. Li’s claim that the presented avatars and their hair were automatically generated  
22 was a brazen lie. Even up to six months after Li’s initial presentations to Sadeghi, Li and  
23 Pinscreen repeatedly fabricated avatars in various representations, including by misrepresenting  
24 manually prepared hair shapes as automatically generated.

25 76. For instance, Pinscreen misrepresented manually prepared hair shapes as  
26 automatically generated in its SIGGRAPH RTL submission on April 4, 2017; SIGGRAPH Asia  
27 Technical Papers submission on May 23, 2017; SIGGRAPH RTL public demo on August 1, 2017;  
28 as well as business representations to investors including, on information and belief, Softbank.

1 77. Prior to Sadeghi’s signing the contract with Pinscreen, Li had further  
2 misrepresented Pinscreen’s technical capabilities. For example, on December 26, 2016, Li claimed  
3 that Pinscreen has built “a technology that is state of the art,” and on January 19, 2017, that  
4 Pinscreen has “high quality hair.” (Exhibits C2, C3)

5 78. Shortly after Sadeghi joined the company, Li contradicted his prior claims on  
6 multiple occasions. For instance, on March 1, 2017, Li evaluated various components of  
7 Pinscreen’s technology, including the hair component as “shit” or “complete crap,” and on March  
8 13, 2017, Li stated that, the “avatar hair reconstruction is shit.” In practice, the quality of  
9 Pinscreen’s hair reconstruction (i.e. hair shape estimation) was poor enough that Pinscreen  
10 repeatedly resorted to fabricating it. Additionally, Pinscreen’s hair rendering (i.e. hair appearance),  
11 before Sadeghi’s contributions, was far from “high quality,” as confirmed by SIGGRAPH  
12 conference reviewers, and was referred to as “primitive” in Pinscreen’s own statement. (Exhibits  
13 C4, C5, D1, D2, D3)

14 79. Li also deceived Sadeghi by intentionally concealing that Li and Pinscreen were  
15 involved in data fabrication, academic misconduct, labor law violations, immigration law  
16 violations, and unlawful practices that Sadeghi learned about only after resigning from Google and  
17 joining Pinscreen.

18 80. On January 23, 2017, after reasonably relying on Li’s representations, and after  
19 months of negotiation, Sadeghi accepted an offer from Pinscreen and signed the contract to join  
20 the company as its VP of Engineering. Sadeghi sent out his resignation letter to Google, on  
21 January 25, 2017, and a sentimental farewell letter to his colleagues at Google, on January 26,  
22 2017, and stated that his last day at Google would be on February 1, 2017. Sadeghi began working  
23 for Pinscreen the next day on February 2, 2017, per Li’s request to have Sadeghi on board for a  
24 Public Relations (“PR”) event. (Exhibits B11, G)

25 81. Sadeghi would not have resigned from Google to join Pinscreen if Li had not  
26 misrepresented and concealed Pinscreen’s data fabrication and academic misconduct from  
27 Sadeghi.

28 82. Sadeghi would not have resigned from Google to join Pinscreen if Li had not

1 concealed Pinscreen’s labor law violations and immigration law violations from Sadeghi.

2 83. Sadeghi was damaged by being fraudulently induced to give up his employment at  
3 Google which income and benefits were unsubstituted once Sadeghi was retaliated against and  
4 wrongfully terminated from Pinscreen.

5 84. Sadeghi’s reliance on Li’s representation was a substantial factor in causing him  
6 damage.

7 85. A strong justification for Sadeghi’s reasonable reliance on Li’s misrepresentations  
8 was that Li, on information and belief, was and is an assistant professor at USC. Li’s claims to  
9 have automated that which he had merely fabricated means that Li has committed academic  
10 misconduct which, if discovered, could be subject to draconian punishment.

### 11 **Sadeghi’s Contributions**

#### 12 **Hair Appearance**

13 86. During his employment at Pinscreen, Sadeghi significantly improved the quality of  
14 Pinscreen’s avatars and digital hair appearance (i.e. hair rendering, or hair shading) from “below  
15 the SIGGRAPH standard” to well above.

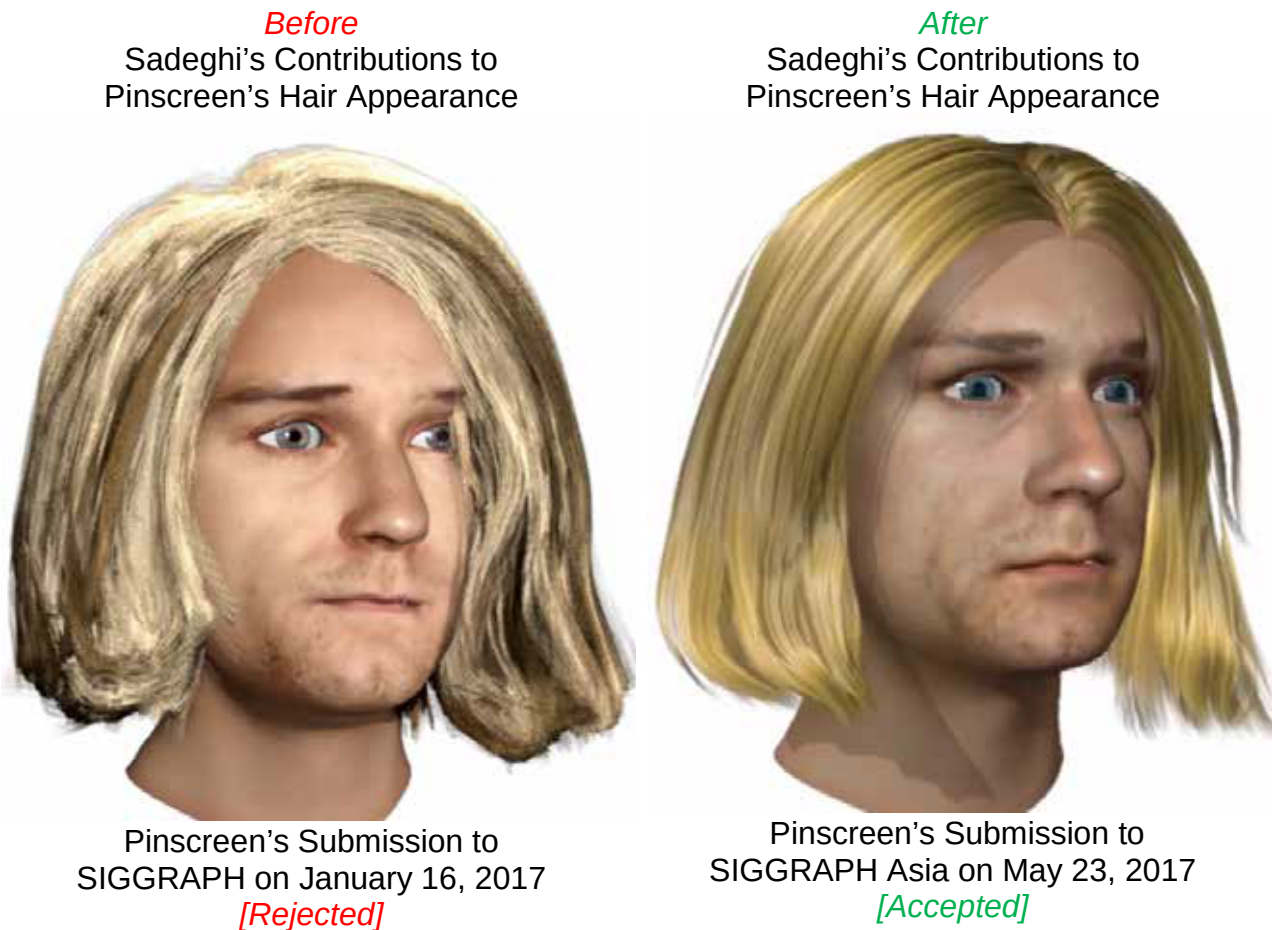
16 87. Pinscreen’s submission to SIGGRAPH Technical Papers, on January 16, 2017,  
17 prior to Sadeghi’s employment, was rejected. One of the reasons for the rejection, given by the  
18 conference reviewers, was the poor quality of Pinscreen’s avatars. One of the conference  
19 reviewers stated that the quality of Pinscreen avatars were “below the SIGGRAPH standard,” that  
20 “a lot of disturbing artifacts (e.g. in regions around the silhouette) can be observed in almost all  
21 hair models” and that they “seriously doubt if the quality is good enough for games or VR [Virtual  
22 Reality] applications.” (Exhibit D1)

23 88. For the SIGGRAPH Asia Technical Papers submission, on May 23, 2017, Sadeghi  
24 implemented a variation of his published hair appearance framework which significantly improved  
25 the quality of Pinscreen’s avatars. This submission was consequently accepted. The quality  
26 improvement in the submission was so significant that the conference reviewers asked Pinscreen  
27 for an explanation on “why the quality is so improved comparing [*sic*] with previous submission”?  
28 Pinscreen’s official response stated that “in this submission, hair shading has been significantly



1 improved using a variant of Sadeghi 2010 (used in Disney’s Tangled) and [...]” (Exhibit D2)

2 89. The following diagram compares the quality of Pinscreen’s avatars before and after  
3 Sadeghi’s contributions to Pinscreen’s digital hair appearance: (Exhibit D3)



20 **Hair Shape**

21 90. Sadeghi also innovated an approach to use Deep Convolutional Neural Networks  
22 and Artificial Intelligence (“AI”) to obtain *Semantic Constraints* for the hair (e.g. hair length, hair  
23 curliness, etc.) from the input image in order to enhance the accuracy of the automatically  
24 estimated hair shapes. (Exhibit D4)

25 91. In preparation for Pinscreen’s SIGGRAPH Asia 2017 publication, on April 18,  
26 2017, Saito, who later became a first author of the publication, told Li, through Skype messages,  
27 that Sadeghi’s approach for “Semantic Constraints could add biggest contribution” to the  
28 publication. Li also considered Sadeghi’s approach to be a competitive edge and stated “we need



1 to make sure that people cannot easily implement it.” (Exhibit D5)

2 **Infrastructure**

3 92. Sadeghi improved Pinscreen’s core infrastructure through his contributions to its  
4 System Architecture, Software Code Health, Software Codebase Structure, System Security, User  
5 Interface/User Experience, and Mobile Apps Framework. (Exhibits D6, D7, D8, D9, D10, D11)

6 93. Sadeghi created the most comprehensive product description and roadmap for, on  
7 information and belief, Pinscreen’s main product at the time, *Pinmojis*. Pinmoji, which stands for  
8 Pinscreen *Emoji*, is a term Sadeghi coined and popularized within the company. (Exhibit D12)

9 **Leadership**

10 94. Sadeghi supervised individual employees, coordinated multiple teams, and planned  
11 product launches and deliverables for Pinscreen. Sadeghi’s direct reports included Pinscreen’s  
12 CTO, Fursund. (Exhibits D13, D14, D15, D16)

13 95. During Sadeghi’s meeting with Li, on March 9, 2017, Li stated that Sadeghi was  
14 “one of the most important hires for Pinscreen,” that Sadeghi “brought structure and energy to the  
15 team” and that Li “couldn’t be happier” with Sadeghi’s employment.

16 96. Additionally, Sadeghi provided assistance and guidance to other Pinscreen  
17 employees. For example, the day before his personal anniversary vacation, Sadeghi worked an 18-  
18 hour shift, alongside Nagano, to investigate an issue with computation of lights described by  
19 *Spherical Harmonics* (“SH”). In order to make sure that the issue was resolved, Sadeghi worked  
20 overnight until after sunrise the next morning, on July 14, 2017, which enabled Pinscreen to  
21 demonstrate dynamic lighting during its SIGGRAPH 2017 RTL demo. (Exhibit D17)

22 **Li’s and Pinscreen’s Data Fabrication and Academic Misconduct**

23 97. After joining Pinscreen, Sadeghi gradually realized that Li, although an assistant  
24 professor, disrespected academics and was involved in data fabrication and various academic  
25 misconduct. (Exhibit E1)

26 98. [February 4, 2017] Li: “Just a bunch of academic losers [sic] 😊”



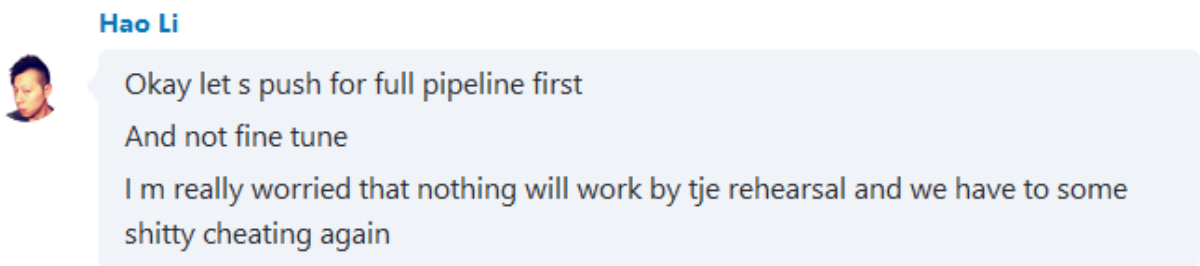
**Hao Li**

28 just a bunch of academic losers 😊

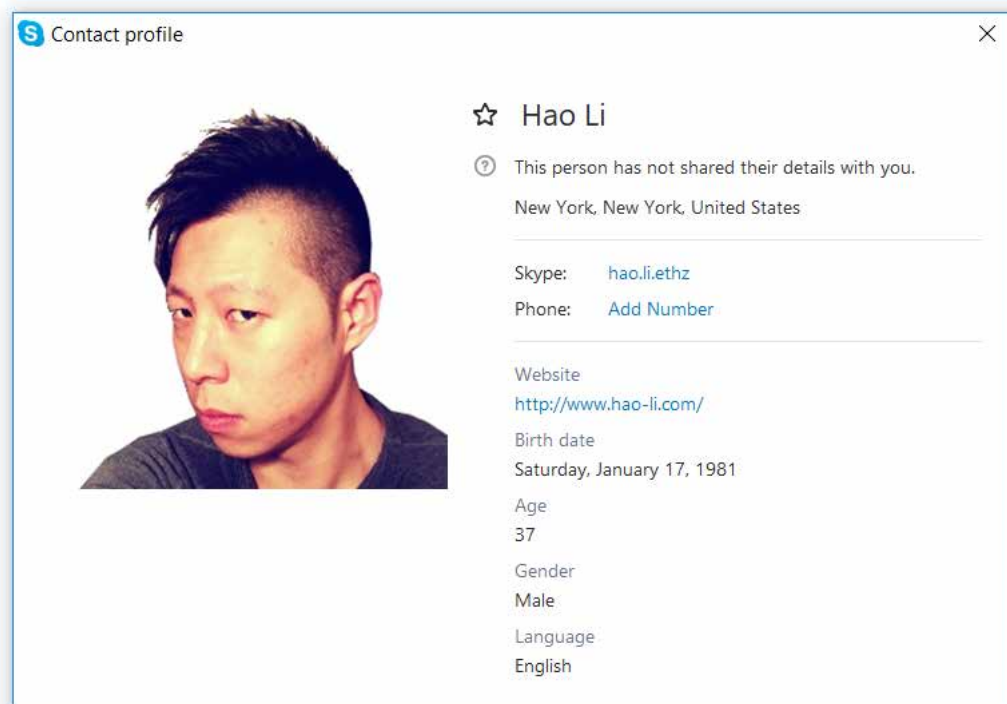
1  
2 99. Li would embellish Pinscreen’s technical capabilities in scientific research  
3 submissions and then use deadline pressure to overwork the employees to achieve his inflated  
4 claims, and if the employees eventually failed, he would order them to fake the deliverables.

5 100. Li discussed ways to “tweak data to get the results we want” and referred to data  
6 fabrication as “faking things,” “cheating,” “shitty cheating,” and “doing it manually.” Li mandated  
7 data fabrication by stating that he “doesn’t think we can make it automatic,” that “we probably  
8 have no choice but to cheat,” and that he thinks “it’s the only way.” (Exhibits E2, E3, E4, E5, E6,  
9 E7, E8)

10 101. [June 29, 2017] Li: “I’m really worried that nothing will work by tje [sic] rehearsal  
11 and we have to [sic] some shitty cheating again.”



17 102. Li’s Skype profile with Skype ID “hao.li.ethz”:



1           103. Li's data fabrication and academic misconduct was a deception of the public, fraud  
2 on company's actual and potential investors, violation of the universally accepted scientific code  
3 of conduct, and a betrayal to academics. On information and belief, these fabrications have  
4 resulted in scientific publications, technical demos and news articles, which have given Pinscreen  
5 an advantage in the competitive market by attracting millions of investor dollars to the company  
6 and away from its competitors. (Exhibit E9)

7           104. On information and belief, Pinscreen employees considered Li a role model when it  
8 came to conducting scientific research, including the ethics of it. These employees knew about and  
9 aided and abetted Li in misrepresenting Pinscreen's avatar generation results.

10           105. Under Li's leadership, Pinscreen intentionally misrepresented manually prepared  
11 data as automatically generated in various scientific and business presentations. This dishonest  
12 practice is universally recognized by academic ethics codes as data fabrication and data  
13 falsification, which are also universally condemned as academic misconduct. Data fabrication and  
14 data falsification are classified as "Research Misconduct," and instances of "Scientific  
15 Misconduct," by USC's official policy and are in violation of ACM's "Code of Ethics and  
16 Professional Conduct." (Exhibit E41)

17           106. Pinscreen misrepresented manually prepared data as automatically generated in its  
18 SIGGRAPH Real-Time Live ("RTL") submission on April 4, 2017.

19           107. Pinscreen misrepresented manually prepared data as automatically generated in its  
20 SIGGRAPH Asia Technical Papers submission on May 23, 2017.

21           108. Pinscreen misrepresented manually prepared data as automatically generated in its  
22 SIGGRAPH RTL public demo on August 1, 2017.

23           109. Pinscreen misrepresented pre-cached avatars as real-time and brand-new from the  
24 webcam in its SIGGRAPH RTL public demo on August 1, 2017.

25           110. Pinscreen misrepresented the speed of its avatar generation of around a minute and  
26 half as around 5 seconds in its SIGGRAPH RTL public demo on August 1, 2017.

27           111. Pinscreen misrepresented manually prepared data as automatically generated in its  
28 representations to the investment firm Softbank.

1 **SIGGRAPH 2017 Technical Papers Submission**

2 112. Shortly after joining Pinscreen, Sadeghi realized that under Li’s leadership,  
3 Pinscreen included fabricated and falsified results in their SIGGRAPH Technical Papers  
4 submission, submitted on January 16, 2017, prior to Sadeghi’s employment. In that scientific  
5 research submission, among other misrepresentations, Pinscreen had misrepresented manually  
6 prepared hair shapes as automatically generated. This submission was eventually rejected and later  
7 re-submitted to SIGGRAPH Asia 2017 Technical Papers.

8 113. When Sadeghi questioned Li about these misrepresentations, for instance on March  
9 9, 2017, Li claimed that they were “not important” because the submissions were “not public.” Li  
10 stated that Pinscreen had been practicing the strategy of “Fake it ‘til you make it” and declared  
11 that “it has been working great.” Li claimed that should Pinscreen’s fabricated submissions be  
12 accepted, Pinscreen would have sufficient time to actually develop the claims before publication.  
13 Li claimed that it was crucial to the success of Pinscreen to get into these conferences for industry  
14 exposure. Li stated that scientific publications and technical presentations would result in media  
15 coverage by technology news outlets, such as TechCrunch, and will substantially “increase the  
16 valuation of the company.” Li later claimed similar statements, writing “TechCrunch coverage  
17 should be our target.” (Exhibit E10)

18 114. [May 22, 2017] Li: “TechCrunch coverage should be our target”



20 techcrunch coverage should be our target

21 **SIGGRAPH 2017 Real-Time Live Submission**

22 115. In preparation for SIGGRAPH RTL submission, due on April 4, 2017, Li wrote on  
23 multiple team threads, on March 27, 2017, that “the issue is that we don’t have time,” and that  
24 “even if we fake things there is no time,” and that for the hair reconstruction (i.e. hair shape  
25 estimation) “we probably have no choice but to cheat.” (Exhibits E3, E7)

26 116. [March 27, 2017] Li: “Even if we fake things there is no time”

27 117. [March 27, 2017] Li: “The reconstruction part we probably have no choice but to  
28 cheat”

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Hao Li



but what i m saying is that we should colelc it, then we know something  
the issue is that we don't have time

[...]

if we don't parallelize it, there is no way we can make it  
even if we fake things there is no time

[...]

but we should try to have some hair if we want to try to aim for it  
the reconstruction part we probably have no choice but to cheat

118. Among other misrepresentations in the submission, on information and belief, Li commissioned a freelance artist, located in Germany, named Leszek, to manually prepare the hair shapes for all avatars presented in the submission. On March 30, 2017, Li stated that it would take “3 hours” for an artist to create a hair shape and the cost would be “100 Euros.” Pinscreen misrepresented these hair shapes as automatically generated, when in fact they were created through this lengthy and expensive manual process. (Exhibit E11)

**Fabricated Avatars  
with Manually Prepared Hair Shapes by Leszek  
Submitted by Pinscreen to SIGGRAPH RTL on April 4, 2017**

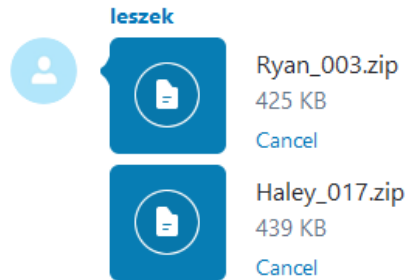


Ryan Gosling

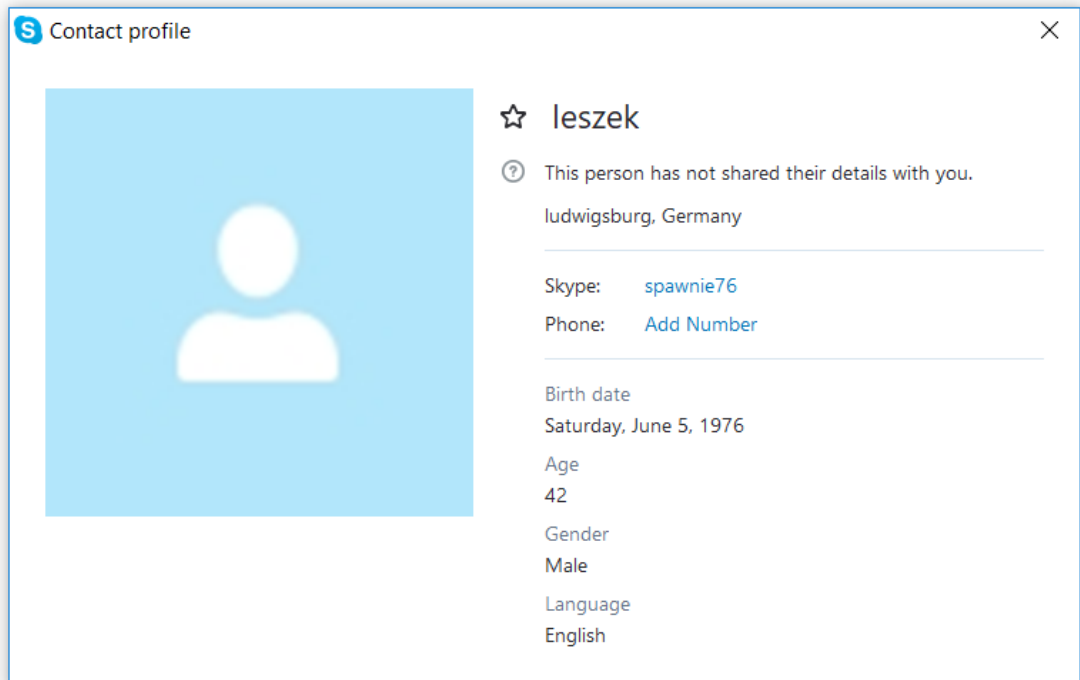


Haley Dunphy

1 119. On April 18, 2017, Leszek shared his manually prepared hair shapes for Ryan  
2 Gosling's and Hailey Dunphy's avatars with Sadeghi: (Exhibit E11)



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8 120. Leszek's Skype profile with Skype ID "spawnie76":



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21 121. Pinscreen's technology has been and still is, nearly a year and a half after the  
22 submission, incapable of automatically generating hair shapes with intricacies demonstrated in  
23 Leszek's hand-made hair shape for Hailey Dunphy's avatar. (Exhibit K2)





1 and misrepresented them in the submission as automatically generated.

2 129. Li stated, on April 18, 2017, “then I have an artist create 100 hairs ahahaha,” and  
3 on May 17, 2017, “basically, I need to create 3D hair models for 100 people or get 3D modelers to  
4 do it.” (Exhibits E14, E15)

5 130. [April 18, 2017] Li: “Then I have an artist create all 100 hairs”

6 131. [April 18, 2017] Li: “Ahahaha”

7 132. [May 17, 2017] Li: “So basically I need to create 3D hair models for 100 people”

8 133. [May 17, 2017] Li: “Or get 3D modelers to do it”

9 Hao Li



10 then we can aim for that too, so the others can focus on hair  
11 so maybe it woud be good to select 100 faces and we have similar hairstyles  
12 that correspond to our selection thing  
13 then i have an artist create all 100 hairs  
14 ahahaha

[...]



15 so basically i need to create 3D hair models for 100 people  
16 or get 3D modelers to do it

17  
18 134. Pinscreen also fabricated the process of estimating the eye color in the submission.  
19 On May 18, 2017, five days before the submission deadline, Li stated that Pinscreen’s eye color  
20 estimation was “total shit,” “completely random” and ordered Pinscreen employees to “manually  
21 fix all the eye colors” for the avatars. Pinscreen then fraudulently claimed in the publication that  
22 “several key components, such as [...] eye color recognition, are only possible due to recent  
23 advances in deep learning.” (Exhibits E6, E16, E17, E18, E19, E20)

24 135. [May 15, 2017] Li: “Our eyes are wrong”

25 136. [May 15, 2017] Li: “The colors”

26 137. [May 15, 2017] Li: “We need to use a Deep Neural Net for that”

27 138. [May 15, 2017] Li: “Or we just do it manually for SIGGRAPH Asia for now”

28 139. [May 15, 2017] Li: “Let s [sic] do it manually for now”

1 140. [May 15, 2017] Li: “I think it s [sic] the only way”

2 **Hao Li**



3 our eyes are wrong  
4 the colors  
5 we need to use a deep neural net for that

6 [...]



7 or we just do it manually for siggraph asia for now

8 [...]



9 let s do it manually for now  
10 i think it s the only way

10

11 141. [May 18, 2017] Li: “The eye color is total shit”

12 142. [May 18, 2017] Li: “It s [sic] completely random”

13 143. [May 18, 2017] Li: “I would say let s [sic] do them manually for now”

14 144. [May 18, 2017] Li: “Okay so I m [sic] generating all the avatars”

15 145. [May 18, 2017] Li: “We need someone to manually fix all the eye colors”

16

**Hao Li**



17 the eye color is total shit  
18 it s completely random

19 [...]



20 i would say medium priority  
21 i would say let s do them manually for now

22 [...]



23 okay so i m generating all the avatars  
24 we need someone to manually fix all the eye colors

24

25 146. In addition, Pinscreen fabricated the process of estimating the hair color in the  
26 submission. On May 18, 2017, five days before the submission deadline, Li stated, “we also have  
27 nothing that can guess hair color.” Subsequently, Pinscreen’s CTO, Fursund, was assigned the task  
28 to “manually pick up hair color” for the avatars. Pinscreen then fraudulently stated in the

1 submission that “the eye color texture is computed using a similar convolutional neural network  
2 [...] as the one used for hair color classification.” (Exhibits E18, E21, E22)

3 147. Pinscreen misrepresented other manually prepared data as automatically generated  
4 in its submission including, on information and belief, the “focal length” estimation, a sub  
5 component of face shape estimation, and “hair segmentation,” a sub component of hair shape  
6 estimation. (Exhibits E19, E21)

7 148. [May 19, 2017] Hu: “Anther [sic] thing missing is the hair segmentation”

8 149. [May 19, 2017] Hu: “Now the current automatic segmentation results are not  
9 always very good”

10 150. [May 19, 2017] Hu: “So I think we need [sic] manually refine them”

11 Liwen Hu



12 another thing missing is the hair segmentation

13 [...]



14 now the current automatic segmentation results are not always very good  
15 so i think we need manually refine them

16 151. On May 22, 2017, one day before the submission deadline, Li ordered the team, on  
17 “PinscreenTeamAll” Skype thread, including Saito, Nagano, Wei, Yen-Chun Chen, Hu, Fursund,  
18 Sun, Kung, Seo, Yu, Xiang, Stephen Chen, Zhou, and Sadeghi to fabricate the *Hair Polystrip*  
19 *Patch Optimization* process stating “we spent 1 day on it,” that is a lot, and that “if in an hour it’s  
20 not working, let’s do it manually and give up on it. I don’t think we can make it automatic.”  
21 (Exhibit E8)

22 152. [May 22, 2017] Saito: “Is the patch optimization working now?”

23 153. [May 22, 2017] Nagano: “There are several issues in error computation and we are  
24 testing a new approach”

25 154. [May 22, 2017] Yen-Chun Chen: “@Hao Li asking @Koki Nagano Liwen [Hu]  
26 does the thing work?”

27 155. [May 22, 2017] Hu: “There is another bug”

28 156. [May 22, 2017] Li: “>\_<”

- 1 157. [May 22, 2017] Li: “Will you guys have it in an hour?”
- 2 158. [May 22, 2017] Li: “We spent 1 day on it. that s a o;t [sic]”
- 3 159. [May 22, 2017] Li: “lot”
- 4 160. [May 22, 2017] Nagano: “The gamma or something is only off for dark values”
- 5 161. [May 22, 2017] Li: “What s [sic] the current ETA?”
- 6 162. [May 22, 2017] Li: “I need it to see if we shoudn’t [sic] do something else?”
- 7 163. [May 22, 2017] Li: “We are late by 6 hours”
- 8 164. [May 22, 2017] Li: “We almost don’t hzve [sic] time to produce results and write
- 9 the paper”
- 10 165. [May 22, 2017] Li: “If in an hour it s [sic] not working let s [sic] do it manually
- 11 166. [May 22, 2017] Li: “And give up on it”
- 12 167. [May 22, 2017] Li: “I don’t think we can make it automatic”



☆ PinscreenTeamAll

14 participants | <https://join.skype.com/L4luq1aWUhl2>



- 16 carrie sun Cosimo Wei Frances Chen Han-Wei Kung Hao Li
- 17 Jaewoo Seo Jens Fursund Koki Nagano Liwen Hu Ronald Yu
- 18 Shunsuke Saito Sitao Xiang Stephen Chen Yi Zhou

19 I was going to ask

20 if we have hairs we are god Monday, May 22, 2017

21 **Shunsuke Saito**



22 is the patch optimization working now?

1:22 PM

23 **Koki Nagano**



24 there are several issues in error computation and we are testing a new approach

1:23 PM

25 [...]

26 **Frances Chen**





27 @Hao Li asking @Koki Nagano liwen does the thing work?

1:53 PM


28 [...]


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**Liwen Hu**  
 there is another bug 2:10 PM

**Hao Li**  
 >\_< 2:10 PM

[...]

**Hao Li**  
 will you guys have it in an hour?  
we spent 1 day on it. that s a o;t  
lot 2:15 PM

**Koki Nagano**  
 the gamma or something is only off for dark values 2:15 PM

**Hao Li**  
 what s the current ETA? 2:18 PM  
i need it to see if we shoudn't do something else?  
we are late by 6 hours  
we almost don't hzve time to produce results and write the paper  
if in an hour it s not working let s do it manually  
and give up on it  
i don't think we can make it automatic

168. On May 23, 2017, Sadeghi confronted Li regarding the data fabrication and academic misconduct committed in Pinscreen’s SIGGRAPH Asia 2017 Technical Papers submission. Li stated that he wanted “Pinscreen to be the first” in research and the industry. Li claimed that by the time of the conference, in November of 2017, Pinscreen would have had a public product launch and would have achieved Li’s embellished claims in the submission. Sadeghi asked Li, “what if for unforeseeable reasons we don’t have everything by then?” Li promised Sadeghi that Pinscreen’s data fabrication would be limited to nonpublic representations and never shown in public and stated:

169. [May 23, 2017] Li: “We won’t present something we don’t have”

170. On May 23, 2017, Pinscreen, under Li’s leadership, submitted fabricated avatars with manually prepared eye colors, hair colors, and hair shapes to SIGGRAPH Asia.

1 171. Pinscreen’s SIGGRAPH Asia 2017 Technical Paper; titled “Avatar Digitization  
2 from a Single Image for Real-Time Rendering”; co-authored by Hu, Saito, Wei, Nagano, Seo,  
3 Fursund, Sadeghi, Sun, Yen-Chun Chen, and Li; containing fabricated avatars with manually  
4 prepared eye colors, hair colors and hair shapes; published on ACM Digital Library:

5 172. <https://dl.acm.org/citation.cfm?id=31310887>

6 173. After the filing of the complaint, the Los Angeles Times reported, on June 20,  
7 2018, that Li told its reporter, on a phone interview, that Pinscreen’s app is “proof that Pinscreen’s  
8 technology works.” However, third parties have produced evidence that Li’s proof is inadequate  
9 since Pinscreen’s app produces inferior results compared to Pinscreen’s representations. The  
10 following figure compares one of Pinscreen’s fabricated avatars with manually prepared eye color,  
11 hair color, and hair shape in the submission (middle) to Pinscreen’s actual automatically generated  
12 avatar produced by a third party more than a year after the submission using Pinscreen’s app  
13 (right). Pinscreen’s actual automatically generated hair shape, hair color, eye color and overall  
14 avatar is inferior to its prior fabricated representations. (Exhibits K1, K2)



1 **SIGGRAPH 2017 Real-Time Live Public Demo**

2 174. Li considered SIGGRAPH Real-Time Live (“RTL”) as the “best event at  
3 SIGGRAPH,” “the hardest thing to get in,” and “the only show that matters at SIGGRAPH.” Li  
4 claimed that RTL gets “much more visibility than papers” and emphasized that “there will be  
5 TechCrunch at SIGGRAPH RTL.” (Exhibits E10, E23)

6 175. However, as Pinscreen approached the RTL public presentation date of August 1,  
7 2017, on information and belief, Li realized that Pinscreen would not be able to deliver on Li’s  
8 inflated claims put forth in the submission, months earlier on April 4, 2017, despite Pinscreen  
9 employees’ long hours and hard work. Li stated, on June 29, 2017, that he was “really worried that  
10 nothing would work” by the RTL rehearsal and that Pinscreen would have to do “some shitty  
11 cheating again.” (Exhibit E5)

12 176. The title that Li had chosen for the RTL demo, months earlier on April 4, 2017,  
13 was “Pinscreen: Creating Performance-Driven Avatars in Seconds.” In reality, however,  
14 Pinscreen’s avatar generation would take around a minute and half to execute which was, on  
15 information and belief, comparable to the performance of competitors such as Loom.ai. (Exhibits  
16 E12, E24, E27)

17 177. Additionally, the accuracy of Pinscreen’s hair shape estimation was far from Li’s  
18 inflated claims in Pinscreen’s RTL submission, since each purportedly automatic hair shape had  
19 been manually prepared by the freelance artist Leszek.

20 178. The allocated time for Pinscreen’s RTL demo was 6 minutes, and Li planned to  
21 show multiple avatar generations within 2 minutes. Sadeghi suggested that “if we don’t generate a  
22 brand-new avatar,” the avatar can be *cached*. Pre-caching results, i.e., computing them beforehand  
23 and storing them for quick access, is a common custom and practice while presenting technical  
24 demos with limited time. However, scientific ethics require that the fact that an element is pre-  
25 cached should always be disclosed. (Exhibit E25)

26 179. While Sadeghi was away on vacation, Li decided to misrepresent pre-cached  
27 avatars as real-time during Pinscreen’s public demo at SIGGRAPH Real-Time Live, on August 1,  
28 2017, to an audience of thousands. In Sadeghi’s absence, Li revealed his intention to deceive the



1 RTL audience, in writing, on July 20, 2017, when he proposed on “PinscreenTeamAll” Skype  
2 thread that Pinscreen would “give the people the feeling the avatar is not pre-built” and that “we  
3 should give them a sense that it is computing.” In reality, the avatars were pre-built and pre-  
4 computed. Li’s decision to fabricate data in a public presentation was in violation of the law and  
5 his promise to Sadeghi. (Exhibit E26)

6 180. [July 20, 2017] Sun: “Plus with many images, if we fake the loading time, it can  
7 add up”

8 181. [July 20, 2017] Li: “I think file load is reasonable because it give [sic] the people  
9 the feeling the avatar is not pre-built”

10 182. [July 20, 2017] Li: “We should give them a sense that it is computing”

11 183. [July 20, 2017] Li: “If it s [sic] just loaded it s [sic] not impressive”

12 **carrie sun**



13 in that case is it necessary to have the file upload UI? maybe just  
14 load the whole app wiht the thumbnails at the bottom?  
15 plus with many images, if we fake the loading time, it can add up

16 **Hao Li**



17 i think file load is reasonable because it give the people the  
18 feeling the avatar is not pre-built  
19 we should give them a sense that it is computing  
20 if it s just loaded it s not impressive

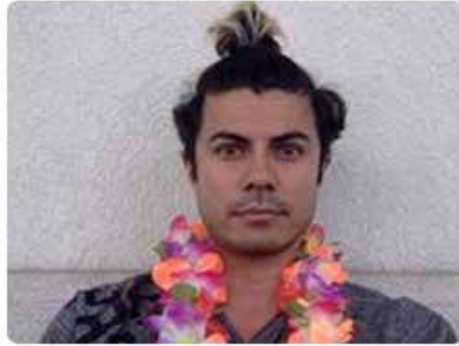
21 184. On July 22, 2017, upon returning from his anniversary vacation, Sadeghi met other  
22 Pinscreen employees at a scientific conference in Hawaii. Sadeghi tested Pinscreen’s avatar  
23 generation and reported on “PinscreenTeamAll” Skype thread that it took around a minute and  
24 half. Sadeghi’s report also indicated that the automatically estimated hair shape was not accurate  
25 and represented a different hairstyle. (Exhibit E27)

26 185. [July 22, 2017] Sadeghi: “The creation took ~90 seconds.”

27  
28



1 Saturday, July 22, 2017



13  
14 The creation took ~90 seconds.

15  
16 186. Sadeghi's Skype profile with Skype ID "iman.sadeghi":

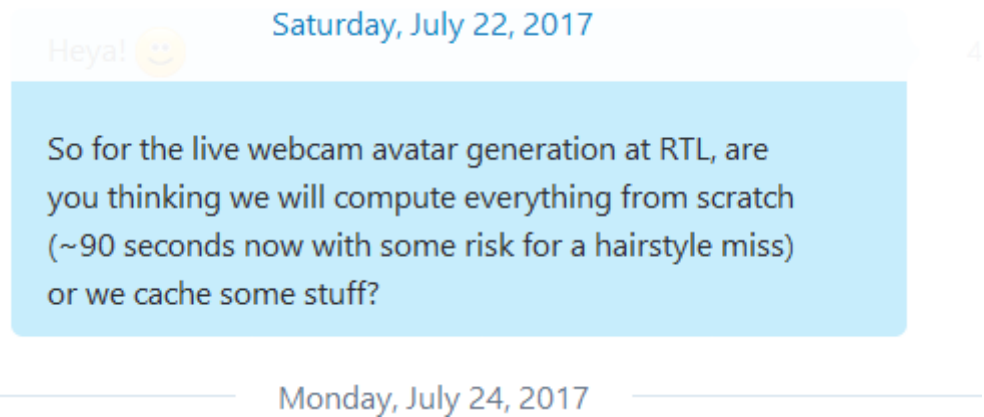
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27 187. Shortly after, Sadeghi messaged Li to clarify Li's plan to present a brand-new  
28 avatar generation from the webcam at the RTL demo. Sadeghi informed Li that the speed of avatar

1 generation was around a minute and half and that there was “some risk for a hairstyle miss”  
2 meaning inaccurate hair shape estimation. Li did not respond to Sadeghi’s message: (Exhibit E28)

3 188. [July 22, 2017] Sadeghi: “So for the live webcam avatar generation at RTL, are you  
4 [Li] thinking we will compute everything from scratch (~90 seconds now with some risk for a  
5 hairstyle miss) or we cache some stuff?”



11  
12 Monday, July 24, 2017

13 189. Later that evening, on July 22, 2017, Sadeghi met with Li who disclosed his plan to  
14 fabricate the webcam avatar generation and its speed by misrepresenting pre-cached manually  
15 prepared avatars as brand-new, automatic, and real-time. Sadeghi confronted Li and stated that  
16 Pinscreen should be truthful to the public and scientific community, that Li’s data fabrication  
17 could be considered “investment fraud,” and that everyone’s “academic reputation” at Pinscreen  
18 was at stake.

19 190. Li dismissed Sadeghi’s objections and claimed that the actual speed of Pinscreen’s  
20 avatar generation was “too slow,” and that it “won’t be impressive,” and therefore Pinscreen could  
21 not present it. Li stated that one of his goals was to have “Loom.ai and ObEN to stop even trying  
22 to compete with us.” Li expressed concerns that Pinscreen’s actual automatic hair shape estimation  
23 could have poor quality and would “make us look bad” and claimed that “Loom.ai will laugh at  
24 us.” Li later made similar statements to the team until a few days before the RTL demo. (Exhibit  
25 E29)

26 191. Li claimed that Pinscreen “didn’t have any other choice at that point,” that the  
27 decision was made last week, that it was “final,” and that Sadeghi must follow the plan and focus  
28 on finalizing the RTL demo.

1            192. Subsequently, Sadeghi asked Li to promise that moving forward, Pinscreen would  
2 stay honest and avoid fabricating its results. Li dismissed Sadeghi’s request and stated, around  
3 midnight on July 22, 2017:

4            193. Li: “Let’s talk about this after the RTL demo.”

5            194. Sadeghi reluctantly accepted Li’s proposal and focused on finalizing Pinscreen’s  
6 RTL demo.

7            195. On July 24, 2017, Fursund, Pinscreen’s CTO, admitted in writing that Pinscreen  
8 was “just using pre-cached avatars” and therefore “it’s important that we know exactly who is  
9 using the webcam to generate the avatar”: (Exhibit E30)

10           196. [July 24, 2017] Fursund: “Anyway... It’s important that we know exactly who is  
11 using the webcam to generate the avatar”

12           197. [July 24, 2017] Fursund: “Since we’re just using pre-cached avatars”

13           *anyway... it's important that we know exactly who is*  
14           *using the webcam to generate the avatar*  
15           *since we're just using pre-cached avatars*

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17 198. Fursund’s Skype profile with Skype ID “alt\_er\_ego”:



1 199. Li defined tasks such as “creating all avatars, hair models, tweak for perfect hair  
2 color” and “hair models/avatars” and assigned them to Sun. Pinscreen presented multiple avatars  
3 during its RTL demo including an avatar of the program chair Cristobal Cheng (“Cristobal”). Sun  
4 manually prepared the hair shapes for many of the avatars presented at RTL, including for  
5 Sadeghi’s, Cristobal’s, Nagano’s, and her own avatar. (Exhibit E31, E38, E39, E40)

6 **Fabricated Avatars**  
7 **with Manually Prepared Hair Shapes by Carrie Sun**  
8 **Demoed by Pinscreen at SIGGRAPH RTL on August 1, 2017**



15 Sadeghi

16 Cristobal

17 Nagano

18 Sun

19 200. On July 25, 2017, 7 days before RTL, Sadeghi gave feedback regarding the hair  
20 shapes for Sun’s and Sadeghi’s avatars, which were manually prepared by Sun. Sadeghi wrote to  
21 Sun, “you might want to redo the hair for your avatar” and that “around my ears the hair is  
22 missing” to which Sun responded “I’ll add the hair around your ears today.” (Exhibits E38, E39)

23 201. [July 25, 2017] Sadeghi: “@Carrie Sun only if you had extra cycles, you might  
24 want to redo the hair for your avatar.”

25 @carrie sun only if you had extra free cycles, you might  
26 want to redo the hair for your avatar. There are some

27 202. [July 25, 2017] Sadeghi: “Looks like around my ears the hair is missing.”


28 203. [July 26, 2017] Sun: “I’ll add the hair around your ears today”

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Thanks for adding my avatar.  
Looks like around my ears the hair is missing.  
Due to the transparency




Wednesday, July 26, 2017

 i'll add the hair around your ears today

204. On July 26, 2017, 6 days before RTL, Nagano, wrote to Sun, on “PinscreenTeamAll” Skype thread, and requested “for my hair if you can lower it down a bit if it’s not too hard, that would be nice,” and that Nagano doesn’t think his “forehead is that large.” The requested manual modification of the hair shape was done after around 2 days: (Exhibit E31)

205. [July 24, 2017] Sun: “I created a hair for Koki [Nagano]’s avatar”

 hey  
i created a hair for koki's avatar

206. [July 26, 2017] Nagano: “Oh and for my hair if you [Sun] can lower it down a bit if it's not too hard, that would be nice. (I don;t [sic] think my forehead is that large 😊)”

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**carrie sun**



oh btw i also fixed my hair - i'll upload the updated mesh  
it looks like there are some intersections for your hair too, should  
i fix?

**Koki Nagano**



Thanks! Yeah this video shows the current status of the avatars /  
hairs. So anything you can improve in the asset would be great  
like the hair intersection

oh and for my hair if you can lower it down a bit if it's not too  
hard, that would be nice. (I don;t think my forehead is that large  
😊)

207. [July 28, 2017] Sun: “Koki [Nagano]’s new hair (with fewer intersections in the front) is in the Dropbox folder here:”

208. [July 28, 2017] Sun: “https://www.dropbox.com/home/Pinscreen Team Folder/SIG17RTL/AvatarCandidates/AvatarData/Koki\_new”

**carrie sun**



koki's new hair (with fewer intersections in the front) is in the  
dropbox folder here:  
[https://www.dropbox.com/home/Pinscreen%20Team%20Folder/SIG17RTL/AvatarCandidates/AvatarData/Koki\\_new](https://www.dropbox.com/home/Pinscreen%20Team%20Folder/SIG17RTL/AvatarCandidates/AvatarData/Koki_new)

209. On July 28, 2017, 4 days before RTL, Sadeghi wrote to Sun, on “PinscreenTeamAll” Skype thread, and requested that she manually add more hair around the ears for Cristobal’s avatar. It took Sun more than 2.5 hours to add the missing hair around Cristobal’s ears. (Exhibit E40)

210. [July 28, 2017] Sadeghi: “I am finalizing the avatars. Cristobal hair around his ears can use some love if you have time @Carrie Sun”

211. [July 28, 2017] Sun: “Do you think we’re going to be showing the sides? haa”

212. [July 28, 2017] Sadeghi: “It shows if I rotate him a tiny bit”

213. [July 28, 2017] Sun: “I will be able to do it 😊”

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Haha so good! 🤔 Friday, July 28, 2017

4:01 PM

I am finalizing the avatars. Cristobal hair around his ears can use some more love if you have time @carrie sun Maybe a good practice to show @frances while she is learning from you 😊



4:02 PM

**carrie sun**



do you think we're going to be showing the sides? haa

4:08 PM



4:08 PM

It shows if I rotate him a tiny bit.

4:09 PM

[...]

**carrie sun**

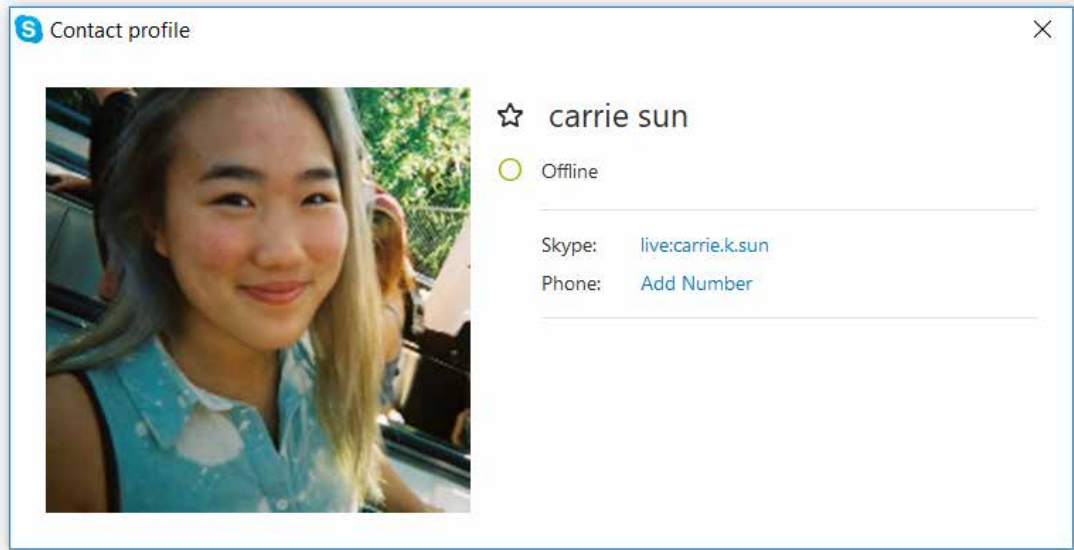


i will be able to do it 😊 just letting frances use the VR a bit

4:31 PM



1 214. Sun’s Skype profile with Skype ID “live:carrie.k.sun”:



11 215. On August 1, 2017, Pinscreen, under Li’s leadership, during its SIGGRAPH RTL  
12 public demo in front of thousands of attendees and online viewers, misrepresented manually  
13 prepared hair shapes as automatic, pre-cached avatars as brand-new and in real-time, and the speed  
14 of its avatar generation of around a minute and half as around 5 seconds.

15 216. Pinscreen’s public demo at SIGGRAPH 2017 RTL, titled “Pinscreen: Creating  
16 Performance-Driven Avatars in Seconds” was co-presented by Li, Sadeghi, Nagano, Seo, and Sun  
17 and contained fabricated avatars with manually prepared hair shapes. This demo is published on  
18 ACM digital library and ACM SIGGRAPH’s YouTube channel:

19 217. [https://dl.acm.org/ft\\_gateway.cfm?id=3107546&ftid=1920365](https://dl.acm.org/ft_gateway.cfm?id=3107546&ftid=1920365)

20 218. [https://www.youtube.com/watch?v=hpuEdXn\\_M0Q&t=31m6s](https://www.youtube.com/watch?v=hpuEdXn_M0Q&t=31m6s)

21 219. After receiving the “Notice of Claim and Litigation Hold” letter from Sadeghi’s  
22 counsel, on November 2, 2017, Pinscreen announced inconsistent numbers for its speed of avatar  
23 generation compared to what was misrepresented at SIGGRAPH 2017 RTL demo, which was  
24 around 5 seconds. For instance, on November 14, 2017, Pinscreen announced that its avatar  
25 generation requires around 4 minutes (around 50 seconds in “5X fast forward”) in its “high-  
26 quality” setting and that it takes “less than a minute” without the high-quality features. (Exhibit  
27 E32)

28 220. Further evidence confirming Pinscreen’s data fabrication at RTL includes Li’s own



1 testimony. On November 29, 2017, during Pinscreen’s SIGGRAPH Asia 2017 Technical Papers  
2 presentation in Thailand, Pinscreen stated that the hair shape estimation subprocess alone required  
3 “less than 10 seconds.” After the presentation and during the Q&A session, Li was challenged  
4 about Pinscreen’s demonstrated speed of avatar generation at RTL of around 5 seconds. Li was  
5 questioned as to how the whole avatar generation process took around 5 seconds at RTL while one  
6 of the subprocesses required around 10 seconds by itself. In response, Li blurted out that for RTL  
7 “we definitely cached it.” When Li was subsequently questioned “the webcam was cached too?”  
8 Li refused to answer the question, headed out of the Q&A session, and proceeded to leave the  
9 conference premises, on information and belief, to avoid answering the question.

10 221. Pinscreen was scheduled to showcase its technology at RTL 2018, more than a year  
11 after Pinscreen’s fabricated demo at RTL 2017, and shortly after the media coverage of the lawsuit  
12 which accused Pinscreen of misrepresenting manually prepared hair shapes as automatically  
13 generated. On August 14, 2018, Pinscreen made no attempts or claims to generate any hair shapes  
14 in real-time during its demo and chose to generate only one brand-new avatar from the webcam.  
15 For its live webcam avatar generation, Pinscreen chose a bald subject which did not involve any  
16 hair shape generation. Subsequently, Pinscreen’s RTL 2018 demo gained around only 5.5% of the  
17 popular votes. (Exhibit K3)

18 Pinscreen's Only Attempt to  
19 Generate an Avatar in Real-Time  
20 During SIGGRAPH 2018 Real-Time Live



28 Input Image

Output Avatar

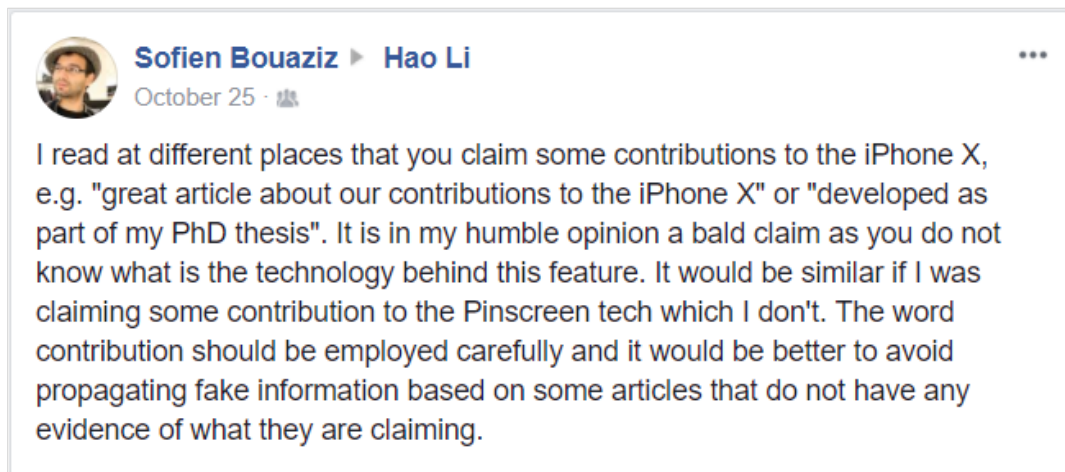
1 **Li’s Miscellaneous Data Fabrication and Academic Misconduct**

2 222. Li’s academic misconduct included sharing confidential under-review scientific  
3 paper submissions from competitor research groups within Pinscreen and suggesting to look for  
4 “details that can be used.” This exploitation of his position as a reviewer violates established  
5 scientific ethics. Sharing papers he was reviewing, for his own commercial gain, is another  
6 instance of Li’s academic misconduct. (Exhibit E33)

7 223. Li made public claims about having scientific contributions to the *iPhone X* until  
8 Dr. Sofien Bouaziz (“Bouaziz”), a research scientist from Apple Inc., the manufacturer of the  
9 iPhone X, posted on Li’s Facebook on October 25, 2017, suggesting that Li “avoid propagating  
10 fake information.” Bouaziz informed Sadeghi during the SIGGRAPH 2018 conference (located in  
11 Vancouver, BC on August 13, 2018) that Li unfriended and blocked Bouaziz on Facebook after  
12 Bouaziz posted on Li’s Facebook for a second time regarding Li’s repeated misrepresentations of  
13 his own contributions to the iPhone X. On information and belief, Li has deleted both Facebook  
14 posts by Bouaziz. (Exhibit E34)

15 224. Bouaziz’s post on Li’s Facebook dated October 25, 2017:

16 225. <https://www.facebook.com/li.hao/posts/10155155647648753>



25 226. Li’s data fabrication extended to business representations for investors and venture  
26 capitalists (“VCs”), whom Li neither trusted nor respected. For instance, Li misrepresented  
27 Pinscreen’s technical capabilities to Softbank by falsely representing manually “picked” hair  
28 shapes as automatic. The day the investment agreement between the parties was close to being

1 finalized, Li stated on “PinscreenTeamAll” Skype thread: (Exhibits E35, E36, E37)

2 227. [June 17, 2017] Li: “Pinscreen just fucked Softbank”

3 Hao Li



4 wo kao

5 cosimo ah

6 pinscreen just fucked softbank

### 7 Li’s and Pinscreen’s Labor Law Violations

8 228. Li used deadline pressure to overwork Pinscreen employees and unlawfully refused  
9 to pay them overtime. Li repeatedly asked for updates during the nights, weekends, and expected  
10 student employees to work on holidays. For instance, on Father’s Day, Sunday, June 18, 2017, Li  
11 wrote to Sadeghi and asked “please push the students more, they are getting lazy and only work  
12 half of the day.” (Exhibit F1)

13 229. When Sadeghi questioned why there was a work-related event on Sunday, April 16,  
14 2017, Li responded on a team thread that we work every day.

15 230. On June 28, 2017, Sadeghi told Li that some of Pinscreen’s non-exempt employees  
16 were working an excessive amount of overtime and should be properly compensated. Li dismissed  
17 Sadeghi’s proposal, telling him that “the students are used to working this many hours” and that  
18 “the employees are salary based and are being paid enough already.”

19 231. Li told Sadeghi, in the same meeting, that “deadlines are a tool to push the students  
20 to work more. Without deadlines they won’t work on the weekends and nights.” Li also suggested  
21 Sadeghi to push Pinscreen employees to work more “as long as they don’t die from *Karōshi*.”  
22 *Karōshi* is a Japanese term literally meaning “overwork death.” Another related Japanese term  
23 used by Li was *Salaryman* which refers to employees who “are expected to work long hours,  
24 additional overtime, [...] and to value work over all else.” (Exhibits F2, F3)

25 232. While unlawfully refusing to pay overtime, Li posted on his Facebook about  
26 overworked Pinscreen employees, who were passed out on couches inside Pinscreen’s office,  
27 referring to them as “casualties.” Li referred to Saito, as “Salariman [sic]” multiple times. Li also  
28

1 publicly paid tribute to death from overwork on his Facebook, posting “Karoshi! Let me tell you!  
2 Sleep is for the weak.” (Exhibits F4, F5, F6)

3 233. Sadeghi dined with Seo and Nagano on July 24, 2017, during a scientific  
4 conference in Hawaii. During the dinner, they told Sadeghi about their excessive amount of  
5 overtime work without receiving any financial compensation from the company. Seo further stated  
6 that he and Nagano “have no life” and that this amount of work “would not be sustainable.” Later,  
7 both of the employees confirmed in writing that they had each worked, on average, around 110  
8 hours per week for the months of May, June, and July of 2017. Sadeghi promised them he would  
9 talk to Li after the SIGGRAPH Real-Time Live demo and try to persuade him to pay overtime and  
10 “to make sure we are fair to everyone.” (Exhibits F7, F8)


11 234. [August 6, 2017] Sadeghi: “Hey my man Jaewoo [Seo], what would be your best  
12 estimate on the average hours you worked per day/week in the past 3 months and upto RTL? 😊”

13 235. [August 7, 2017] Seo: “I don't know. Maybe around 100-120 hrs/wk? :-[“

14 236. [August 7, 2017] Sadeghi: “Yes that's a lot of hours. Alright cool. Will talk to Hao  
15 [Li] today to make sure we are fair to everyone. Especially the full time employees 😊”

16 Hey my man Jaewoo, What would be your best estimate on the average  
17 hours you worked per day/week in the past 3 months and upto RTL? 😊

18 Monday, August 07, 2017

19  I don't know. maybe around 100-120 hrs/wk? :-[

20  
21 Yes that's a lot of hours. Alright cool. Will talk to Hao today to make sure we  
22 are fair to everyone. Especially the full time employees 😊

23 237. Additionally, Li harassed, bullied, and discriminated against a Pinscreen employee  
24 who it was generally assumed among employees to suffer from autism-spectrum disorder. Li  
25 stated, on June 23, 2017, that the employee “should not be autistic” and that it will be Li’s “new  
26 project” to teach him “manners.” Li stated that the employee allegedly “does not have the ability  
27 to respond,” does not behave “like an adult,” and that Li feels like he “is talking to a wall” when  
28 he is talking to the employee. Li verbally abused the employee and used demeaning language such

1 as “are u [sic] fucking shitting me???” and “we are not fucking paying u [sic] for that!” when  
2 addressing the employee. Sadeghi requested on June 28, 2017 that Li be respectful towards the  
3 employee, but Li dismissed Sadeghi’s request, stating that the employee is “used to it” and that the  
4 demeaning language was how Li was able to “push them to work more.” (Exhibit F9)

5 238. Furthermore, Li discussed firing Pinscreen’s CTO, Fursund, while he was  
6 expecting a newborn. Li claimed that if Li and Sadeghi do not check on Fursund, “he is just doing  
7 nothing,” and that “Jens [Fursund] is sick at every deadline we have.” Li stated, “out of a sudden  
8 [sic] he [Fursund] had a child” and attributed Fursund’s alleged lack of performance to having a  
9 baby. On information and belief, Li’s resentment toward Fursund was because Fursund prioritized  
10 his family over work during the weekends. Li told Sadeghi that Fursund was a “bad hombre”  
11 because “he doesn’t work on the weekends.” Li later claimed, on May 23, 2017, that “Jens  
12 [Fursund]’s baby has cost Pinscreen a shit ton of money.” In order to clarify Fursund’s  
13 performance, Sadeghi suggested that Li ask Fursund to share detailed progress reports with Li and  
14 Sadeghi. Furthermore, Sadeghi suggested that Li “make sure he [Fursund] doesn't feel  
15 micromanaged or disrespected.” (Exhibits F10, F11)

16 239. Pinscreen committed further labor law violations after wrongfully terminating  
17 Sadeghi by withholding his business expense reimbursements in violations of California Labor  
18 Code § 2802. Pinscreen also phrased the purpose of a check mailed to Sadeghi for late wage  
19 payment penalties as a settlement offer “to resolve any wage issues,” in violation of California  
20 Labor Code § 203.

### 21 **Li’s and Pinscreen’s Immigration Law Violations**

22 240. On information and belief, Li was ineligible to work at Pinscreen as its CEO and  
23 has performed work for the company illegally because Li did not have a work visa for Pinscreen.  
24 On information and belief, Li is not a US Citizen, his permanent residency (i.e. green card)  
25 application has been rejected, and he lacks a proper visa to perform any role at Pinscreen. On  
26 information and belief, Li has an H-1B visa sponsored by USC, which only allows him to work at  
27 the university and not at Pinscreen. In response to Sadeghi’s inquiry about Li’s work authorization  
28 and eligibility, Li claimed that he does not need a visa to work for Pinscreen because he is not

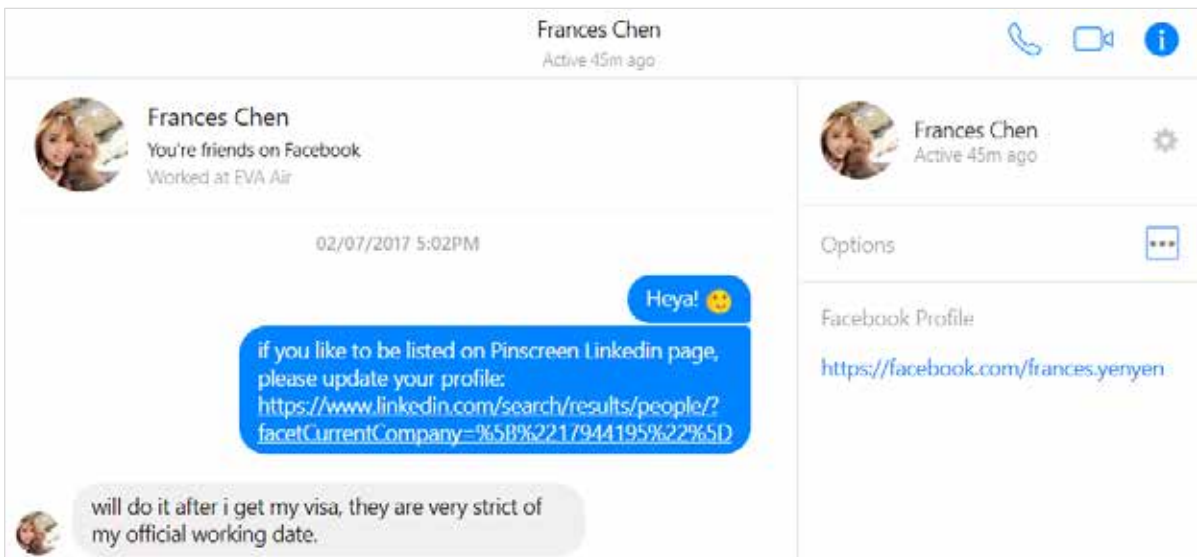
1 receiving any salary from the company. Li's working at Pinscreen without a proper visa would  
2 violate the Immigration Reform and Control Act of 1986.

3 241. On information and belief, Li pressured other Pinscreen employees to perform  
4 work for Pinscreen illegally including without a work visa, before their work visa's start date or  
5 while employed at other companies as summer interns. On information and belief, at least one of  
6 Pinscreen's employees illegally performed work for the company without a proper work visa. On  
7 information and belief, at least one of Pinscreen's employees illegally performed work for the  
8 company before their work visa's start date. On information and belief, at least one of Pinscreen's  
9 employees illegally performed work for Pinscreen while hired as a summer intern at another  
10 company.

11 242. On information and belief, Pinscreen's CFO, Yen-Chun Chen, illegally performed  
12 work for Pinscreen before her work visa's start date. Yen-Chun Chen admitted in Facebook  
13 messages to Sadeghi that she did not have a proper work visa to perform work for the company as  
14 of February 7, 2017. However, Yen-Chun Chen had performed work for Pinscreen prior to that  
15 date, including the paperwork for Sadeghi's hiring processes. (Exhibit F12, F13)

16 243. [February 7, 2017] Sadeghi: "If you like to be listed on Pinscreen LinkedIn page,  
17 please update your profile"

18 244. [February 7, 2017] Yen-Chun Chen: "Will do it after I get my visa, they are very  
19 strict of my official working date."

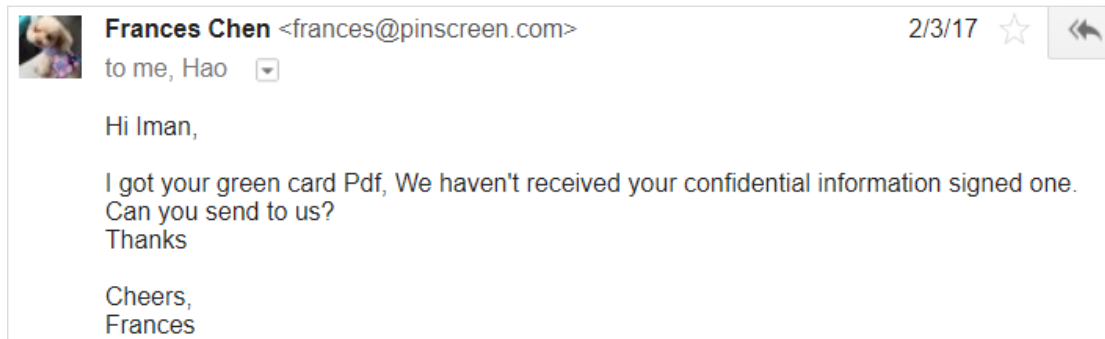




1 245. [February 3, 2017] Yen-Chun Chen: “Hi Iman,”

2 246. [February 3, 2017] Yen-Chun Chen: “I got your green card Pdf, We haven't  
3 received your confidential information signed one. [sic]”

4 247. [February 3, 2017] Yen-Chun Chen: “Can you send to us? [sic]”



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11 248. On March 9, 2017, Sadeghi raised concerns about Pinscreen’s immigration law  
12 violations and requested that Li consult Pinscreen’s counsel to ensure Pinscreen’s compliance. In  
13 response, Li stated that he is “pretty sure that it's OK” and that he will “double check with the  
14 lawyers.”

15 249. On June 28, 2017, Sadeghi confronted Li about Pinscreen’s immigration law  
16 violations again. Sadeghi then followed up to inquire about the response from company's counsel.  
17 Li refused to give a response from Pinscreen’s counsel and told Sadeghi:

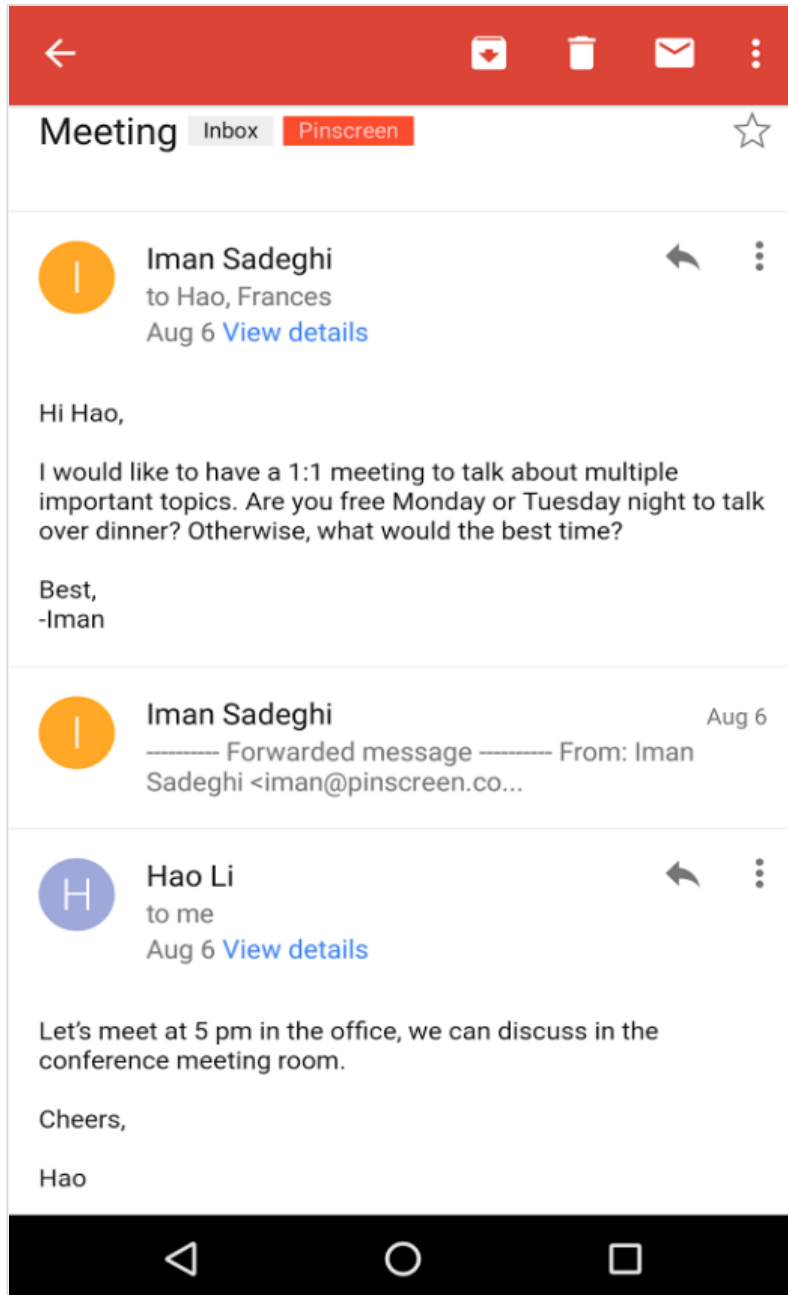
18 250. [June 28, 2017] Li: “You do not need to worry about these issues. Let me handle  
19 them.”

20 **Li’s and Pinscreen’s Retaliation and Wrongful Termination of Sadeghi**

21 251. Since Li had promised to address Sadeghi’s concerns after Pinscreen’s SIGGRAPH  
22 2017 RTL demo, Sadeghi requested, on Sunday, August 6, 2017, through e-mail to Li and Yen-  
23 Chun Chen, to set up a meeting with Li “to talk about multiple important topics.” Li agreed to  
24 have the meeting the next day, on Monday, August 7, 2017, at 5 p.m.:

25 252. [August 6, 2017] Sadeghi: “I would like to have a 1:1 meeting to talk about  
26 multiple important topics. Are you free Monday or Tuesday night to talk over dinner?”

27 253. [August 6, 2017] Li: “Let’s meet at 5 p.m. in the office, we can discuss in the  
28 conference meeting room.”



254. In Sadeghi’s meeting notes, titled “Pinscreen Concerns,” time-stamped by Google servers prior to the meeting, Sadeghi referenced Pinscreen’s data fabrication during the SIGGRAPH 2017 Real-Time Live demo and the SIGGRAPH Asia 2017 Technical Papers submission. Sadeghi stated that Pinscreen “can be accused of illegal crime.” Sadeghi’s notes included that “these decisions to promise things we don’t even have is coming from you [Li] and only you.”

255. Sadeghi’s meeting notes also contain a subsection regarding “overtime pay” with

1 examples of Pinscreen employees who, on information and belief, had worked around 110 hours  
2 per week for three consecutive months, and did not receive overtime compensation from the  
3 company, in violation of California labor laws.

4 256. On August 7, 2017, Li suggested having the meeting immediately upon Sadeghi's  
5 arrival to Pinscreen's office, instead of at 5 p.m. as previously planned. Sadeghi met with Li and  
6 Yen-Chun Chen and reiterated his concerns about Li's and Pinscreen's data fabrication and past  
7 due overtime payments. Sadeghi stated his objections regarding Li refusing to properly  
8 compensate Pinscreen's employees for overtime hours; Pinscreen "lying to thousands of people"  
9 during its RTL demo; Li putting "everyone's academic reputation" at risk; and Li endangering  
10 Pinscreen's investor relations due to the data fabrication. In response, moments before Li handed  
11 Sadeghi his termination letter from Pinscreen, Li told Sadeghi:

12 257. [August 7, 2017] Li: "Maybe I don't want to further damage your reputation."

13 258. [August 7, 2017] Li: "I don't think you need to worry about these anymore."

14 259. Sadeghi received the termination letter within his first working hour after  
15 Pinscreen's fabricated RTL demo, which was during the meeting that Sadeghi had previously  
16 requested to discuss "multiple important topics" regarding Li's and Pinscreen's unlawful  
17 activities.

18 260. During the meeting, Sadeghi requested to meet Pinscreen's full board of directors,  
19 including Kim, before the termination decision was final, to which Li responded, "sure."

20 261. In response to Sadeghi's inquiry for the reason of the termination, Li and Yen-  
21 Chun Chen stated:

22 262. [August 7, 2017] Sadeghi: "Tell me what are the reasons?"

23 263. [August 7, 2017] Li: "I don't have to answer"

24 264. [August 7, 2017] Li: "I don't have to tell you why"

25 265. [August 7, 2017] Li: "I think we are too small. We are not like Google."

26 266. [August 7, 2017] Yen-Chun Chen: "The main reason is that we are too small for  
27 you."

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**SEVERANCE AGREEMENT AND GENERAL RELEASE OF CLAIMS**

This Severance Agreement and General Release of Claims (the "Agreement") is entered into by and between Iman Sadeghi ("Employee" or "you") and Pinscreen, Inc. ("Employer") (singly, a "Party" and jointly, the "Parties") in complete, final and binding settlement of all claims and potential claims, if any, with respect to their employment relationship.

This Agreement confirms the terms of your separation from Employer effective August 7, 2017 (the "Separation Date"). In consideration for your signing this Agreement, and providing the general release, you will receive the severance benefits identified in paragraph 1 below, which you acknowledge you would not otherwise be entitled to receive.

NOW, THEREFORE, in consideration of the promises and releases given herein, the Parties hereby agree as follows:

1. **Severance Payment and Tax Liability.** Provided Employee signs this Agreement, Employer agrees to pay to Employee the gross amount of Thirteen Thousand Seven Hundred Fifty Dollars and No Cents (\$13,750.00), less deductions authorized or required by law, which is one month's compensation at Employee's current wage rate. The net severance

[...]

Dated \_\_\_\_\_

\_\_\_\_\_  
Iman Sadeghi

Pinscreen, Inc.,  
a Delaware corporation

Dated 8/7/2017

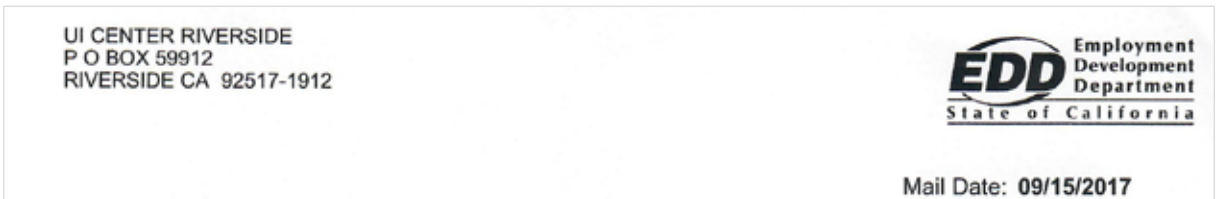
\_\_\_\_\_  
By: Hao Li  
Its: President

22           269.   On August 9, 2017, two days after the termination, Sadeghi's counsel requested  
23 Sadeghi's "personnel file and all other records which Pinscreen maintains relating to Mr.  
24 Sadeghi's employment, including without limitation, employee handbooks, policies, procedures,  
25 and investigative reports" pursuant to Labor Code § 1198.5, as well as "all documents Mr.  
26 Sadeghi signed that relate to his employment by Pinscreen" pursuant to California Labor Code §  
27 432. Pinscreen's response, dated September 8, 2018, contains no document whatsoever indicating  
28 any concerns with Sadeghi's performance or employment. Pinscreen's response contained no

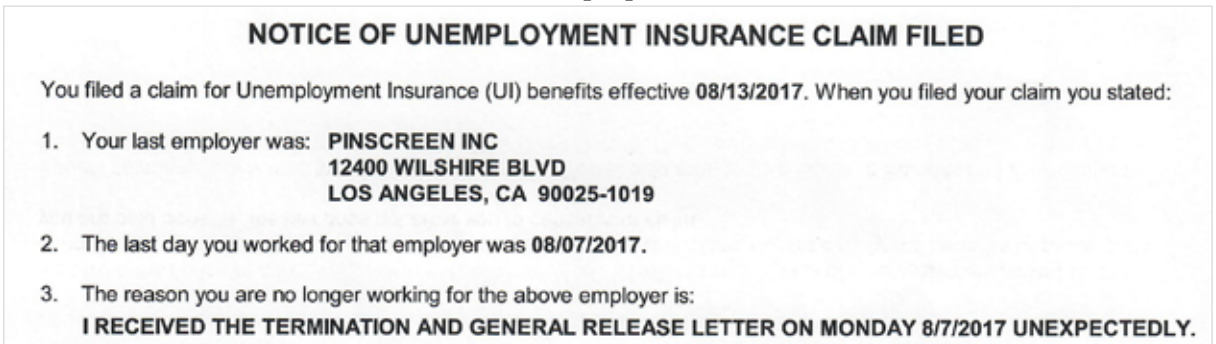
1 employee handbook, company policies, or codes of conduct. Sadeghi’s counsel also mentioned  
2 that Sadeghi “may have, among other things, a Labor Code § 1102.5 whistleblower retaliation  
3 claim and a claim for wrongful termination in violation of public policy” and demanded Pinscreen  
4 to “act immediately to preserve potentially relevant Electronically Stored Information (‘ESI’).”

5 270. There is no mention of any reason for Sadeghi’s termination in his employment  
6 personnel file, in his termination letter, or in his severance offer. There is no mention of any  
7 concern with Sadeghi’s performance or any other issue bearing on his qualities as an employee.  
8 Sadeghi received the termination letter “unexpectedly” as confirmed by Sadeghi’s statement in his  
9 Unemployment Insurance Claim application, filed on August 13, 2017. Employment Development  
10 Department (“EDD”) consequently approved Sadeghi’s application, on information and belief,  
11 after verifying the information provided by Sadeghi with Pinscreen.

12 271. [August 13, 2017] Sadeghi: “I received the termination and general release letter on  
13 Monday 8/7/2017 unexpectedly.”



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24 272. Sadeghi’s termination was in retaliation for his objections to Li regarding Li’s and  
25 Pinscreen’s illegal practices and in violation of California’s whistleblowing protection laws  
26 provided in California Labor Code § 1102.5.



1 **Defendants' Assault and Battery on Sadeghi**

2 273. Before Sadeghi had a chance to read the termination letter, Li suddenly lost his  
3 temper, slammed the conference room door open, and yelled at Sadeghi to leave the room, in front  
4 of Sadeghi's coworkers and in a humiliating and embarrassing manner. Li then attempted to  
5 physically push Sadeghi out of the conference room in front of other Pinscreen employees.

6 274. [August 7, 2017] Sadeghi to Li: "You can't touch me"

7 275. Concerned by Li's aggressive behavior, Sadeghi decided to leave Pinscreen's  
8 office; however, Li physically blocked the door of the office and forcefully confined Sadeghi  
9 against his will. Li demanded Sadeghi's work laptop which was inside Sadeghi's backpack that  
10 Sadeghi was wearing. Li then attempted to take the laptop by force.

11 276. [August 7, 2017] Sadeghi to Li: "You are being aggressive"

12 277. [August 7, 2017] Yen-Chun Chen to Li: "Let's be calm. Let's calm down. Calm  
13 down."

14 278. Sadeghi intended to return the laptop before the end of business day, on August 7,  
15 2017, and told Li that he would return it after he preserved his personal data. The storage of  
16 personal data complied with any applicable Pinscreen's policies. In fact, Pinscreen had no policy  
17 regarding storing personal data on one's computer, and no such policy was ever communicated to  
18 Sadeghi.

19 279. Subsequently, Sadeghi left Pinscreen's office and headed towards the elevators. Li  
20 ordered some of Pinscreen's employees to follow Sadeghi.

21 280. After Sadeghi, Li, and other employees left the elevator, Sadeghi attempted to leave  
22 the building through the lobby. However, Li and three other Pinscreen employees, Yen-Chun  
23 Chen, Hu, and Kung, under Li's commands, surrounded Sadeghi and physically attacked him.  
24 They grabbed Sadeghi and his backpack, which he was wearing, forcefully restrained him, opened  
25 his backpack, and took possession of Sadeghi's work laptop.

26 281. [August 7, 2017] Sadeghi to Li and the other defendants: "Don't touch me. Don't  
27 touch me."

28 282. The battery, on information and belief, has been captured on the security cameras

1 of the building and the recordings have been preserved by the building security team. The security  
2 officers on duty described the battery as Sadeghi being “grabbed,” “brought to the ground,” and  
3 “taken to the ground” by Pinscreen employees.

4 283. During the battery, Sadeghi suffered injuries to his eye and his previously  
5 dislocated shoulder, requiring medical attention and multiple physical therapy sessions.

6 284. Sadeghi has suffered severe mental and emotional distress as a result of the forced  
7 confinement, invasion of his privacy, battery and the consequent physical injuries; he required  
8 multiple psychotherapy sessions.

9 **Defendants’ Post Termination Violations**

10 285. After Sadeghi’s termination, Pinscreen withheld business expense reimbursements  
11 including Sadeghi’s COBRA health insurance premiums despite prior written agreements.  
12 Pinscreen has subsequently acknowledged that reimbursements were owed but refused to pay  
13 them unless there was a successful settlement and/or Mutual Non-Disclosure Agreement  
14 (“MNDA”). After more than nine months delay, Pinscreen paid only a small portion of the past  
15 due reimbursements, in breach of Sadeghi’s contract, violation of prior written agreements, and in  
16 violation of California Labor Code § 2802. (Exhibits J3, J5)

17 286. Additionally, Pinscreen delayed paying Sadeghi his final wage payments, which  
18 according to California Labor Code § 203, entitled Sadeghi to waiting time penalties. On August  
19 16, 2017, Pinscreen sent Sadeghi an undated letter with no signature, as well as a check for the late  
20 wage payment penalties in the amount of the waiting time penalties owed. Pinscreen phrased the  
21 purpose of the check as a settlement offer “to resolve any wage issues.” Sadeghi’s counsel  
22 requested Pinscreen, multiple times, including September 17, 2017, and December 29, 2017, to  
23 reissue another check for the waiting time penalties only and to exclude the settlement agreement  
24 verbiage. Pinscreen subsequently refused to do so and stated through Kim, on January 16, 2018,  
25 that reissuing a check would be “subject to execution of a mutually agreeable MNDA by and  
26 between Pinscreen and you [Sadeghi]” in violation of California Labor Code § 203. After more  
27 than nine months delay, on May 23, 2018, Pinscreen reissued another check without the settlement  
28 agreement verbiage. Sadeghi is entitled to his salary for 30 additional days. (Exhibits J2, J5)

1           287. The letter of Sadeghi’s counsel on August 9, 2017, 2 days after the termination,  
2 requested for Sadeghi’s personal property, pointing out that Sadeghi’s personal belongings are  
3 “valuable” and “fragile.” Nonetheless, Pinscreen damaged Sadeghi’s personal property remaining  
4 at Sadeghi’s desk at Pinscreen’s office. In storing it negligently, Pinscreen broke Sadeghi’s  
5 handmade sculpture, which has sentimental value. Sadeghi has demanded Pinscreen to reimburse  
6 him for the personal property damages. Subsequently, Pinscreen has refused to do so and stated  
7 through Kim, on January 16, 2018, that such reimbursement would be “subject to execution of a  
8 mutually agreeable MNDAs” between Pinscreen and Sadeghi. (Exhibits J1, J5)

9           288. On January 16, 2018, Kim, a co-founder and a board member of Pinscreen, joined  
10 Sadeghi for a Google Hangout video conference call to talk about Sadeghi’s employment related  
11 claims. During the call, Sadeghi asked Kim whether he was aware of Li and Pinscreen’s data  
12 fabrication. Kim did not deny the fabrication in his response: (Exhibit J4)

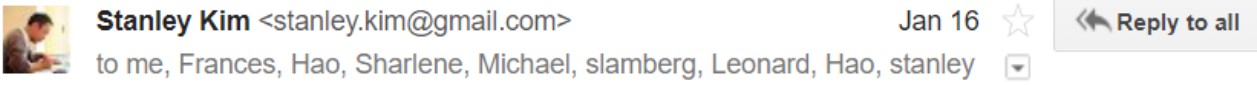
13           289. [January 16, 2018] Sadeghi: “I don’t know if you knew about the data fabrication.  
14 Did you?”

15           290. [January 16, 2018] Kim: “Not in real time.”



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291. After the video conference, on the same day, Kim send Sadeghi an e-mail with subject line “Re: Iman Sadeghi - Notice of Claim and Litigation Hold.” In his e-mail, Kim stated that Pinscreen would provide a check for the reimbursements, reissue a check to substitute for previous time penalty check, and provide a check for the personal property damage “subject to execution of mutually agreeable MNDA by and between Pinscreen and you.” (Exhibit J5)



Iman ~ Thanks for connecting today.

[...]

Pinscreen proposes the following:

- Pinscreen provides check for reimbursement; re-issues check to substitute for previous time penalty check; and provides check for personal property damage, subject to execution of
- Mutually agreeable MNDA by and between Pinscreen and you

[...]

If you do not find this acceptable, that is your prerogative.

292. Due to Li’s and Pinscreen’s violation of scientific research ethics and academic code of conduct, Sadeghi requested ACM and SIGGRAPH organizations to retract his name from Pinscreen’s fabricated publications. Li’s and Pinscreen’s fraud against the scientific community and academic misconduct were the proximate cause of Sadeghi having to sacrifice the scientific credit for his own significant contribution to these publications.

293. Sadeghi required multiple psychotherapy sessions as a result of the severe mental and emotional distress as a result of conversion of his personal data and infringement of his intellectual property rights.

**Li’s Unfitness, Incompetence, and Ineligibility to Work for Pinscreen**

294. Li was and is unfit and incompetent to perform the duties required for the CEO role at Pinscreen due to numerous instances of fraud, data fabrication, academic misconduct, disregard for California labor laws, disregard for federal immigration laws, and other illegal practices.

295. On information and belief, Li was and is ineligible to perform any role at Pinscreen due to his lack of proper work visa.

296. Li’s actions have been reckless, vicious, and have caused harm to Sadeghi, other

1 Pinscreen employees, and Pinscreen’s investors and stakeholders.

2           297. Sadeghi was harmed and Pinscreen is liable because Pinscreen negligently hired  
3 and retained an unfit, incompetent, and ineligible CEO, did not properly train him, did not  
4 properly supervise him, and did not properly verify his eligibility.

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1 **FIRST CAUSE OF ACTION**

2 **Fraudulent Inducement of Employment Contract**

3 **by Intentional Misrepresentation**

4 **(Against Li, Pinscreen, and Does 1-100)**

5 298. The allegations contained in each paragraph above are incorporated by reference as  
6 if fully set forth here.

7 299. Li, on behalf of Pinscreen, willfully deceived Sadeghi with the intent to induce  
8 Sadeghi to resign his employment at Google and to join Pinscreen.

9 300. Li, on behalf of Pinscreen, intentionally misrepresented Pinscreen’s technical  
10 capabilities to Sadeghi and concealed its various illegal practices from him, which caused Sadeghi  
11 harm.

12 301. Li intended for Sadeghi to rely on his misrepresentations, resign from Google, and  
13 join Pinscreen, in order to gain access to Sadeghi’s expertise and experience in digital hair  
14 appearance and software engineering.

15 302. Reasonably relying on Li’s misrepresentations, Sadeghi resigned from Google and  
16 joined Pinscreen.

17 303. A strong justification for Sadeghi’s reasonable reliance on Li’s misrepresentations  
18 is that Li, on information and belief, was and is an assistant professor at USC. Li’s claims to have  
19 automated that which he had merely fabricated means that Li has committed academic misconduct  
20 which, if discovered, could be subject to draconian punishment.

21 304. Crucial to Sadeghi’s decision to sign the contract with Pinscreen and to resign from  
22 Google was Li’s intentional misrepresentation of Pinscreen’s technical capabilities, including Li’s  
23 claim on January 22, 2017, that Pinscreen was capable of automatically generating the avatars that  
24 Li presented to Sadeghi on that same day.

25 305. On January 22, 2017, at 3:39 p.m., Li sent Sadeghi, in private Facebook messages,  
26 two sets of input images as well as their corresponding supposedly automatically generated  
27 (“autogenerated”) output avatars. Sadeghi expressed his surprise and asked Li whether the avatar’s  
28 hair was “autogenerated.” Li responded to Sadeghi in writing, “yes.”

1           306. [January 22, 2017, at 3:43 p.m.] Sadeghi: “[...] Autogenerated hair?” Li: “Yes”

2           307. Li’s claim that the presented avatars and their hair were automatically generated  
3 was a brazen lie. Li and Pinscreen repeatedly misrepresented manually prepared avatars as  
4 automatic, even up to six months after Li’s initial fraudulent representations to Sadeghi, including  
5 during Pinscreen’s public demo at SIGGRAPH RTL 2017, on August 1, 2017.

6           308. Accurate copies of Li’s fraudulent misrepresentations to Sadeghi, are attached in  
7 Exhibit C and are incorporated here by reference.

8           309. Sadeghi would not have resigned from Google and joined Pinscreen if Li had not  
9 intentionally misrepresented and concealed that Pinscreen and Li were involved in data  
10 fabrication, academic misconduct, and other unlawful practices.

11           310. Li’s misrepresentation and concealment were intentional. Li must have been aware  
12 that his representation to Sadeghi was false when he made it and also that he was concealing  
13 Pinscreen’s data fabrication and academic misconduct from Sadeghi: Li was himself directing the  
14 misrepresentations.

15           311. These fraudulent misrepresentations were made by Li, on behalf of Pinscreen, as its  
16 co-founder and CEO.

17           312. Sadeghi was damaged, in an amount to be determined at trial, by being fraudulently  
18 induced to give up his employment at Google, which income and benefits were unsubstituted once  
19 Sadeghi was retaliated against and wrongfully terminated from Pinscreen.

20           313. As a direct, foreseeable, and proximate result of Pinscreen, through Li, willfully  
21 deceiving Sadeghi to cause him to resign from Google and join Pinscreen, Sadeghi has lost and  
22 will continue to lose income and benefits and has suffered and continues to suffer mental and  
23 emotional distress, all to Sadeghi’s damage, in an amount to be determined at trial.

24           314. Sadeghi is entitled to punitive or exemplary damages because brazen deceit is  
25 malicious.

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1 **SECOND CAUSE OF ACTION**

2 **Fraudulent Inducement of Employment Contract**

3 **by Intentional Concealment**

4 **(Against Li, Pinscreen, and Does 1-100)**

5 315. The allegations contained in each paragraph above are incorporated by reference as  
6 if fully set forth here.

7 316. Li, on behalf of Pinscreen, willfully deceived Sadeghi with the intent to induce  
8 Sadeghi to resign his employment at Google and to join Pinscreen.

9 317. Li, on behalf of Pinscreen, intentionally concealed its various illegal practices from  
10 him, causing Sadeghi harm.

11 318. Li intentionally concealed from Sadeghi that Li and Pinscreen were involved in  
12 unlawful practices, including data fabrication, academic misconduct, fraud on investors, labor law  
13 violations, and immigration law violations.

14 319. Sadeghi did not know about Pinscreen’s illegal practices before resigning from  
15 Google and joining Pinscreen.

16 320. Li’s concealment was intentional. Li must have been aware of Pinscreen’s illegal  
17 practices as he had an active role in all of them.

18 321. Li intended for Sadeghi to rely on his misrepresentations, resign from Google, and  
19 join Pinscreen, in order to gain access to Sadeghi’s expertise and experience in digital hair  
20 appearance and software engineering.

21 322. Sadeghi would not have resigned from Google and joined Pinscreen if Li had not  
22 intentionally misrepresented and concealed that Pinscreen and Li were involved in data  
23 fabrication, academic misconduct, labor laws violations, immigration law violations and other  
24 unlawful practices.

25 323. Li knew or should have known that Sadeghi would not have left Google and joined  
26 Pinscreen if Pinscreen’s illegal practices, including data fabrication, academic misconduct, fraud  
27 on investors, labor law violations, and immigration law violations, were known to Sadeghi. In fact,  
28 Li purposely and maliciously misrepresented and concealed such to get Sadeghi to leave Google

1 and join Pinscreen.

2 324. These fraudulent misrepresentations were made by Li, on behalf of Pinscreen, as its  
3 co-founder and CEO.

4 325. Sadeghi was damaged, in an amount to be determined at trial, by being fraudulently  
5 induced to give up his employment at Google which income and benefits were unsubstituted once  
6 Sadeghi was retaliated against and wrongfully terminated from Pinscreen.

7 326. As a direct, foreseeable, and proximate result of Pinscreen, through Li, willfully  
8 deceiving Sadeghi to resign from Google and join Pinscreen, Sadeghi has lost and will continue to  
9 lose income and benefits and has suffered and continues to suffer mental and emotional distress,  
10 all to Sadeghi's damage, in an amount to be determined at trial.

11 327. Sadeghi is entitled to punitive or exemplary damages because the concealment is  
12 part of a pattern of brazen deceit and therefore is malicious.

13

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### **THIRD CAUSE OF ACTION**

15

#### **Battery**

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#### **(Against Li, Yen-Chun Chen, Hu, Kung, Pinscreen, and Does 1-100)**

17

18 328. The allegations contained in each paragraph above are incorporated by reference as  
19 if fully set forth here.

19

20 329. The defendants, including Li, Yen-Chun Chen, Hu, and Kung, committed battery  
21 on Sadeghi through intentional, non-consensual, offensive and harmful physical contact.

21

22 330. On August 7, 2017, Pinscreen employees, including Li, forcefully grabbed,  
23 restrained, and physically attacked Sadeghi. They forcefully opened Sadeghi's backpack and took  
24 possession of his work laptop.

24

25 331. Each of the four defendants, Li, Yen-Chun Chen, Hu, and Kung, either touched,  
26 grabbed or attacked Sadeghi or acted in concert with the defendants who did.

26

27 332. Li and the three other employees, Yen-Chun Chen, Hu, and Kung, who followed  
28 Li's orders, were acting within the course and scope of their employment.

28

333. The physical altercation is captured on the security cameras of Pinscreen's office's

1 building and is described by the security officers on duty as Sadeghi being “grabbed,” “brought to  
2 the ground,” and “taken to the ground” by Pinscreen employees.

3 334. Sadeghi did not consent to being touched, grabbed, and restrained by the  
4 defendants.

5 335. Sadeghi was offended, harmed, and physically injured by defendants’ battery.  
6 Sadeghi required medical attention and continues to seek physical therapy. Besides physical pain  
7 and suffering, Sadeghi has suffered substantial physical, mental, and emotional distress as a result  
8 of the battery and the consequent physical injury and required and continues to seek  
9 psychotherapy.

10 336. As a foreseeable proximate effect of the battery, Sadeghi has suffered damages in  
11 an amount to be determined at trial.

12 337. Sadeghi is entitled to punitive or exemplary damages because a brutal physical  
13 attack by several employees is an undeniably malicious act.

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**FOURTH CAUSE OF ACTION**

16

**Violation of California Labor Code § 1102.5 –**

17

**Retaliation Against Whistleblowing**

18

**(Against Pinscreen)**

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20 338. The allegations contained in each paragraph above are incorporated by reference as  
if fully set forth here.

21

22 339. California Labor Code § 1102.5 (b), in pertinent part, provides: “An employer, or  
23 any person acting on behalf of the employer, shall not retaliate against an employee for disclosing  
24 information, or because the employer believes that the employee disclosed or may disclose  
25 information, to a government or law enforcement agency, to a person with authority over the  
26 employee or another employee who has the authority to investigate, discover, or correct the  
27 violation [...], if the employee has reasonable cause to believe that the information discloses a  
28 violation of state or federal statute, or a violation of or noncompliance with a local, state, or  
federal rule or regulation, regardless of whether disclosing the information is part of the

1 employee's job duties.”

2 340. Li, on behalf of Pinscreen, wrongfully terminated Sadeghi in retaliation for his  
3 objections to Li's and Pinscreen's illegal practices.

4 341. Sadeghi entered into an employment contract with Pinscreen, on January 23, 2017.  
5 An accurate copy of the employment contract, which is signed by Li and Sadeghi, is attached as  
6 Exhibit G and incorporated here by reference.

7 342. On information and belief, Li and Pinscreen believed that Sadeghi might disclose  
8 their illegal practices to a government agency or law enforcement agency.

9 343. Li and Pinscreen knew that Sadeghi had objected to their illegal practices to Li,  
10 who had authority over Sadeghi and could investigate, discover, and correct the misconduct.

11 344. Pinscreen's and Li's unlawful practices included data fabrication, academic  
12 misconduct, California labor law violations, and federal immigration law violations. Sadeghi  
13 opposed these wrongful activities and had reasonable cause to believe that Li's and Pinscreen's  
14 activities were in violation of California and federal laws.

15 345. Sadeghi had reasonable cause to believe that Pinscreen's data fabrication and  
16 academic misconduct constituted a fraud on Pinscreen investors, violating Business &  
17 Professional Code § 17200, Corporations Code § 25401, and Civil Code §§ 1572, 1709, and 1710.  
18 Sadeghi had reasonable cause to believe that Li's refusal to pay overtime compensation was in  
19 violation of California labor laws, including Labor Code §§ 510 and 204. Sadeghi had reasonable  
20 cause to believe that Pinscreen's employment of foreign workers without proper work visas was in  
21 violation of federal immigration laws, including the Immigration Reform and Control Act of 1986.

22 346. Therefore, Sadeghi's objections to Li's and Pinscreen's illegal practices were  
23 protected whistleblowing activities.

24 347. Li, on behalf of Pinscreen, terminated Sadeghi on August 7, 2017.

25 348. Sadeghi's protected act of objecting to Li's and Pinscreen's illegal practices to Li  
26 was a contributing factor in Li's decision to terminate Sadeghi.

27 349. As a direct, foreseeable, and proximate result of Pinscreen's wrongful termination  
28 of Sadeghi, through Li, Sadeghi has lost and will continue to lose income and benefits and has

1 suffered and continues to suffer severe physical, mental, and emotional distress, all to Sadeghi's  
2 damage, in an amount to be determined at trial.

3 350. Li's retaliation against Sadeghi, on behalf of Pinscreen, was in a deliberate, cold,  
4 callous, malicious, oppressive, and intentional manner in order to injure and damage Sadeghi.  
5 Therefore, Sadeghi is entitled to punitive and exemplary damages against Pinscreen in an amount  
6 appropriate to punish to be determined at trial.

## 8 **FIFTH CAUSE OF ACTION**

### 9 **Breach of Employment Contract**

#### 10 **(Against Pinscreen)**

11 351. The allegations contained in each paragraph above are incorporated by reference as  
12 if fully set forth here.

13 352. Pinscreen breached Sadeghi's employment contract, causing him harm.

14 353. Pinscreen's contract breach included violating the covenant of good faith and fair  
15 dealing, implied by law into every contract.

16 354. Sadeghi entered into an employment contract with Pinscreen, on January 23, 2017.  
17 An accurate copy of the employment contract, which is signed by Li and Sadeghi, is attached as  
18 Exhibit G and incorporated here by reference.

19 355. Sadeghi substantially performed all of his duties under the contract.

20 356. Pinscreen materially breached Sadeghi's employment contract by requiring  
21 Sadeghi to participate in the preparation and presentation of fabricated results in the SIGGRAPH  
22 2017 RTL public demo as well as other unlawful misrepresentations.

23 357. Pinscreen, materially breached Sadeghi's employment contract by retaliating  
24 against Sadeghi, and by terminating Sadeghi after he raised concerns over Pinscreen's data  
25 fabrication, academic misconduct, labor law violations, immigration law violations, and other  
26 unlawful practices.

27 358. Pinscreen materially breached Sadeghi's employment contract by failing to  
28 reimburse Sadeghi for his business-related expenses.

1 359. Li, Yen-Chun Chen, and Kim, on behalf of Pinscreen, terminated Sadeghi on  
2 August 7, 2017.

3 360. Sadeghi was terminated after being employed at Pinscreen for just over six months,  
4 shortly after Pinscreen gained access to Sadeghi's expertise in software engineering and digital  
5 hair appearance modeling as well as Sadeghi's implementation of a variation of his published and  
6 patented hair rendering framework. The termination happened within Sadeghi's first working hour  
7 after Pinscreen's fabricated presentation at SIGGRAPH 2017 RTL, and during the meeting that  
8 Sadeghi had requested to address his concerns regarding Pinscreen's illegal and unethical  
9 practices.

10 361. Sadeghi was damaged by the breach of contract, and as a result of his unlawful  
11 termination from Pinscreen, in an amount equal to his reasonable expectations, should he have  
12 been ethically and legally able to remain in the company, to be determined at trial.

13  
14 **SIXTH CAUSE OF ACTION**

15 **Breach of Implied Contract for Research Integrity**

16 **(Against Pinscreen)**

17 362. The allegations contained in each paragraph above are incorporated by reference as  
18 if fully set forth here.

19 363. Pinscreen breached the implied contract between him and the company which  
20 caused him harm.

21 364. Sadeghi entered into an employment contract with Pinscreen, on January 23, 2017.  
22 An accurate copy of the employment contract, which is signed by Li and Sadeghi, is attached as  
23 Exhibit G and incorporated here by reference.

24 365. Sadeghi substantially performed all of his duties under the contract.

25 366. Pinscreen had an implied-in-fact agreement and obligation to conform to scientific  
26 research ethics and to follow academic conduct guidelines, including that of the University of  
27 Southern California and Association for Computing Machinery. Li is subject to the ethical  
28 standards of these institutions, with which he is affiliated.

1 367. Pinscreen breached this implied contract by engaging and requiring Sadeghi to  
2 participate in its data fabrication, academic misconduct, and other unlawful practices.

3 368. Sadeghi was damaged, through loss of intellectual property, by having to request  
4 the SIGGRAPH community to retract his name from the authorship of Pinscreen's fabricated  
5 publications, despite his authentic and significant contributions, for example, to Pinscreen's digital  
6 hair appearance.

7  
8 **SEVENTH CAUSE OF ACTION**

9 **Wrongful Termination in Violation of Public Policy**

10 **(Against Pinscreen)**

11 369. The allegations contained in each paragraph above are incorporated by reference as  
12 if fully set forth here.

13 370. Sadeghi was terminated from Pinscreen for reasons that violate California and  
14 federal public policy. It is a violation of California public policy to terminate an employee for  
15 objecting to an employer's practices when those practices are illegal and in contravention of public  
16 policy.

17 371. Sadeghi entered into an employment contract with Pinscreen, on January 23, 2017.  
18 An accurate copy of the employment contract, which is signed by Li and Sadeghi, is attached as  
19 Exhibit G and incorporated here by reference.

20 372. Li, on behalf of Pinscreen, terminated Sadeghi on August 7, 2017.

21 373. Sadeghi's objections to Li's and Pinscreen's illegal practices was a substantial  
22 motivating reason for Sadeghi's termination.

23 374. Among those deceived by Li's intentional misrepresentations of Pinscreen's  
24 technical capabilities were Pinscreen investors.

25 375. California's public policy against Li's and Pinscreen's data fabrication is expressed  
26 in the laws prohibiting deceit of investors and imposing a fiduciary duty of corporate officers  
27 toward investors as well as in Business & Professional Code § 17200 and in Corporations Code §  
28 25401, and Civil Code §§ 1572, 1709, and 1710.



1           376. California’s public policy against Li’s and Pinscreen’s academic misconduct and  
2 scientific misrepresentations is expressed in the universally accepted research ethics including the  
3 official policies of University of Southern California and Association for Computing Machinery.  
4 Li is subject to the ethical standards of these institutions, with which he is affiliated. State public  
5 policy is committed to support the ethical truisms of honest research, for example, by its support  
6 of a huge state university system that could not persevere without research integrity. California  
7 public policy also spurns Li’s and Pinscreen’s academic misconduct and data fabrication because  
8 it represents unfair competition under Business & Professions Code section 17200 and California  
9 Corporations Code § 25401.

10           377. California’s public policy against Li’s and Pinscreen’s labor law violations is  
11 expressed in California labor laws mandating overtime payments for nonexempt employees,  
12 specifically Labor Code §§ 510 and 204.

13           378. The federal public policy against Li’s and Pinscreen’s immigration law violations is  
14 expressed in the Immigration Reform and Control Act of 1986.

15           379. These public policies are fundamental, substantial, well established, and involve  
16 matters that affect society at large.

17           380. Sadeghi’s termination by Pinscreen was in retaliation for Sadeghi’s objections to  
18 Li’s and Pinscreen’s illegal practices, including data fabrications, academic misconduct, labor law  
19 violations, and immigration law violations, and was carried out in violation of California and  
20 federal public policy.

21           381. As a direct, foreseeable, and proximate result of Pinscreen wrongfully terminating  
22 Sadeghi in violation of California and federal public policy, Sadeghi has lost and will continue to  
23 lose income and benefits and has suffered and continues to suffer severe physical, mental, and  
24 emotional distress, all to Sadeghi’s damage, in an amount to be determined at trial.

25           382. Li’s wrongful termination of Sadeghi, on behalf of Pinscreen was done, in a  
26 deliberate, cold, callous, malicious, oppressive, and intentional manner in order to injure and  
27 damage Sadeghi. Therefore, Sadeghi is entitled to punitive and exemplary damages against Li and  
28 Pinscreen in an amount appropriate to punish to be determined at trial.

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**EIGHTH CAUSE OF ACTION**  
**Intentional Interference with Contract**  
**(Against Li and Does 1-100)**

383. The allegations contained in each paragraph above are incorporated by reference as if fully set forth here.

384. On information and belief, Li, based in part on personal motives unrelated to his agency for Pinscreen, without privilege or justification, intentionally interfered with Sadeghi’s employment contract with Pinscreen.

385. Sadeghi entered into an employment contract with Pinscreen, on January 23, 2017. An accurate copy of the employment contract, which is signed by Li and Sadeghi, is attached as Exhibit G and incorporated here by reference.

386. Li was aware of the existence of Sadeghi’s employment contract with Pinscreen.

387. On information and belief, Li intended to induce a breach of Sadeghi’s employment contract with Pinscreen by illegally retaliating against Sadeghi and wrongfully terminating him.

388. On information and belief, Li’s retaliation and wrongful termination of Sadeghi from Pinscreen was engineered by Li in part for personal motives unrelated to his agency for Pinscreen as its CEO.

389. On information and belief, Li interfered with and disrupted the performance of Sadeghi’s employment contract with Pinscreen because he feared Sadeghi would expose Pinscreen’s transgression of inviolate academic norms prohibiting the fabrication of data, as well as Pinscreen’s other illegal activities including labor law and immigration law violations.

390. Sadeghi was damaged by Li’s interference with Sadeghi’s employment contract with Pinscreen in amounts to be determined at trial.

391. As a direct, foreseeable, and proximate result of Li’s interference with Sadeghi’s employment contract with Pinscreen, Sadeghi has lost and will continue to lose income and benefits and has suffered and continues to suffer severe physical, mental, and emotional distress, all to Sadeghi’s damage, in an amount to be determined at trial.

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**NINTH CAUSE OF ACTION**

**Intentional Infliction of Emotional Distress**

**(Against Li, Yen-Chun Chen, Hu, Kung, Pinscreen, and Does 1-100)**

392. The allegations contained in each paragraph above are incorporated by reference as if fully set forth here.

393. Defendants’ actions have caused Sadeghi to suffer severe mental and emotional distress due to, including but not limited to, being fraudulently deceived to leave his employment at Google, being wrongfully terminated from his employment at Pinscreen, being battered, being physically injured, invasion of his privacy, and infringement of his intellectual property rights.

394. Pinscreen’s, Li’s and other defendants’ conduct abused the employment relationship which had given them power to damage Sadeghi’s interests; knew that Sadeghi was susceptible to injuries through mental and emotional distress; and acted intentionally and unreasonably with the recognition that their actions are likely to cause mental and emotional distress.

395. Li and other defendants intended to cause Sadeghi mental and emotional distress or acted with reckless disregard of the probability that Sadeghi would suffer mental and emotional distress.

396. Defendants’ treatment of Sadeghi, culminating in an actual physical attack was such as would be generally proclaimed to be outrageous.

397. As a direct, foreseeable, and proximate result of defendants’ unlawful actions, Sadeghi has lost and will continue to lose income and benefits and has suffered and continues to suffer severe mental and emotional distress, all to Sadeghi’s damage, in an amount to be determined at trial.

398. On information and belief, the acts taken toward Sadeghi, carried out by the defendants, including Li, on behalf of Pinscreen, were in a deliberate, cold, callous, malicious, oppressive, and intentional manner in order to injure and damage Sadeghi. Therefore, Sadeghi is

1 entitled to punitive and exemplary damages against the defendants in an amount appropriate to  
2 punish to be determined at trial.

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4 **TENTH CAUSE OF ACTION**

5 **Negligent Hiring, Supervision or Retention**

6 **(Against Pinscreen)**

7 399. The allegations contained in each paragraph above are incorporated by reference as  
8 if fully set forth here.

9 400. Sadeghi was harmed and Pinscreen is liable because Pinscreen negligently hired  
10 and retained an unfit, incompetent, and ineligible CEO, did not properly train him, did not  
11 properly supervise him, and did not properly verify his work eligibility.

12 401. Li was and is unfit and incompetent to perform the duties required for the CEO role  
13 at Pinscreen due to numerous instances of fraud, data fabrication, academic misconduct, disregard  
14 for California labor laws, immigration laws, and other illegal practices.

15 402. Li's actions have been reckless, vicious, and have caused harm to Sadeghi, other  
16 Pinscreen employees, and Pinscreen's investors and stakeholders.

17 403. On information and belief, Li was and is ineligible to perform any role at Pinscreen  
18 due to his lack of proper work visa.

19 404. Pinscreen knew, should have known, and or had failed to use reasonable care to  
20 discover that Li was unfit, incompetent, and ineligible to work for the company.

21 405. Pinscreen knew, or should have known, that Li's unfitness, incompetence, and  
22 ineligibility risked damaging its employees, including Sadeghi, its investors and the public.

23 406. Li's unfitness, incompetence, and ineligibility harmed Sadeghi. The harms included  
24 being fraudulently deceived, illegally retaliated against, wrongfully terminated, and assaulted and  
25 battered, injuring Sadeghi in an amount to be determined at trial.

26 407. Pinscreen's negligence in hiring, training, supervision, and retention of Li was a  
27 substantial factor in causing Sadeghi's harm.

28 408. As a direct, foreseeable, and proximate result of Li's unfitness, incompetence, and

1 ineligible, Sadeghi has lost and will continue to lose income and benefits and has suffered and  
2 continues to suffer severe physical, mental, and emotional distress, all to Sadeghi's damage, in an  
3 amount to be determined at trial.

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5 **ELEVENTH CAUSE OF ACTION**

6 **Violation of California Labor Code § 2802**

7 **(Against Pinscreen)**

8 409. The allegations contained in each paragraph above are incorporated by reference as  
9 if fully set forth here.

10 410. California Labor Code § 2802, in pertinent part, provides: "(a) An employer shall  
11 indemnify his or her employee for all necessary expenditures or losses incurred by the employee  
12 in direct consequence of the discharge of his or her duties. [...] (c) For purposes of this section, the  
13 term necessary expenditures or losses shall include all reasonable costs, including, but not limited  
14 to, attorney s fees incurred by the employee enforcing the rights granted by this section. (d) In  
15 addition to recovery of penalties under this section in a court action or proceedings pursuant to  
16 Section 98, the commissioner may issue a citation against an employer or other person acting on  
17 behalf of the employer who violates reimbursement obligations for an amount determined to be  
18 due to an employee under this section."

19 411. After Sadeghi's wrongful termination, Pinscreen withheld business expense  
20 reimbursements.

21 412. Pinscreen acknowledged that reimbursements were due, but claimed that it would  
22 only pay them pending a successful settlement and/or mutual non-disclosure agreement. After  
23 more than nine months delay, Pinscreen paid only a small portion of the past due reimbursements.

24 413. As a direct, foreseeable, and proximate result of Pinscreen refusing to reimburse  
25 Sadeghi for his business expenses, Sadeghi has lost and will continue to lose monetary benefits  
26 and has suffered and continues to suffer mental and emotional distress, all to Sadeghi's damage, in  
27 an amount to be determined at trial.

28 414. On information and belief, the acts taken toward Sadeghi, carried out by the

1 defendants, including Li, on behalf of Pinscreen, were in a deliberate, cold, callous, malicious,  
2 oppressive, and intentional manner in order to injure and damage Sadeghi. Therefore, Sadeghi is  
3 entitled to punitive and exemplary damages against the defendants in an amount appropriate to  
4 punish to be determined at trial.

5 415. Sadeghi is entitled to recover attorney’s fees incurred in order to enforce these due  
6 reimbursement payments. enforcing the rights granted by California Labor Code § 2802.

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**TWELFTH CAUSE OF ACTION**

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**Violation of California Labor Code § 203**

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**(Against Pinscreen)**

11 416. The allegations contained in each paragraph above are incorporated by reference as  
12 if fully set forth here.

13 417. Pinscreen delayed paying Sadeghi his final wages and therefore, pursuant to  
14 California Labor Code § 203, Sadeghi was entitled to waiting time penalties.

15 418. California Labor Code § 203 (a), in pertinent part, provides: “(a) If an employer  
16 willfully fails to pay, without abatement or reduction, [...] any wages of an employee who is  
17 discharged or who quits, the wages of the employee shall continue as a penalty from the due date  
18 thereof at the same rate until paid or until an action therefor is commenced.”

19 419. Pinscreen sent Sadeghi a check for the late wage-payment penalties in the amount  
20 of the waiting time penalties were owed. But Pinscreen conditioned the cashing of the check on  
21 Sadeghi accepting the amount as a full settlement of all wage issues. Since Sadeghi was neither  
22 prepared nor required to settle all wage claims as a precondition for recovering what he was owed,  
23 Sadeghi did not cash the check and repeatedly requested Pinscreen, including on September 17,  
24 2017, and on December 29, 2017, to reissue another check for the late penalty only, and to exclude  
25 the settlement verbiage. Pinscreen refused to reissue the penalty check until nine months after the  
26 late final wage payments. Sadeghi is entitled to waiting time penalties including his salary for 30  
27 additional days.

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**THIRTEENTH CAUSE OF ACTION**

**Breach of Constructive Bailment**

**(Against Li, Pinscreen, and Does 1-100)**

420. The allegations contained in each paragraph above are incorporated by reference as if fully set forth here.

421. Sadeghi was harmed by Pinscreen’s, Li’s, and other defendants’ negligence, which consequently caused damages to Sadeghi’s personal property.

422. As Sadeghi’s employer, Pinscreen owed Sadeghi a duty of due care. This duty of due care included the duty to avoid damaging Sadeghi’s personal property at his desk. Pinscreen breached the duty of due care by breaking Sadeghi’s hand-made sculpture, with sentimental value, after Sadeghi was unlawfully terminated from Pinscreen.

423. As a direct, foreseeable, and proximate result of the defendants’ negligence and breach of duty of due care, Sadeghi’s personal property was damaged. Consequently, Sadeghi was harmed and has suffered and continues to suffer severe mental and emotional distress, all to Sadeghi’s damage, in an amount which will be proven at trial.

**FOURTEENTH CAUSE OF ACTION**

**Invasion of Privacy**

**(Against Li, Yen-Chun Chen, Hu, Kung, Pinscreen, and Does 1-100)**

424. The allegations contained in each paragraph above is incorporated by reference as if fully set forth here.

425. Li, Pinscreen, and other defendants violated Sadeghi’s right to privacy in a manner that is highly offensive to a reasonable person.

426. Sadeghi had a reasonable expectation of privacy in the contents of his backpack into which Pinscreen intentionally intruded.

427. On August 7, 2017, while committing battery on Sadeghi, the defendants intentionally intruded Sadeghi’s backpack and took his work laptop by force.

428. As a direct, foreseeable, and proximate result of Pinscreen, Li, and other defendants



1 invading Sadeghi’s privacy, Sadeghi has suffered and continues to suffer severe mental and  
2 emotional distress, all to Sadeghi’s damage, in an amount to be determined at trial.

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5 **FIFTEENTH CAUSE OF ACTION**

6 **Violation of California Unfair Competition Law (UCL),**

7 **Business and Professions Code § 17200 et seq.**

8 **(Against Pinscreen)**

9 429. The allegations contained in each paragraph above are incorporated by reference as  
10 if fully set forth here.

11 430. California Business & Professional Code § 17200 et seq. prohibits any “unlawful,  
12 unfair, or fraudulent business act or practice” and any “unfair, deceptive, untrue or misleading  
13 advertising.”

14 431. Li’s and Pinscreen’s data fabrication and academic misconduct were fraudulent,  
15 deceptive, misleading, unfair, unlawful, and in violation of California Business & Professional  
16 Code § 17200.

17 432. Sadeghi has standing under Business and Professions Code section 17204 because  
18 he suffered actual injury from these practices. Sadeghi was one target of Pinscreen’s fraud in  
19 fabricating results. Sadeghi suffered actual damage from the academic misconduct aspect of Li’s  
20 transgressions because he was forced to ask ACM and SIGGRAPH to retract his name from  
21 publications containing fabricated data.

22 433. Li’s and Pinscreen’s fraudulent misrepresentations have caused deception of the  
23 public, scientific community, and Pinscreen’s actual and potential investors.

24 434. Li’s and Pinscreen’s labor law and immigration law violations are unfair and  
25 violate Labor Code § 204 and the Unfair Competition Law, Business and Professions Code §  
26 17200.

27 435. Because Li’s and Pinscreen’s data fabrication, academic misconduct, labor law  
28 violations, and immigration law violations are ongoing, and there is no indication that they will

1 cease their unlawful conduct, Sadeghi request the court to enjoin Li and Pinscreen from further  
2 violations of the law.

3 436. Li lied, on behalf of Pinscreen, to Sadeghi and fraudulently induced him to leave  
4 Google and join Pinscreen.

5 437. Li lied, on behalf of Pinscreen, to academics and fraudulently misrepresented  
6 Pinscreen's scientific achievements.

7 438. Li lied, on behalf of Pinscreen, to investors and fraudulently misrepresented  
8 Pinscreen's technical capabilities.

9 439. Li lied, on behalf of Pinscreen, to the public and fraudulently misrepresented  
10 Pinscreen's scientific achievements and technical capabilities.

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**PRAYER FOR RELIEF**

WHEREFORE, Sadeghi respectfully requests for relief and judgment against Li, Pinscreen and the other defendants, jointly and severally, as follows, in amounts according to proof:

- 1. For judgment in favor of Sadeghi against Pinscreen, Li, and the other defendants;
- 2. For restitutional, general, special, compensatory, punitive and exemplary damages;
- 3. For all applicable statutory penalties;
- 4. For pre- and post-judgment interest where allowed;
- 5. For attorneys' fees under applicable provisions of law, including California Labor Code § 1102.5;
- 6. For costs of suit incurred herein;
- 7. For injunctive relief against Pinscreen's deceptive business practices; and
- 8. For such other and further relief as the Court deems necessary, just and proper.

DATED: October 5, 2018

Respectfully submitted,

FERNALD LAW GROUP APC  
Brandon C. Fernald  
Adam P. Zaffos



By: \_\_\_\_\_  
Adam P. Zaffos  
Attorneys for Plaintiff Dr. Iman Sadeghi

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**DEMAND FOR JURY TRIAL**

Sadeghi hereby demands a jury trial on all claims and issues raised in the amended complaint for which Sadeghi is entitled to a jury.

DATED: October 5, 2018

Respectfully submitted,

FERNALD LAW GROUP APC  
Brandon C. Fernald  
Adam P. Zaffos



By: \_\_\_\_\_  
Adam P. Zaffos  
Attorneys for Plaintiff Dr. Iman Sadeghi

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**VERIFICATION**

I, Dr. Iman Sadeghi, declare and verify as follows:

I am the plaintiff in this proceeding and have read this amended complaint and know the contents thereof. The information contained herein is accurate to the best of my knowledge except as to those matters which are stated on information and belief, and as to those matters I believe them to be true.

I declare and verify under penalty of perjury under the laws of the State of California that the foregoing is true. It is based on my personal knowledge except where it is alleged on information and belief.

DATED: October 5, 2018

Respectfully submitted,



By: \_\_\_\_\_  
Dr. Iman Sadeghi

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**EXHIBIT A**

**Sadeghi's Qualifications**

1. Sadeghi's rendering titled "A Butterfly, a Water Drop and a High Speed Camera!" which received the Grand Prize in UCSD's Rendering Competition 2007:
  - <http://sadeghi.com/a-butterfly-a-water-drop-and-a-high-speed-camera>





1 Poster of UCSD's Rendering Competition 2007 featuring the renderings for the Grand Prize,  
2 First Prize, and honorable mentions:



1 2. Sadeghi’s “An Artist Friendly Hair Shading System” publication, in collaboration with Walt  
2 Disney Animation Studios, which Sadeghi presented at SIGGRAPH 2010:

- 3 • <http://sadeghi.com/an-artist-friendly-hair-shading-system>

4 Publication page on Disney Research website:

- 5 • <http://www.disneyresearch.com/publication/an-artist-friendly-hair-shading-system>



11 Publication page on ACM Digital Library:

- 12 • <http://dl.acm.org/citation.cfm?id=1778793>



- 1 3. Sadeghi’s “System and Method for Artist Friendly Controls for Hair Shading” co-invented  
2 patent, filed by Walt Disney Animation Studios:
- 3 • <http://www.google.com/patents/US8674988>
- 4
- 5 4. Sadeghi’s movie credit for “Hair Rendering Development,” in Walt Disney Animation  
6 Studios’ movie Tangled, on Internet Movie Database (“IMDb”):
- 7 • <http://www.imdb.com/name/nm4205348>
- 8
- 9 5. Li’s group messages to Sadeghi and Leszek on Skype, dated April 18, 2017:
- 10 • [April 18, 2017] Li: “hey leszek”
  - 11 • [April 18, 2017] Li: “please meet iman, the guy behind all the hair rendering tech for  
12 disney and dreamworks (incl. tangled)”


13  ☆ leszek, Hao Li  

14 ▼ 2 participants | <https://join.skype.com/FjDr37HVCiLE>

15  Hao Li  leszek

16 Tuesday, April 18, 2017

17

18  **Hao Li**

19 hey leszek 3:58 PM

20 please meet iman, the guy behind all the hair rendering tech for disney and  
21 dreamworks (incl. tangled)

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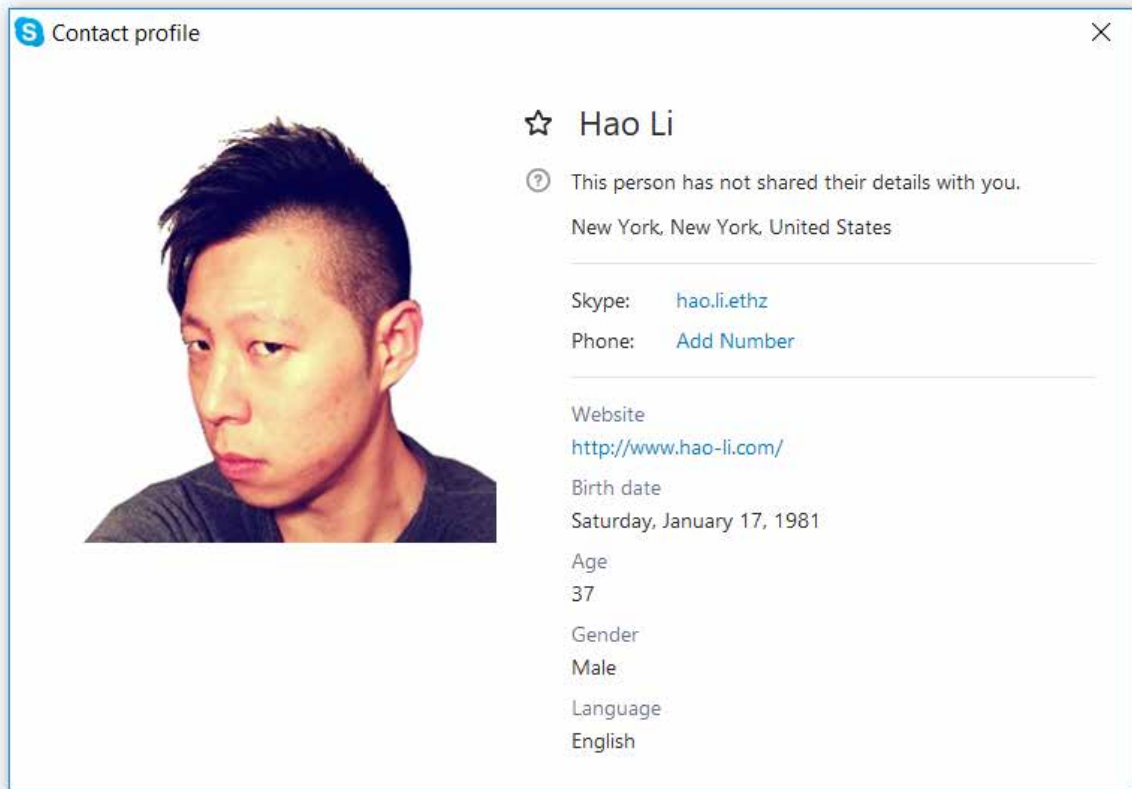
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Sadeghi’s Skype profile with Skype ID “iman.sadeghi”:



Li’s Skype profile with Skype ID “hao.li.ethz”:



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Leszek's Skype profile with Skype ID "spawnie76":




1 6. Li's group messages on "PinscreenTeamAll" Skype thread, shared with Sadeghi and 14 other  
2 participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund, Nagano, Hu, Yu,  
3 Saito, Xiang, Stephen Chen, and Zhou, dated June 1, 2017:


- 4 • [June 1, 2017] Nagano: "2 months is very tight lol for what needs to happen"
- 5 • [June 1, 2017] Li: "no 2 months is good"
- 6 • [June 1, 2017] Li: "kim libreri pulled his shit off in 1 month"
- 7 • [June 1, 2017] Li: "we have the best hair rendering guy"

8  ☆ PinscreenTeamAll    
9 ▼ 14 participants | <https://join.skype.com/L4luq1aWUhl2>


- 10
- 11  carrie sun  Cosimo Wei  Frances Chen  Han-Wei Kung  Hao Li
- 12  Jaewoo Seo  Jens Fursund  Koki Nagano  Liwen Hu  Ronald Yu
- 13  Shunsuke Saito  Sitao Xiang  Stephen Chen  Yi Zhou

14  Frances Chen We need new cool swag Thursday, June 1, 2017 2:12 PM

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16  Koki Nagano 2 months is very tight lol for what needs to happen 2:12 PM

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18  Hao Li no 2 months is good 2:13 PM

19 kim libreri pulled his shit off in 1 month

20 we have the best hair rendering guy

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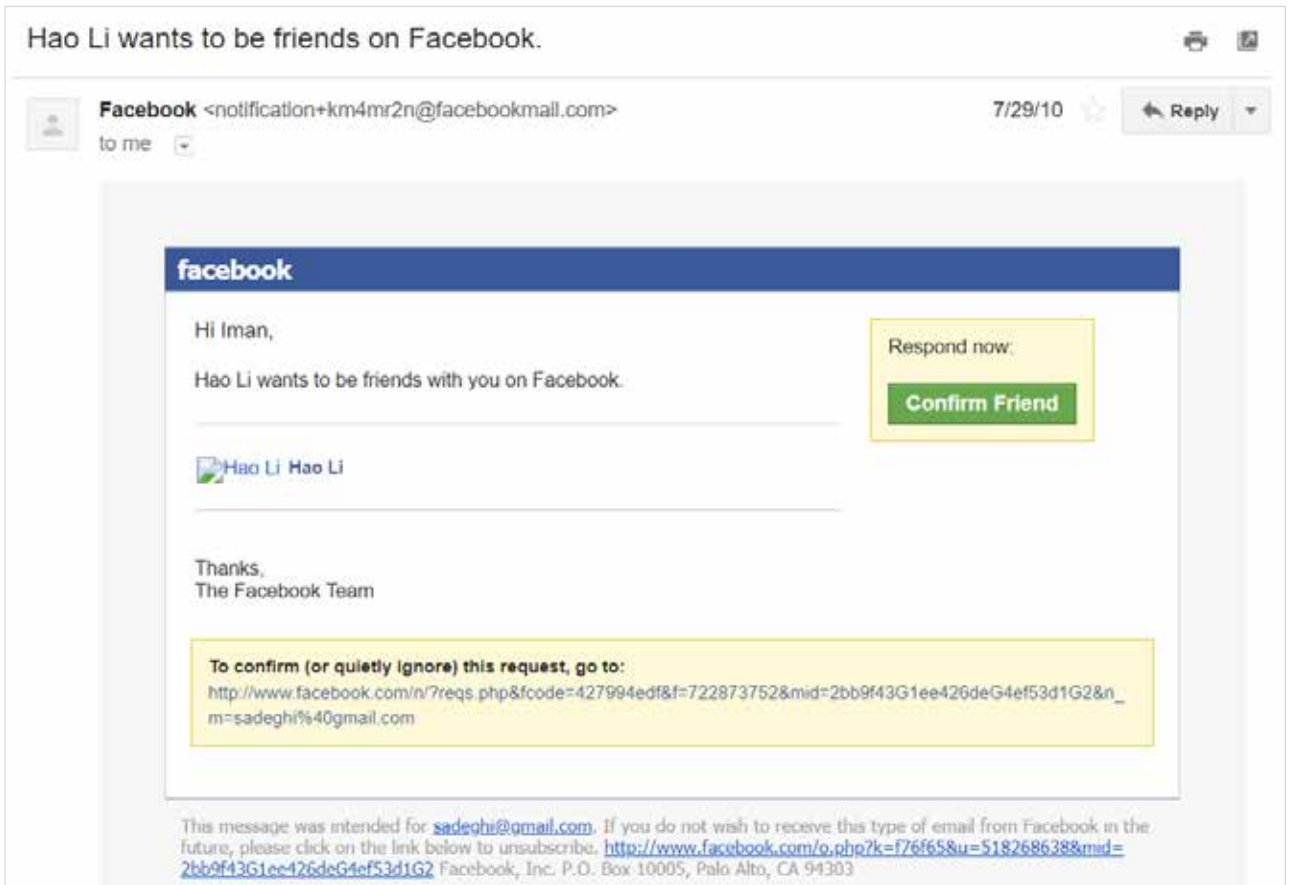
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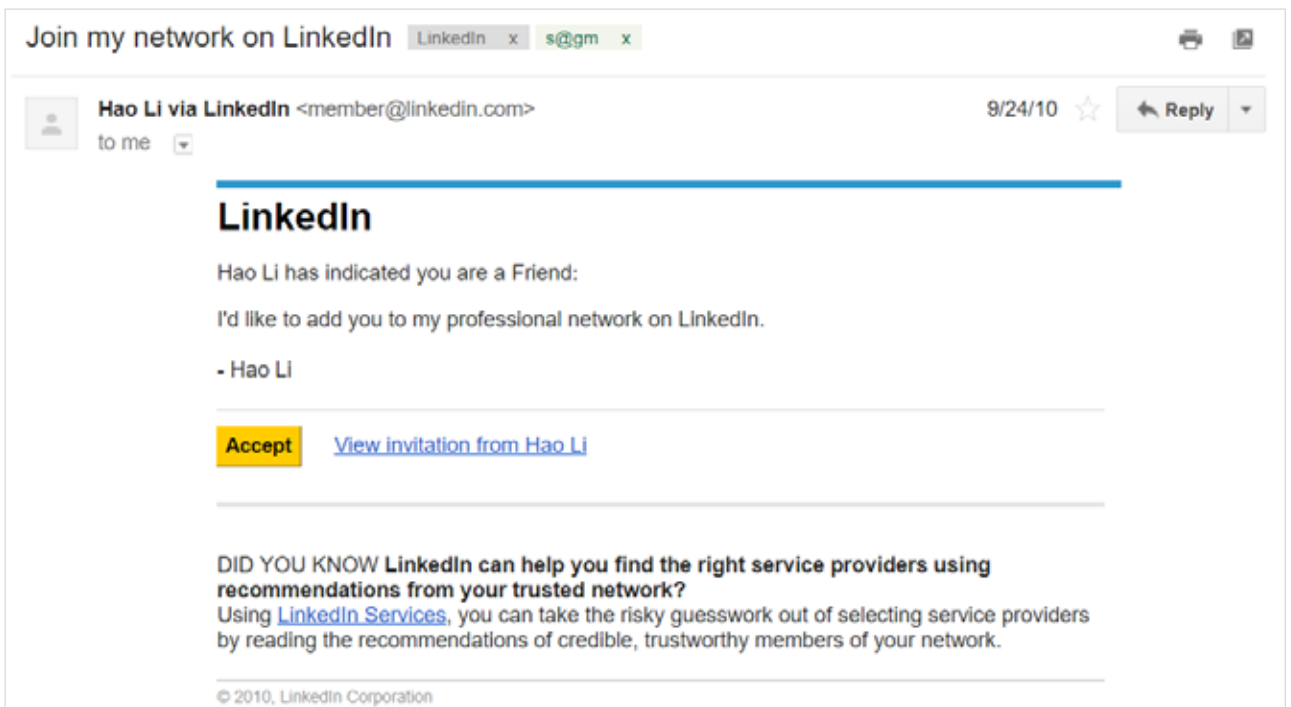
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1 7. Li's request to become friends with Sadeghi on Facebook, dated July 29, 2010:



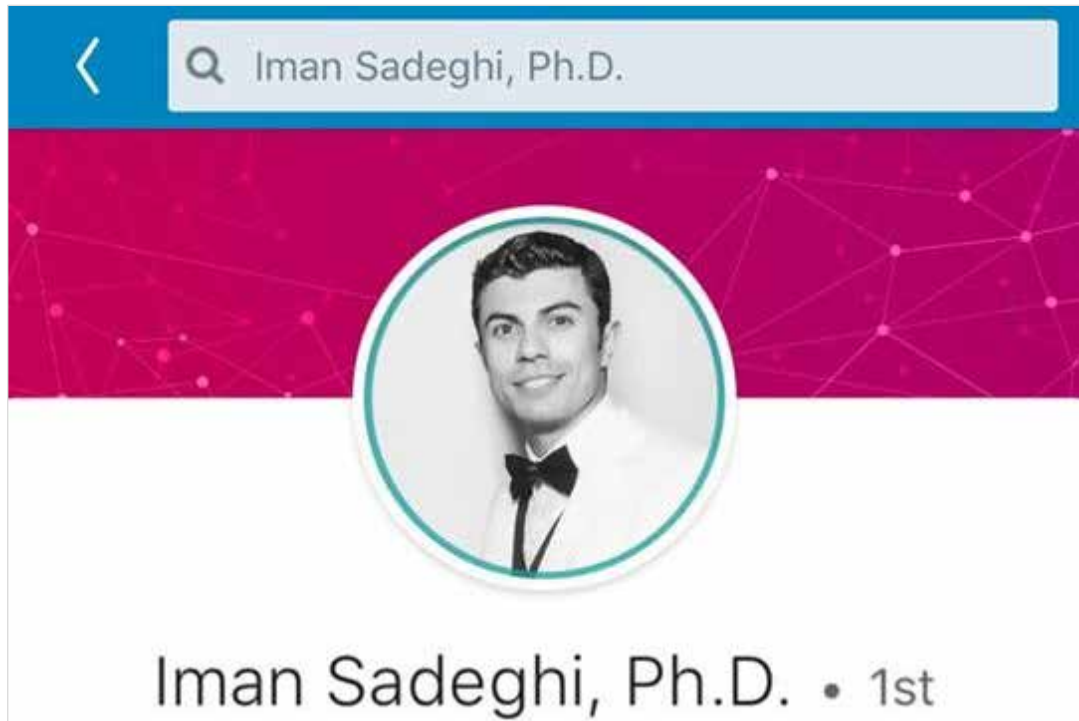
16 Li's request to add Sadeghi to his network on LinkedIn, dated September 24, 2010:





1 Sadeghi's LinkedIn profile:

- 2 • <https://www.linkedin.com/in/isadeghi/>



15 Li's LinkedIn profile:




- 16 • <https://www.linkedin.com/in/lihao/>




1 8. Li's private conversation with Sadeghi on Skype, dated July 28, 2017:

- 2 • [July 28, 2017] Li: "You are a good friend, [...]"
- 3 • [July 28, 2017] Sadeghi: "You are a great friend that I care about a lot as well [...]"

4

5  Hao Li  

6  This person has not shared their details...

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8 Contact request sent - [Resend contact request](#)


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10 *...a postings before exp, which*  
*... simply ignored* Friday, July 28, 2017

11 *You are a good friend, but work is* 6:35 PM

12  Hao Li  

13  This person has not shared their details with you.

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15 Contact request sent - [Resend contact request](#)

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17 *... your language professional and respectful and*  
*... will do the same.* Friday, July 28, 2017

18 *You are a great friend that I care about a lot as well*

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9. Sadeghi’s Ph.D. dissertation titled “Controlling the Appearance of Specular Microstructures,” which Sadeghi defended on June 1, 2011:

- <http://sadeghi.com/controlling-the-appearance-of-specular-microstructures>

Doctoral dissertation page on ACM Digital Library:

- <http://dl.acm.org/citation.cfm?id=2231594>



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10. Sadeghi’s “Physically-based Simulation of Rainbows” publication, a collaboration between UCSD, Universidad de Zaragoza, and Disney Research, which Sadeghi presented at SIGGRAPH 2012:

- <http://sadeghi.com/physically-based-simulation-of-rainbows>

Publication page on ACM Digital Library:

- <http://dl.acm.org/citation.cfm?id=2077344>



1 11. Sadeghi's "A Practical Microcylinder Appearance Model for Cloth Rendering" publication, a  
2 collaboration within UCSD, which Sadeghi presented at SIGGRAPH 2013:

- 3 • <http://sadeghi.com/a-practical-microcylinder-appearance-model-for-cloth-rendering>

4  
5 Publication page on ACM Digital Library:

- 6 • <http://dl.acm.org/citation.cfm?id=2451240>

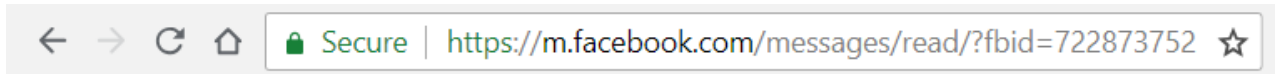



1 **EXHIBIT B**


2 **Li's and Pinscreen's Solicitation of Sadeghi**


3 1. Li's private conversation with Sadeghi on Facebook, dated November 8, 2016 and  
4 November 9, 2016:

- 5 • [November 8, 2016] Li: "ahahaha"
- 6 • [November 8, 2016] Li: "join us!"
- 7 • [November 9, 2016] Sadeghi: "I know! I am seriously considering it. I want to see your  
8 office 😊"
- 9 • [November 9, 2016] Li: "yes yes"
- 10 • [November 9, 2016] Li: "just now some folks at adobe are asking"
- 11 • [November 9, 2016] Li: "they love the trump shit"
- 12 • [November 9, 2016] Li: "this morning our company got valued at 30M"
- 13 • [November 9, 2016] Li: "more VCs knocking at our doors"
- 14 • [November 9, 2016] Li: "we increase are valuation by X8 since 3 months"



16  **Hao Li**  
17 ahahaha  
18 join us!  
Nov 8, 2016 · Sent from Web

19  **Iman Sadeghi**  
20 I know! I am seriously considering it. I want to see your office 😊  
21 Nov 9, 2016 ·

22  **Hao Li**  
23 yes yes  
24 just now some folks at adobe are asking  
25 they love the trump shit  
26 this morning our company got valued at 30M  
27 more VCs knocking at our doors  
28 we increase are valuation by X8 since 3 months  
Nov 9, 2016 · Sent from Web



1 Sadeghi’s Facebook profile with Facebook ID “imanopolo”:

- 2 • <https://www.facebook.com/imanopolo>

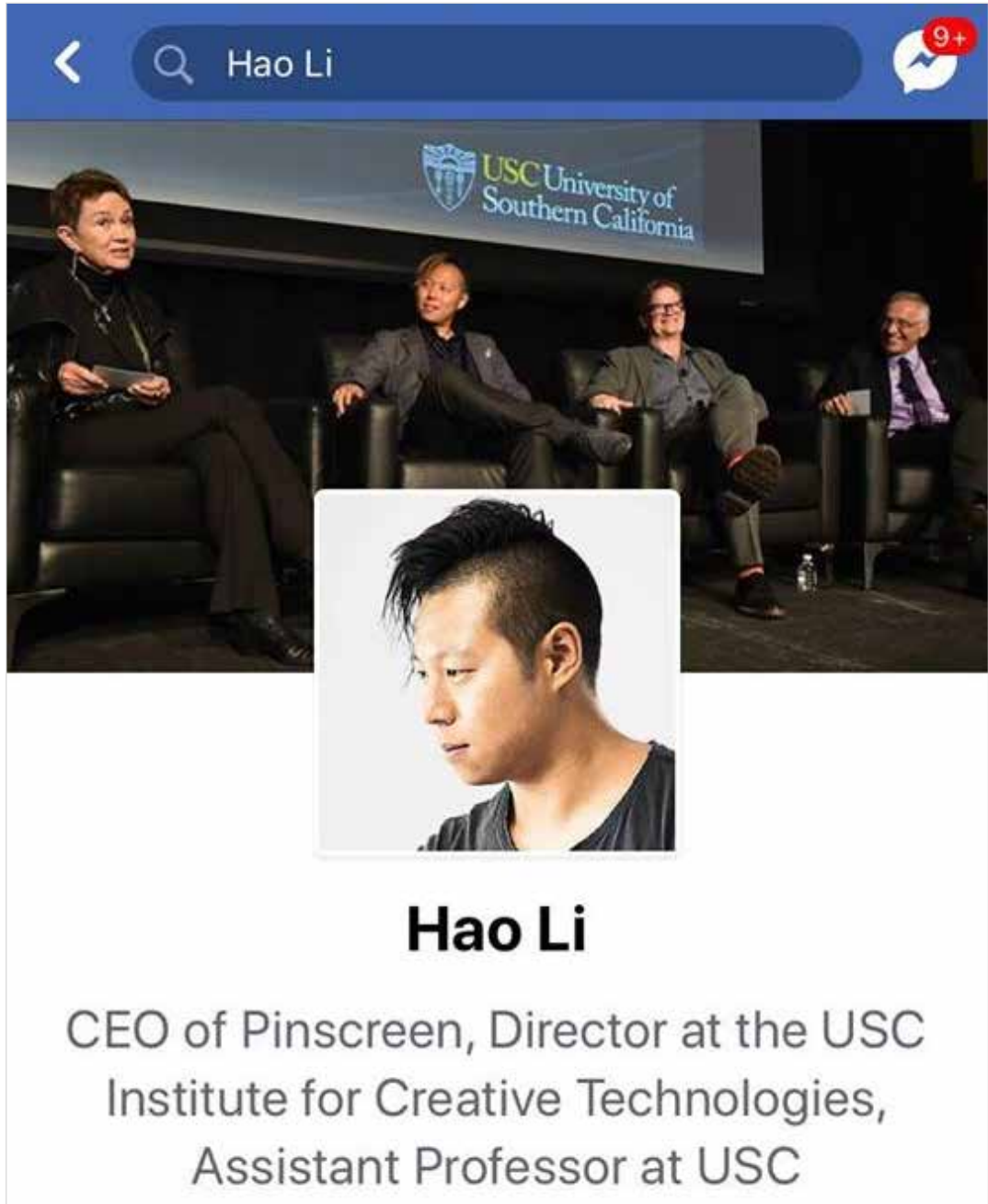


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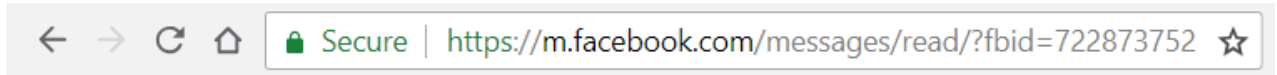
1 Li's Facebook profile with Facebook ID "li.hao":


- 2 • <https://www.facebook.com/li.hao>



2. Li's private messages to Sadeghi on Facebook, dated November 16, 2016:

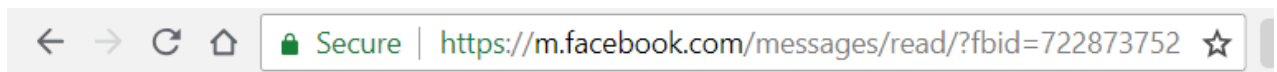
- [November 16, 2016] Li: "omg"
- [November 16, 2016] Li: "it will be awesome"
- [November 16, 2016] Li: "join pinscreen"
- [November 16, 2016] Li: "it will be fun"





 **Hao Li**  
omg  
it will be awesome  
join pinscreen  
it will be fun  
Nov 16, 2016 · Sent from Web

3. Li's private conversation with Sadeghi on Facebook, dated November 18, 2016:

- [November 18, 2016] Sadeghi: "Good morning. I had a great time visiting you guys! Really cool stuff. I just messaged Jens too. Let's talk about the next steps 😊"
- [November 18, 2016] Li: "Sounds good we ll discuss with board and vcs first. We are thinking about offering a VP position."

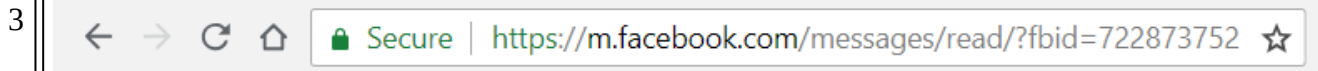



 **Iman Sadeghi**  
Good morning. I had a great time visiting you guys! Really cool stuff. I just messaged Jens too. Let's talk about the next steps 😊  
Nov 18, 2016 ·

 **Hao Li**  
Sounds good we ll discuss with board and vcs first. We are thinking about offering a VP position.  
Nov 18, 2016 · Sent from Messenger

1 4. Li's private message to Sadeghi on Facebook, dated November 29, 2016:

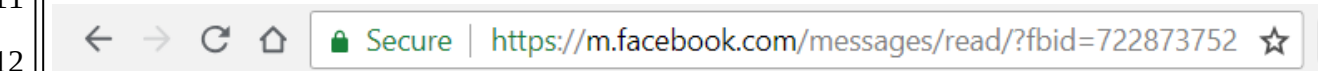
- 2 • [November 29, 2016] Li: "we tthought a lot about having you on board!"




4  **Hao Li**  
5 we tthought a lot about having you on board!

6  
7 5. Li's private messages to Sadeghi on Facebook, dated November 30, 2016:

- 8 • [November 30, 2016] Li: "so for startup at our stage the biggest benefit is in stock options"  
9 • [November 30, 2016] Li: "which value will significantly increase in the next round of  
10 funding"





12  **Hao Li**  
13 so for startup at our stage the biggest benefit is in stock options  
14 which value will significantly increase in the next round of funding


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1 6. Li's private conversation with Sadeghi on Facebook, dated December 1, 2016:

- 2 • [December 1, 2016] Li: "jens thinks that u are awesome"
- 3 • [December 1, 2016] Sadeghi: "Oh cool! I really like him too. I wish I have had met him at  
4 ILM 😊"

5  Secure | <https://m.facebook.com/messages/read/?fbid=722873752> ☆


6  **Hao Li**  
7 jens thinks that u are awesome  
8 Dec 1, 2016 · Sent from Web

9  **Iman Sadeghi**  
10 Oh cool! I really like him too. I wish I have had met him at ILM 😊  
11 Dec 1, 2016 ·

12 7. Li's private messages to Sadeghi on Facebook, dated December 1, 2016:

- 13 • [December 1, 2016] Li: "nice!"
- 14 • [December 1, 2016] Li: "i have a few meetings with investors too"
- 15 • [December 1, 2016] Li: "and will have some more later today with the board"
- 16 • [December 1, 2016] Li: "we all want you to join, we are working out on a good offer"

17  Secure | <https://m.facebook.com/messages/read/?fbid=722873752> ☆

18  **Hao Li**  
19 nice!  
20 i have a few meetings with investors too  
21 Dec 1, 2016 · Sent from Web

22  **Hao Li**  
23 and will have some more later today with the board  
24 we all want you to join, we are working out on a good offer  
25 Dec 1, 2016 · Sent from Web

- 1 8. Li's private e-mail to Sadeghi on December 18, 2016, with subject line "Offer Pinscreen <>  
2 Iman":
- 3 • [December 18, 2016] Li: "Iman,"
  - 4 • [December 18, 2016] Li: "First of all, Congratulations on your offer as VP of engineering  
5 of Pinscreen! We have been really impressed by you and are very thrilled with the  
6 possibility of having you as part of our amazing and unique team."
  - 7 • [December 18, 2016] Li: "We have had great feedbacks from the team as well as from  
8 Stanley. I believe we can do amazing work together and really disrupt the social media and  
9 VR/AR industry, and build a successful company together."
  - 10 • [December 18, 2016] Li: "We have been working hard with our board and investors, in  
11 making you a strong offer and hope that you join our journey, being part of the first  
12 employees."
  - 13 • [December 18, 2016] Li: "Attached is our offer from Pinscreen and a confidential  
14 information and invention assignment agreement. Our offer is higher than the median  
15 compensation for non-founder VP of engineering in Silicon Valley. As we move to the  
16 next rounds of fundings and growth, the value of the company is likely to increase  
17 significantly, so you would be joining at a great time now."
  - 18 • [December 18, 2016] Li: "After you have had a chance to review let's schedule a call to  
19 answer any questions. Please keep the information confidential and feel free to reach out at  
20 any time."
  - 21 • [December 18, 2016] Li: "Thank you!"
  - 22 • [December 18, 2016] Li: "Cheers,"
  - 23 • [December 18, 2016] Li: "Hao Li"
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offer Pinscreen <> Iman



**Hao Li** <hao@pinscreen.com>

12/18/16



Reply

to me

Iman,

First of all, Congratulations on your offer as VP of engineering of Pinscreen! We have been really impressed by you and are very thrilled with the possibility of having you as part of our amazing and unique team.

We have had great feedbacks from the team as well as from Stanley. I believe we can do amazing work together and really disrupt the social media and VR/AR industry, and build a successful company together.

We have been working hard with our board and investors, in making you a strong offer and hope that you join our journey, being part of the first employees.

Attached is our offer from Pinscreen and a confidential information and invention assignment agreement. Our offer is higher than the median compensation for non-founder VP of engineering in Silicon Valley. As we move to the next rounds of fundings and growth, the value of the company is likely to increase significantly, so you would be joining at a great time now.

After you have had a chance to review let's schedule a call to answer any questions. Please keep the information confidential and feel free to reach out at any time.

Thank you!

Cheers,

Hao Li

2 Attachments



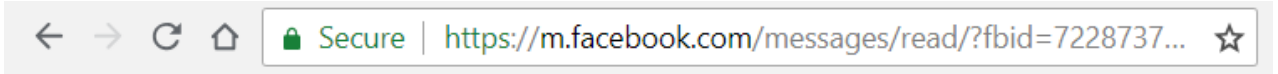
9. Li's private messages to Sadeghi on Facebook, dated December 26, 2016:

- [December 26, 2016] Li: "however, I think if you join us, you would bring a lot of energy

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with you”

- [December 26, 2016] Li: “I think we can increase a bit”
- [December 26, 2016] Li: “do you think there is a chance you can start earlier?”



**Hao Li**

however, I think if you join us, you would bring a lot of energy with you  
I think we can increase a bit  
do you think there is a chance you can start earlier?

10. Li’s private conversation with Sadeghi on Facebook, dated December 26, 2016:

- [December 26, 2016] Sadeghi: “Hmmm ... I understand the potential here. But with any potential comes risk hand in hand.”
- [December 26, 2016] Sadeghi: “What do they say about the DFJ stats I sent you regarding the 3% post series A equity share?”
- [December 26, 2016] Sadeghi: “[http://www.slideshare.net/markpeterdavis/vc-bootcamp-by-dfj-gotham-ventures-and-wilson-sonsini-goodrick-rosati/65-Typical Option Grants ulliA\\_very](http://www.slideshare.net/markpeterdavis/vc-bootcamp-by-dfj-gotham-ventures-and-wilson-sonsini-goodrick-rosati/65-Typical Option Grants ulliA_very)”
- [December 26, 2016] Li: “it’s 1-3% 😊”
- [December 26, 2016] Li: “but it really depends on the company”
- [December 26, 2016] Li: “the one feedback i got a lot from investors is that they know there is huge interest from other companies in partnering/acquiring, and the field is hot right now, also we haven't shown you our latest update yet 😊”
- [December 26, 2016] Li: “also I don’t think there are any risks 😊”
- [December 26, 2016] Li: “you will be a polar bear with an iron man suit”





2 **Iman Sadeghi**

3 Hmm ... I understand the potential here. But with any potential comes risk hand in hand.

4 What do they say about the DFJ stats I sent you regarding the 3% post series A equity share?

5 Dec 26, 2016 ·



6 **Iman Sadeghi**

7 [http://www.slideshare.net/markpeterdavis/vc-bootcamp-by-dfj-gotham-ventures-and-wilson-sonsini-goodrick-rosati/65-Typical\\_Option\\_Grants\\_ulliA\\_very](http://www.slideshare.net/markpeterdavis/vc-bootcamp-by-dfj-gotham-ventures-and-wilson-sonsini-goodrick-rosati/65-Typical_Option_Grants_ulliA_very)

8 Dec 26, 2016 ·



9 **Hao Li**

10 it's 1-3% 😊

11 but it really depends on the company

12 the one feedback i got a lot from investors is that they know there is huge interest from other companies in partnering/acquiring, and the field is hot right now, also we haven't shown you our latest update yet 😊

13 also I don't think there are any risks 😊

14 you will be a polar bear with an iron man suit

15 Dec 26, 2016 · Sent from Web

16 11. Li's private conversation with Sadeghi on Facebook, dated December 26, 2016:

- 17 • [December 26, 2016] Li: "OMG"
- 18 • [December 26, 2016] Li: "❤️"
- 19 • [December 26, 2016] Li: "do you think you will be able to join us in january already?"
- 20 • [December 26, 2016] Li: "we are aiming for a beta launch in late january"
- 21 • [December 26, 2016] Sadeghi: "Hmmm ... The yearly Google bonus is out Jan 20th."
- 22 • [December 26, 2016] Li: "so u could start in feb?"
- 23 • [December 26, 2016] Li: "that will be still before we launch a PR thing"
- 24 • [December 26, 2016] Li: "I can discuss again with the board, but I would like to offer you
- 25 for the polar bear heart: 165K + 2.3%"
- 26 • [December 26, 2016] Li: "important thing to notice is that our valuation is already very
- 27 high for a company in this stage and it s growing lately fast"
- 28

- [December 26, 2016] Li: “so current value is 30M especially since we have built all the backend platform for user creation and a tech that is state of the art”

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**Hao Li**  
OMG



do you think you will be able to join us in january already?  
we are aiming for a beta launch in late january

Dec 26, 2016 · Sent from Web



**Iman Sadeghi**

Hmmm ... The yearly Google bonus is out Jan 20th.

Dec 26, 2016 ·



**Hao Li**

so u could start in feb?

Dec 26, 2016 · Sent from Web



**Hao Li**

that will be still before we launch a PR thing

I can discuss again with the board, but I would like to offer you for the polar bear heart:  
165K + 2.3%

important thing to notice is that our valuation is already very high for a company in this stage and it s growing lately fast

so current value is 30M especially since we have built all the backend platform for user creation and a tech that is state of the art

12. Li’s private messages to Sadeghi on Facebook, dated December 26, 2017:

- [December 26, 2016] Li: “Join us!”
- [December 26, 2016] Li: “Pinscreen will grow, I’m sure, you are sure”
- [December 26, 2016] Li: “and you will be able to grow as well, I’m quite sure the reward is bigger than what the other companies, not only in terms of impact but also financially”

← → ↻ 🏠 🔒 Secure | <https://m.facebook.com/messages/read/?fbid=7228737...> ☆



**Hao Li**

Join us!

Pinscreen will grow, I'm sure, you are sure

and you will be able to grow as well, I'm quite sure the reward is bigger than what the other companies, not only in terms of impact but also financially

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13. Li's private conversation with Sadeghi on Facebook, dated December 26, 2016:

- [December 26, 2016] Sadeghi: "Regarding the offer: thanks for the salary bump. The share % still doesn't feel right to my heart. And I fully understand you have limited resources."
- [December 26, 2016] Li: "How can I hire you?"
- [December 26, 2016] [...]
- [December 26, 2016] Li: "tell me a number"
- [December 26, 2016] [...]
- [December 26, 2016] Li: "[...] I still hope we can make something happen as I'm really excited to get you here. Salaries will of course be increased based on the stage the company will be, as well as bonus will be offered to reward for the work. What i can do in my position is aim for [...]"
- [December 26, 2016] [...]
- [December 26, 2016] Sadeghi: "Share % is more important than the salary. Would it be possible to have a clause to up my share post series A to make up for the dilution?"
- [December 26, 2016] Li: "I can bring it up if you want in the meeting, but think it s better we agree on a number"
- [December 26, 2016] Li: "let me know if you want me to proceed."
- [December 26, 2016] [...]
- [December 26, 2016] Li: "in the end trust your gut feeling and your heart."



2 **Iman Sadeghi**

3 Regarding the offer: thanks for the salary bump. The share % still doesn't feel right to my  
4 heart. And I fully understand you have limited resources.

Dec 26, 2016 ·



5 **Hao Li**

6 How can i hire you?

Dec 26, 2016 · Sent from Web



7 [...] tell me a number

8 Dec 26, 2016 · Sent from Web



9 [...] I still hope we can make something happen as I'm really excited to get you here.  
10 Salaries will of course be increased based on the stage the company will be, as well  
11 as bonus will be offered to reward for the work. What i can do in my position is aim for

12 [...]



13 **Iman Sadeghi**

14 Share % is more important than the salary. Would it be possible to have a clause to up my  
share post series A to make up for the dilution?

15 Dec 26, 2016 ·



16 **Hao Li**

17 I can bring it up if you want in the meeting, but think it s better we agree on a number  
let me know if you want me to proceed.

18 Dec 26, 2016 · Sent from Web



19 [...] in the end trust your gut feeling and your heart.

20 Dec 26, 2016 · Sent from Web

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22 14. Li's private message to Sadeghi on Facebook, dated December 26, 2016:

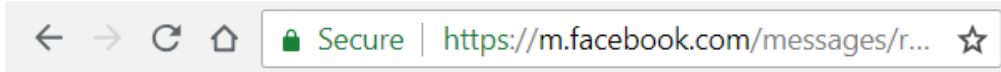
- 23 • [December 26, 2016] Li: "but I do believe that you will bring a lot to the company"



25 **Hao Li**

26 but i do believe that you will bring a lot to the company

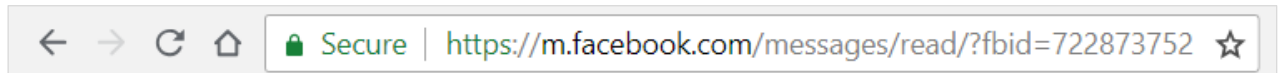
- [December 26, 2016] Li: “[...] But we would love to work with you if there is a chance.”



But we would love to work with you if there is a chance.

Li’s private message to Sadeghi on Facebook, dated December 31, 2016:

- [December 31, 2016] Li: “happy new year!”
- [December 31, 2016] Sadeghi: “Happy new year Hao 😊 Hopefully a year full of adventure is coming our way 🎉”
- [December 31, 2016] Li: “yes! it will take a bit for the VC discussions, everyone is on holidays, let s sync a week later when they are back?”
- [December 31, 2016] Li: “i think some want to chat with you as well”
- [December 31, 2016] Sadeghi: “Sure sounds great 😊”



**Hao Li**  
happy new year!

Dec 31, 2016 · Sent from Web



**Iman Sadeghi**  
Happy new year Hao 😊 Hopefully a year full of adventure is coming our way 🎉

Dec 31, 2016 ·



**Hao Li**  
yes! it will take a bit for the VC discussions, everyone is on holidays, let s sync a week later when they are back?

Dec 31, 2016 · Sent from Web



**Hao Li**  
i think some want to chat with you as well

Dec 31, 2016 · Sent from Web

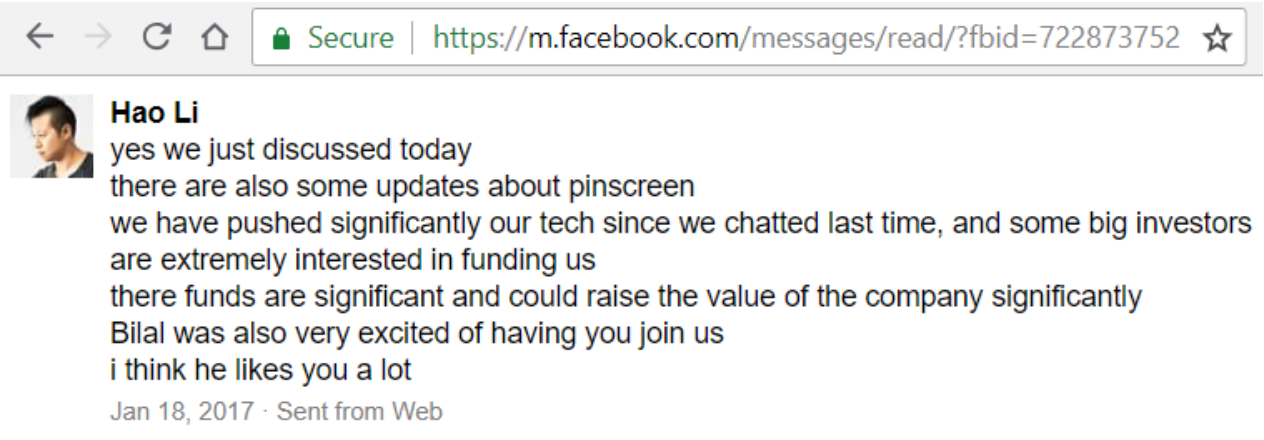


**Iman Sadeghi**  
Sure sounds great 😊

Dec 31, 2016 ·

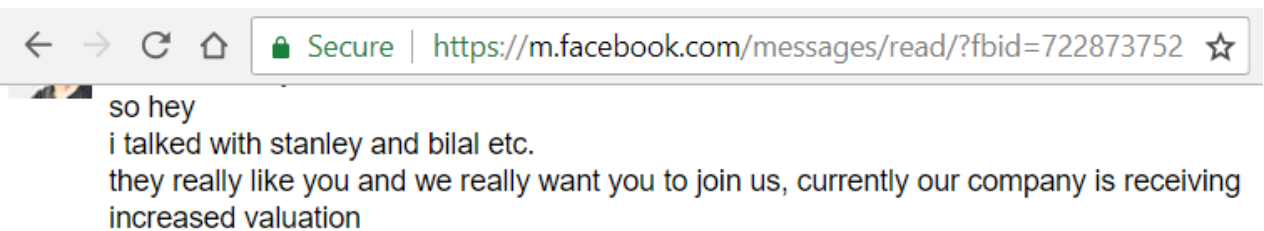
1 15. Li's private messages to Sadeghi on Facebook, dated January 18, 2017:

- 2 • [January 18, 2017] Li: "yes we just discussed today"
- 3 • [January 18, 2017] Li: "there are also some updates about pinscreen"
- 4 • [January 18, 2017] Li: "we have pushed significantly our tech since we chatted last time,  
5 and some big investors are extremely interested in funding us"
- 6 • [January 18, 2017] Li: "there funds are significant and could raise the value of the  
7 company significantly"
- 8 • [January 18, 2017] Li: "Bilal was also very excited of having you join us"
- 9 • [January 18, 2017] Li: "i think he likes you a lot"

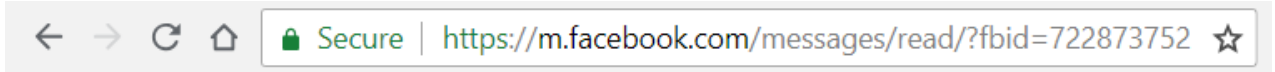



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19 16. Li's private messages to Sadeghi on Facebook, dated January 19, 2017:

- 20 • [January 19, 2017] Li: "so hey"
- 21 • [January 19, 2017] Li: "i talked with stanley and bilal etc."
- 22 • [January 19, 2017] Li: "they really like you and we really want you to join us, currently  
23 our company is receiving increased valuation"

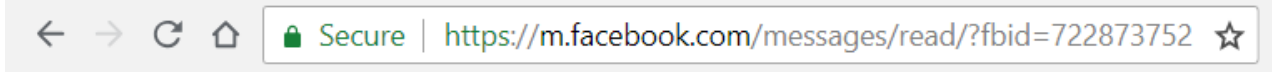



- 1 • [January 19, 2017] Li: “and also the valuation will increase a lot”
- 2 • [January 19, 2017] Li: “but we would like you to think a little more”
- 3 • [January 19, 2017] Li: “and still consider, since this is a very strong offer”
- 4 • [January 19, 2017] Li: “we are aiming for 50-60M valuation”

5  Secure | <https://m.facebook.com/messages/read/?fbid=722873752> ☆

6  **Hao Li**  
7 and also the valuation will increase a lot  
8 but we would like you to think a little more  
9 and still consider, since this is a very strong offer  
10 we are aiming for 50-60M valuation

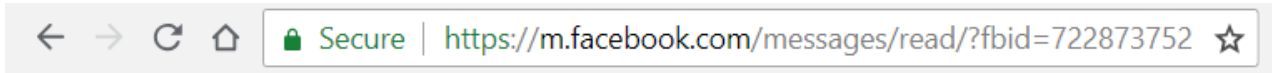
- 11 • [January 19, 2017] Li: “😏”
- 12 • [January 19, 2017] Li: “please sleep over it”

13  Secure | <https://m.facebook.com/messages/read/?fbid=722873752> ☆

14  **Hao Li**  
15   
16 please sleep over it  
17 Jan 19, 2017 · Sent from Web

18  
19 17. Li’s private message to Sadeghi on Facebook, dated January 19, 2017:

- 20 • [January 19, 2017] Li: “this is the case for many of us, but stanley suggested we should  
21 still try to convince you that the offer is good”
- 22 • [January 19, 2017] Li: “i think you should join”

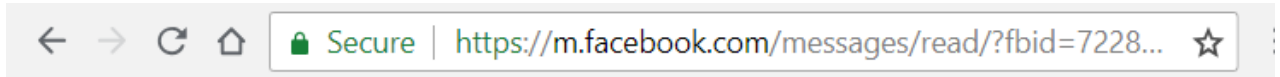
23  Secure | <https://m.facebook.com/messages/read/?fbid=722873752> ☆

24 this is the case for many of us, but stanley suggested we should still try to convince you  
25 that the offer is good  
26 i think you should join  
27 Jan 19, 2017 · Sent from Web



1 18. Li's private message to Sadeghi on Facebook, dated January 21, 2017:

- 2 • [January 21, 2017] Li: "2.2% is what we will offer now, but you will make sure to take  
3 a leadership role as VP of engineering (potentially having a more important role than  
4 CTO), meaning coordinating teams and also ensuring efficient deliverables, etc. we can  
5 discuss details [...]"

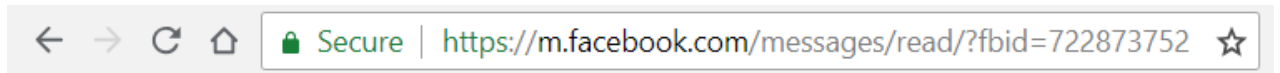


8 **Hao Li**

8 2.2% is what we will offer now, but you will make sure to take a leadership role as VP  
9 of engineering (potentially having a more important role than CTO), meaning  
10 coordinating teams and also ensuring efficient deliverables, etc. we can discuss details

11 19. Li's private message to Sadeghi on Facebook, dated January 22, 2017:

- 12 • [January 22, 2017] Li: "most importantly we need you to help me oversee the technology  
13 dev of everyone and push it to the next level"



16 **Hao Li**

16 most importantly we need you to help me oversee the technology dev of everyone and  
17 push it to the next level

18 20. The following is the "Stock Option Plan" in Sadeghi's employment contract with Pinscreen  
19 and signed by Li and Sadeghi, on January 23, 2017. The full employment contract is available  
20 in Exhibit G:

- 21 • "Subject to the approval of the Company's Board of Directors (the 'Board'), the Company  
22 shall grant you a stock option covering the number shares of the Company's Common  
23 Stock equivalent to 2.3% of the outstanding shares of the Company (the 'Option'). The  
24 Option shall be granted as soon as reasonably practicable after the date of this Agreement  
25 or, if later, the date you commence full-time Employment. The exercise price per share  
26 will be equal to the fair market value per share on the date the Option is granted, as  
27 determined by the Company's Board of Directors in good faith compliance with applicable  
28

1 guidance in order to avoid having the Option be treated as deferred compensation under  
2 Section 409A of the Internal Revenue Code of 1986, as amended. There is no guarantee  
3 that the Internal Revenue Service will agree with this value. You should consult with your  
4 own tax advisor concerning the tax risks associated with accepting an option to purchase  
5 the Company's Common Stock. The term of the Option shall be 10 years, subject to earlier  
6 expiration in the event of the termination of your services to the Company. So long as your  
7 Employment is continuous, the Option shall vest and become exercisable as follows: 1/4 of  
8 the total number of option shares shall vest and become exercisable on the first anniversary  
9 of the Option grant date. Thereafter, the unvested shares shall vest quarterly over a three-  
10 year period in equal increments. The Option will be an incentive stock option to the  
11 maximum extent allowed by the tax code and shall be subject to the other terms and  
12 conditions set forth in the Company's 2015 Stock Option Plan (the 'Stock Plan') and in the  
13 Company's standard form of Stock Option Agreement (the 'Stock Agreement').”

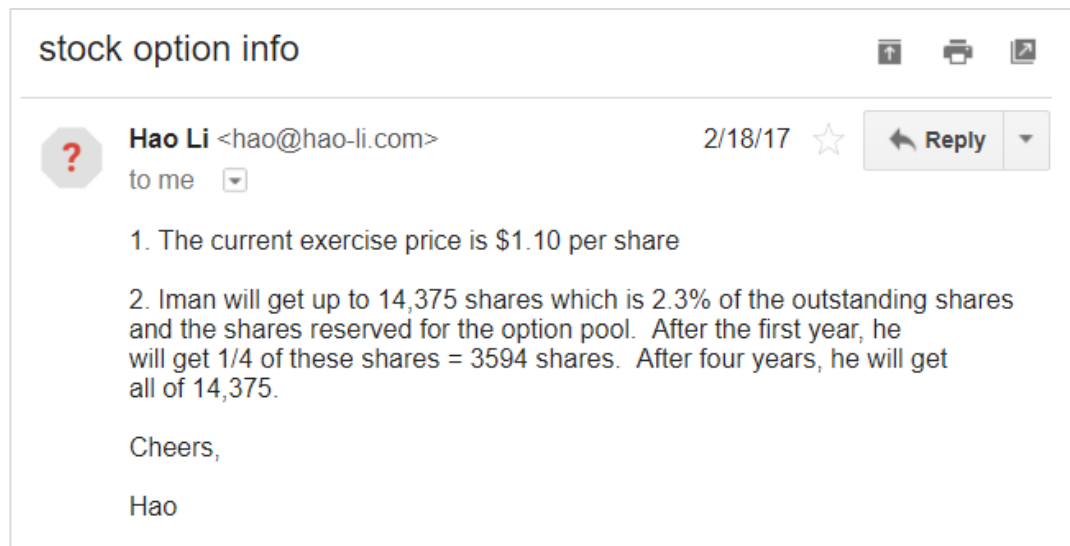
- 14 • “Furthermore, the Company shall negotiate with you in good faith regarding an additional  
15 stock option grant following the consummation by the Company of its Series A round of  
16 financing to counteract the dilutive effect on you of such financing.”

17 (b) **Stock Option Plan.** Subject to the approval of the Company’s Board of  
18 Directors (the “Board”), the Company shall grant you a stock option covering the number shares of  
19 the Company’s Common Stock equivalent to 2.3% of the outstanding shares of the Company (the  
20 “Option”). The Option shall be granted as soon as reasonably practicable after the date of this  
21 Agreement or, if later, the date you commence full-time Employment. The exercise price per share  
22 will be equal to the fair market value per share on the date the Option is granted, as determined by  
23 the Company’s Board of Directors in good faith compliance with applicable guidance in order to  
24 avoid having the Option be treated as deferred compensation under Section 409A of the Internal  
25 Revenue Code of 1986, as amended. There is no guarantee that the Internal Revenue Service will  
26 agree with this value. You should consult with your own tax advisor concerning the tax risks  
27 associated with accepting an option to purchase the Company’s Common Stock. The term of the  
28 Option shall be 10 years, subject to earlier expiration in the event of the termination of your  
services to the Company. So long as your Employment is continuous, the Option shall vest and  
become exercisable as follows: 1/4 of the total number of option shares shall vest and become  
exercisable on the first anniversary of the Option grant date. Thereafter, the unvested shares shall  
vest quarterly over a three year period in equal increments. The Option will be an incentive stock  
option to the maximum extent allowed by the tax code and shall be subject to the other terms and  
conditions set forth in the Company’s 2015 Stock Option Plan (the “Stock Plan”) and in the  
Company’s standard form of Stock Option Agreement (the “Stock Agreement”).

Furthermore, the Company shall negotiate with you in good faith regarding an  
additional stock option grant following the consummation by the Company of its Series A round of  
financing to counteract the dilutive effect on you of such financing.

1 21. Li's private e-mail to Sadeghi, with subject line "Stock Option Info," dated February 18,  
2 2017:

- 3 • [February 18, 2017] Li: "1. The current exercise price is \$1.10 per share"
- 4 • [February 18, 2017] Li: "2. Iman will get up to 14,375 shares which is 2.3% of the  
5 outstanding shares and the shares reserved for the option pool. After the first year, he will  
6 get 1/4 of these shares = 3594 shares. After four years, he will get all of 14,375."
- 7 • [February 18, 2017] Li: "Cheers,"
- 8 • [February 18, 2017] Li: "Hao"

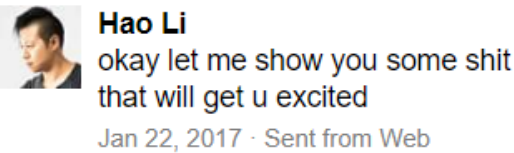
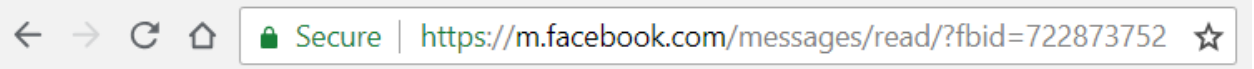


1 **EXHIBIT C**

2 **Li's and Pinscreen's Fraud and Deceit of Sadeghi**

3 1. Li's private conversation with Sadeghi on Facebook, dated January 22, 2017:

- 4 • [January 22, 2017, at 3:39 p.m.] Li: "okay let me show you some shit"  
5 • [January 22, 2017, at 3:39 p.m.] Li: "that will get u excited"



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10 • [January 22, 2017, at 3:39 p.m.] Sadeghi: "Cool. Let's see it 😊"  
11 • [January 22, 2017, at 3:39 p.m.] Li: [image]  
12 • [January 22, 2017, at 3:39 p.m.] Li: "input"  
13 • [January 22, 2017, at 3:39 p.m.] Li: "output"  
14 • [January 22, 2017, at 3:40 p.m.] Li: [image]  
15 • [January 22, 2017, at 3:40 p.m.] Li: "Input"  
16 • [January 22, 2017, at 3:40 p.m.] Li: [image]  
17 • [January 22, 2017, at 3:40 p.m.] Li: "Output"  
18 • [January 22, 2017, at 3:40 p.m.] Li: [image]  
19 • [January 22, 2017, at 3:40 p.m.] Li: "ahahaha"  
20 • [January 22, 2017, at 3:40 p.m.] Li: "and so on and so on"  
21 • [January 22, 2017, at 3:41 p.m.] Li: "we are porting this pipeline to the server right now, so  
22 that we don't have to compute everything on our PCs"  
23 • [January 22, 2017, at 3:41 p.m.] Li: "cosimo is also done in 2 weeks with UX"  
24 • [January 22, 2017, at 3:41 p.m.] Sadeghi: "Wow! This is awesome! 🤖"  
25 • [January 22, 2017, at 3:41 p.m.] Li: "and backend"  
26 • [January 22, 2017, at 3:41 p.m.] Li: "another urgent item is avatar 2"  
27 • [January 22, 2017, at 3:42 p.m.] Li: "we will be working on the real-time face tracking for  
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all the navii’s”

- [January 22, 2017, at 3:42 p.m.] Li: “okay lemme write the lawyer to get you the contract”
- [January 22, 2017, at 3:43 p.m.] Sadeghi: “Omg! So good! This is well done!”
- [January 22, 2017, at 3:43 p.m.] Sadeghi: “Pre-defined models for eyes and teeth? Autogenerated hair?”
- [January 22, 2017, at 3:43 p.m.] Li: “yes”
- [January 22, 2017, at 3:44 p.m.] Li: “but needs improvement”
- [January 22, 2017, at 3:44 p.m.] Li: “the quality can still be improved”
- [January 22, 2017, at 3:44 p.m.] Li: “and robustness as well”
- [January 22, 2017, at 3:44 p.m.] Li: “we also have tongue animations”
- [January 22, 2017, at 3:44 p.m.] Li: “everything”
- [January 22, 2017, at 3:44 p.m.] Li: “would be cool if we could do something for valentines day ,but not sure if we can make it”
- [January 22, 2017, at 3:45 p.m.] Sadeghi: “I was thinking something like this would be down the road. Very impressive early results.”

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**Iman Sadeghi**  
Cool. Let's see it 😊  
Jan 22, 2017 ·



Jan 22, 2017 · Sent from Web



**Hao Li**  
input  
Jan 22, 2017 · Sent from Web



Jan 22, 2017 · Sent from Web

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**Hao Li**  
input

Jan 22, 2017 · Sent from Web



**Hao Li**



Jan 22, 2017 · Sent from Web



**Hao Li**  
output

Jan 22, 2017 · Sent from Web



**Hao Li**



Jan 22, 2017 · Sent from Web



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**Hao Li**  
ahahaha  
and so on and so on

Jan 22, 2017 · Sent from Web



**Hao Li**  
we are porting this pipeline to the server right now, so that we don't have to compute everything on our PCs  
cosimo is also done in 2 weeks with UX

Jan 22, 2017 · Sent from Web



**Iman Sadeghi**  
Wow! This is awesome! 🎉

Jan 22, 2017 ·



**Hao Li**  
and backend  
another urgent item is avatar 2  
we will be working on the real-time face tracking for all the navii's  
okay lemme write the lawyer to get you the contract

Jan 22, 2017 · Sent from Web



**Iman Sadeghi**  
Omg! So good! This is well done!  
  
Pre defined models for eyes and teeth? Autogenerated hair?

Jan 22, 2017 ·



**Hao Li**  
yes  
but needs improvement  
the quality can still be improved  
and robustness as well  
we also have tongue animations  
everything

Jan 22, 2017 · Sent from Web



**Hao Li**  
would be cool if we could do something for valentines day ,but not sure if we can make it

Jan 22, 2017 · Sent from Web

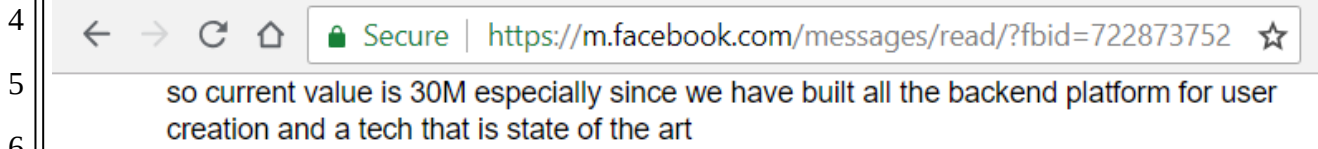


**Iman Sadeghi**  
I was thinking something like this would be down the road. Very impressive early results.

Jan 22, 2017 ·

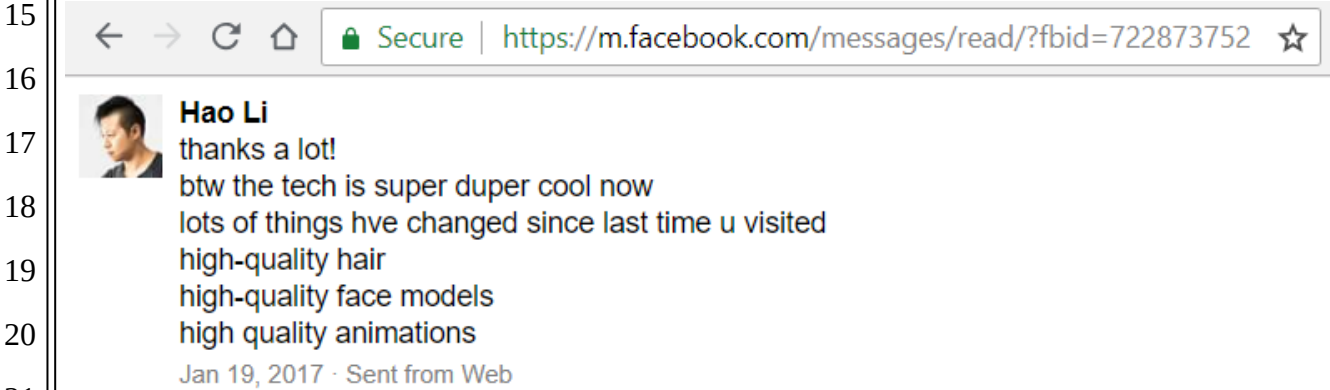
1 2. Li's private message to Sadeghi on Facebook, dated December 26, 2016:

- 2 • [December 26, 2016]: Li: "so current value is 30M especially since we have built all the  
3 backend platform for user creation and a tech that is state of the art"



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8 3. Li's private messages to Sadeghi on Facebook, dated January 19, 2017:

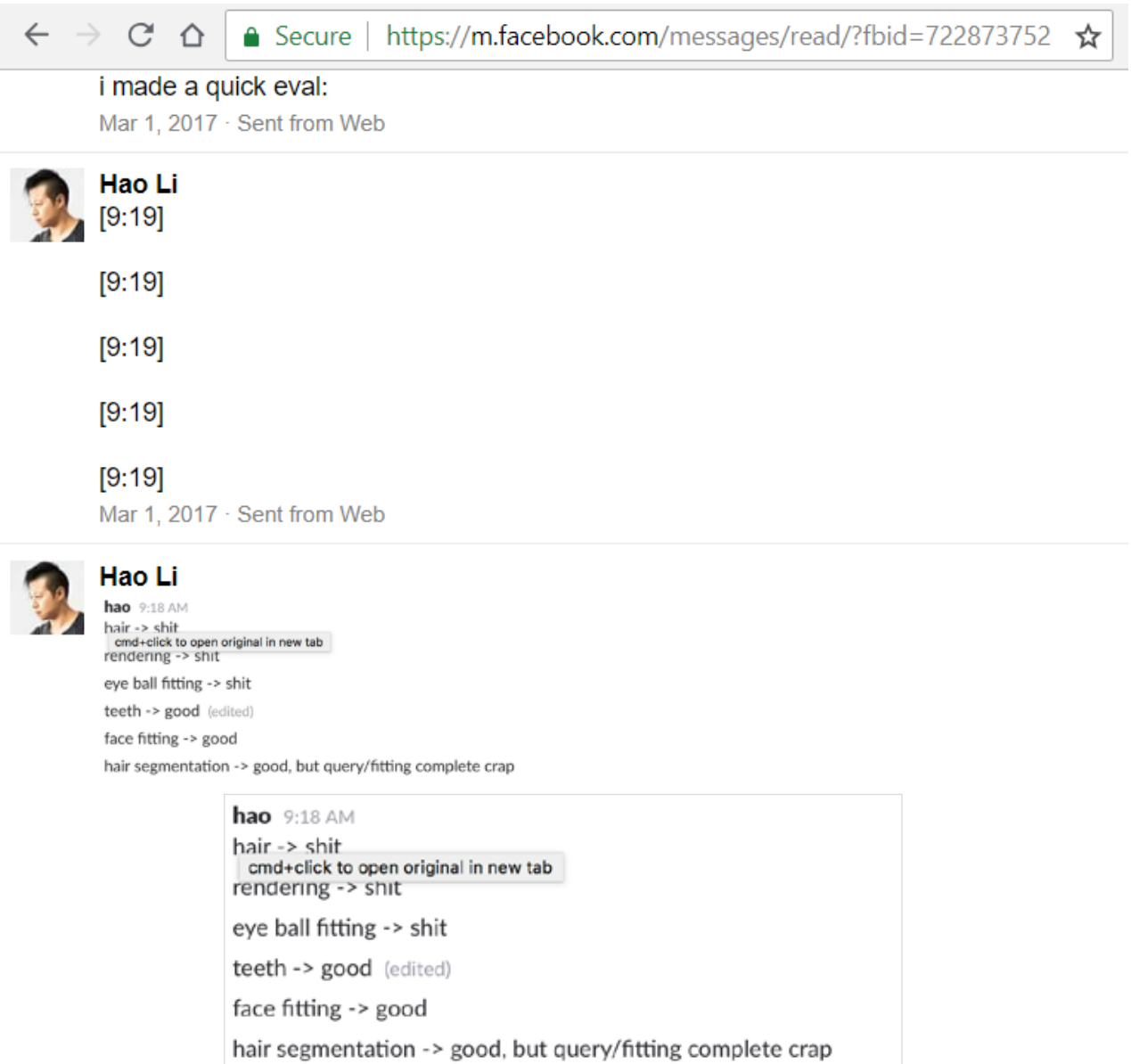
- 9 • [January 19, 2017] Li: "thanks a lot!"  
10 • [January 19, 2017] Li: "btw the tech is super duper cool now"  
11 • [January 19, 2017] Li: "lots of things hve changed since last time u visited"  
12 • [January 19, 2017] Li: "high-quality hair"  
13 • [January 19, 2017] Li: "high-quality face models"  
14 • [January 19, 2017] Li: "high-quality animations"



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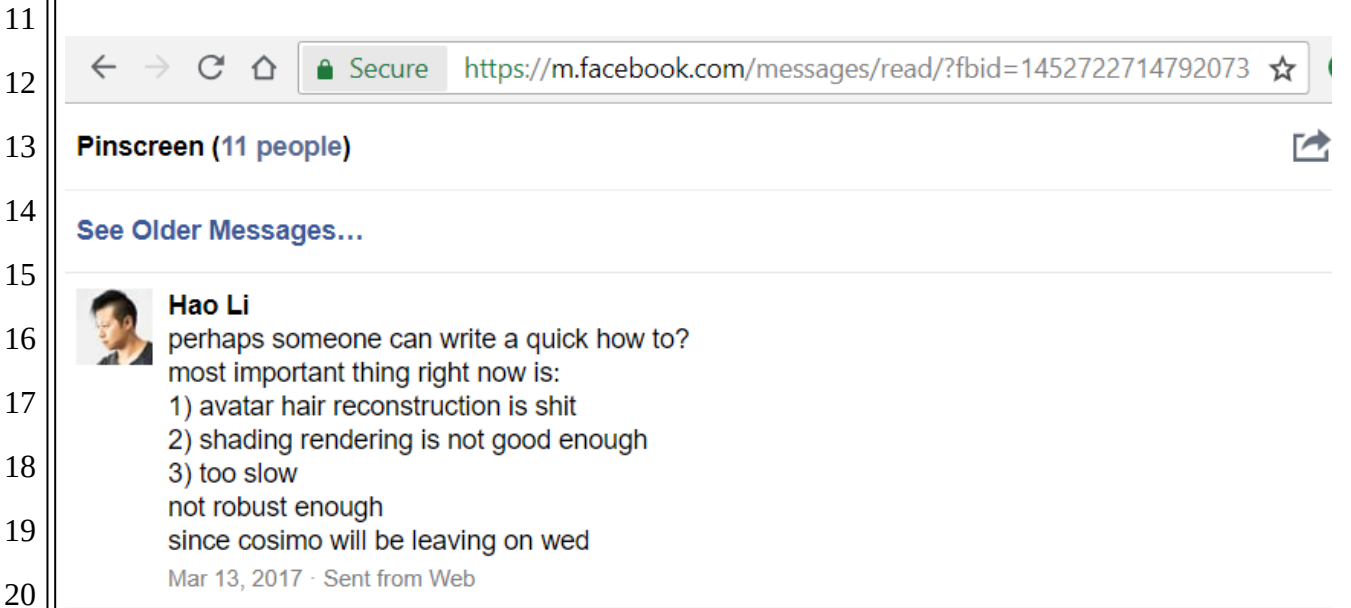
4. Li's private messages to Sadeghi on Facebook, dated March 1, 2017:

- [March 1, 2017] Li: "i made a quick eval:"
- [March 1, 2017] Li: [...]
- [March 1, 2017] Li: "hair -> shit"
- [March 1, 2017] Li: "rendering -> shit"
- [March 1, 2017] Li: "eye ball fitting -> shit"
- [March 1, 2017] Li: "teeth -> good"
- [March 1, 2017] Li: "face fitting -> good"
- [March 1, 2017] Li: "hair segmentation -> good, but query/fitting complete crap"

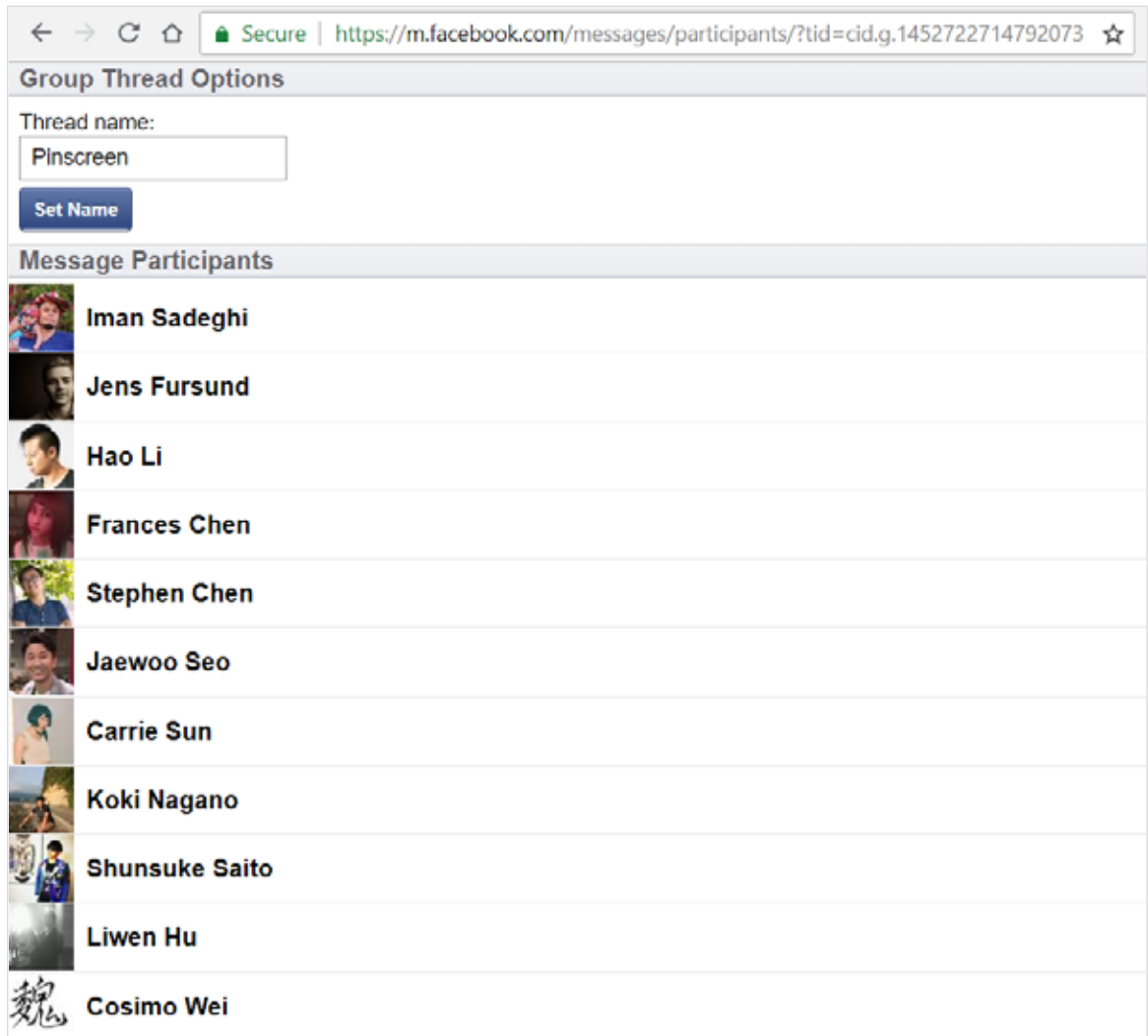


1 5. Li's group messages on the "Pinscreen" Facebook thread with 11 participants, including:  
2 Sadeghi, Fursund, Li, Yen-Chun Chen, Stephen Chen, Seo, Sun, Nagano, Saito, Hu, and Wei,  
3 dated March 13, 2017:

- 4 • [March 13, 2017] Li: "perhaps someone can write a quick how to?"
- 5 • [March 13, 2017] Li: "most important thing right now is:"
- 6 • [March 13, 2017] Li: "1) avatar hair reconstruction is shit"
- 7 • [March 13, 2017] Li: "2) shading rendering is not good enough"
- 8 • [March 13, 2017] Li: "3) too slow"
- 9 • [March 13, 2017] Li: "not robust enough"
- 10 • [March 13, 2017] Li: "since cosimo will be leaving on wed"



1 The “Pinscreen” Facebook group thread’s 11 participants:



19 Sadeghi’s Facebook profile with Facebook ID “imanopolo”:

- 20
- <https://www.facebook.com/imanopolo>
- 21

22 Fursund’s Facebook profile with Facebook ID “jens.fursund”:

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- <https://www.facebook.com/jens.fursund>
- 24

25 Li’s Facebook profile with Facebook ID “li.hao”:

- 26
- <https://www.facebook.com/li.hao>
- 27
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1 Yen-Chun Chen’s Facebook profile with Facebook ID “frances.yenyen”:

- 2 • <https://www.facebook.com/frances.yenyen>

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4 Stephen Chen’s Facebook profile with Facebook ID “stephenyhchen”:

- 5 • <https://www.facebook.com/stephenyhchen>

6

7 Seo’s Facebook profile with Facebook ID “jaewoo.seo.5”:

- 8 • <https://www.facebook.com/jaewoo.seo.5>

9

10 Sun’s Facebook profile with Facebook ID “carrieyal”:

- 11 • <https://www.facebook.com/carrieyal>

12

13 Nagano’s Facebook profile with Facebook ID “luminohope”:

- 14 • <https://www.facebook.com/luminohope>

15

16 Saito’s Facebook profile with Facebook ID “shun9981”:

- 17 • <https://www.facebook.com/shun9981>

18

19 Hu’s Facebook profile with Facebook ID “liwen.hu.79”:

- 20 • <https://www.facebook.com/liwen.hu.79>

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22 Wei’s Facebook profile with Facebook ID “cosimo.dw”:

- 23 • <https://www.facebook.com/cosimo.dw>

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1 **EXHIBIT D**

2 **Sadeghi's Contributions**

3 1. The following is feedback from conference reviewers regarding Pinscreen's SIGGRAPH  
4 2017 Technical Papers submission, which was submitted on January 16, 2017:

- 5
- 6 • "Compared with state-of-the-art avatar generation techniques that all requires multiple  
7 images as input, the described system only needs a single image, which makes it more  
8 appealing to consumer applications. However, the novelty of the work and the quality of  
9 the generated avatars are below the SIGGRAPH standard (see comments below)."

10 Compared with state-of-the-art avatar generation techniques that all requires multiple images  
11 as input, the described system only needs a single image, which makes it more appealing to  
12 consumer applications. However, the novelty of the work and the quality of the generated  
13 avatars are below the SIGGRAPH standard (see comments below).

- 14 • "Results presented in the paper and video are not satisfactory. A lot of disturbing artifacts  
15 (e.g. in regions around the silhouette) can be observed in almost all hair models shown in  
16 the paper. I seriously doubt if the quality is good enough for games or VR applications. For  
17 the comparisons shown in Fig. 11, I'd like to see the full models in the video. I also want to  
18 see the comparisons between AutoHair and the present system. It's also necessary to rotate  
19 the models to let people see the back side of the models."

20 Results presented in the paper and video are not satisfactory. A lot of disturbing artifacts  
21 (e.g. in regions around the silhouette) can be observed in almost all hair models shown in the  
22 paper. I seriously doubt if the quality is good enough for games or VR applications. For the  
23 comparisons shown in Fig. 11, I'd like to see the full models in the video. I also want to see  
24 the comparisons between AutoHair and the present system. It's also necessary to rotate the  
25 models to let people see the back side of the models.

26 2. Question from one of the conference reviewers about Pinscreen's SIGGRAPH Asia Technical  
27 Papers submission, which was submitted on May 23, 2017:

- 28 • "Q: Why the quality is so improved comparing with previous submission."
- "A: For the hair, our previous submission only used a primitive hair texture rendering  
based on Blinn-Phong shading and transparency ordering was not implemented. In this  
submission, hair shading has been significantly improved using a variant of Sadeghi 2010



(used in Disney's Tangled) and a correct [...]"

#11

Q: Why the quality is so improved comparing with previous submission.

A: For the hair, our previous submission only used a primitive hair texture rendering based on Blinn-Phong shading and transparency ordering was not implemented. In this submission, hair shading has been significantly improved using a variant of Sadeghi 2010 (used in Disney's Tangled) and a correct

3. A comparison of Pinscreen's digital hair appearance *before* and *after* Sadeghi's contributions to Pinscreen's digital hair appearance:



Input Image

*Before*

Sadeghi's Contributions to Pinscreen's Hair Appearance

*After*

Sadeghi's Contributions to Pinscreen's Hair Appearance



Pinscreen's Submission to SIGGRAPH on January 16, 2017

*[Rejected]*



Pinscreen's Submission to SIGGRAPH Asia on May 23, 2017

*[Accepted]*

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*Before*  
Sadeghi's Contributions to  
Pinscreen's Hair Appearance



Pinscreen's Submission to  
SIGGRAPH on January 16, 2017  
*[Rejected]*

*After*  
Sadeghi's Contributions to  
Pinscreen's Hair Appearance



Pinscreen's Submission to  
SIGGRAPH Asia on May 23, 2017  
*[Accepted]*

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4. Sadeghi’s contributions regarding Pinscreen’s Hair Recognition 2.0:

- [http://docs.google.com/a/pinscreen.com/document/d/1TbVH6yhIjqvOTz-B - qqCSQ7AFHVzl\\_inbbIB7Bdfb0/edit](http://docs.google.com/a/pinscreen.com/document/d/1TbVH6yhIjqvOTz-B - qqCSQ7AFHVzl_inbbIB7Bdfb0/edit)

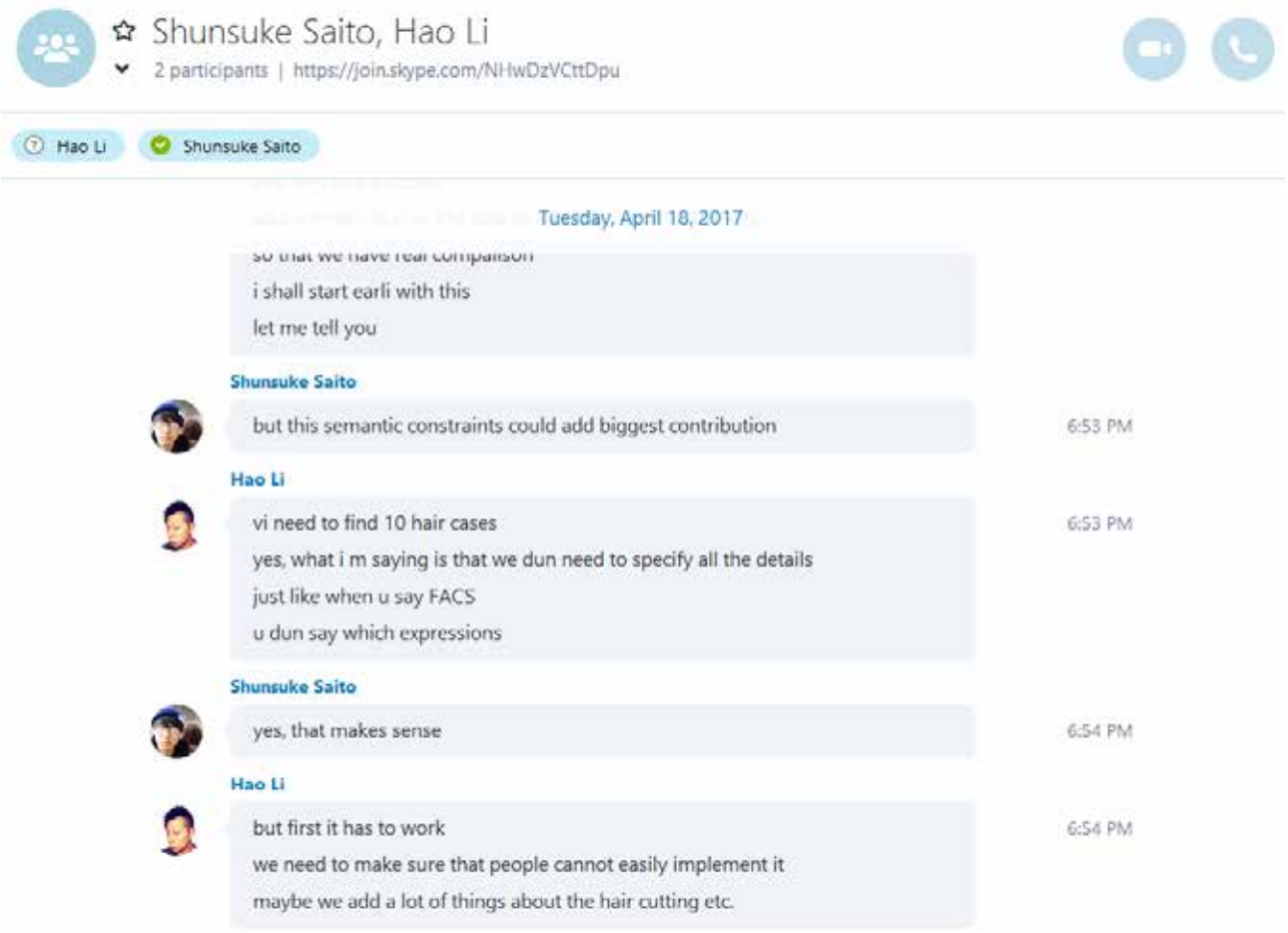
Sadeghi’s contributions regarding Pinscreen’s Hair Recognition 2.0 Training Data:

- [http://docs.google.com/a/pinscreen.com/document/d/1I\\_971F8a43\\_Mn5No\\_bdG4SXyJGFm7YIcRjs0V7BkTOk/edit](http://docs.google.com/a/pinscreen.com/document/d/1I_971F8a43_Mn5No_bdG4SXyJGFm7YIcRjs0V7BkTOk/edit)

5. Li’s group messages to Sadeghi and Saito on Skype, dated April 18, 2017:

- [April 18, 2017] Li: “i shall start earli with this”
- [April 18, 2017] Li: “let me tell you”
- [April 18, 2017] Saito: “but this semantic constraints could add biggest contribution”
- [April 18, 2017] Li: “vi need to find 10 hair cases”
- [April 18, 2017] Li: “yes, what i m saying is that we dun need to specify all the details”
- [April 18, 2017] Li: “just like when u say FACS”
- [April 18, 2017] Li: “u dun say which expressions”
- [April 18, 2017] Saito: “yes, that makes sense”
- [April 18, 2017] Li: “but first it has to work”
- [April 18, 2017] Li: “we need to make sure that people cannot easily implement it”
- [April 18, 2017] Li: “maybe we add a lot of things about the hair cutting etc.”

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6. Sadeghi’s contributions regarding Pinscreen’s System Architecture:

- [http://docs.google.com/a/pinscreen.com/document/d/1Efej\\_qLs\\_4M3ieA0qotLkQqy40gEF\\_R- V8pROLIZUY/edit](http://docs.google.com/a/pinscreen.com/document/d/1Efej_qLs_4M3ieA0qotLkQqy40gEF_R- V8pROLIZUY/edit)

7. Sadeghi’s contributions regarding Pinscreen’s Code Health:

- <http://docs.google.com/a/pinscreen.com/document/d/1ozO4Nb-H5b4wy0glQm9k2Q8b60yhgorgC1PdanOjDtQ/edit>

8. Sadeghi’s contributions regarding Pinscreen’s Codebase Structure:

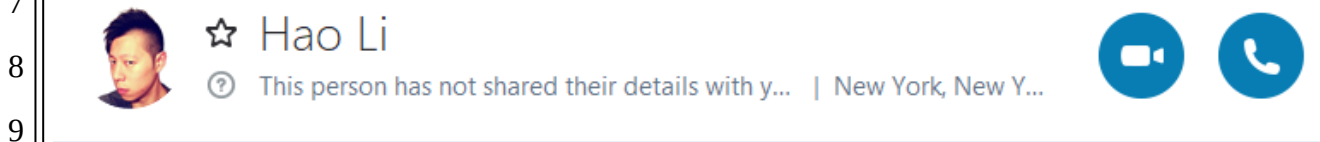
- [http://docs.google.com/a/pinscreen.com/document/d/1bCNqLQDSuFPxqTReKBR5tIwvX\\_gsj84FpUgvmZEf0C9A/edit](http://docs.google.com/a/pinscreen.com/document/d/1bCNqLQDSuFPxqTReKBR5tIwvX_gsj84FpUgvmZEf0C9A/edit)

- 1 9. Sadeghi's contributions regarding Pinscreen's System Security:
- 2 • <http://docs.google.com/a/pinscreen.com/document/d/1w7ow9PW4HTBE5UilkoROQ4h6C>
- 3 [chxQbpoWNXjZZ2WH5c/edit](http://docs.google.com/a/pinscreen.com/document/d/1w7ow9PW4HTBE5UilkoROQ4h6C)
- 4
- 5 10. Sadeghi's contributions regarding Pinscreen's User Interface/User Experience (UI/UX):
- 6 • <http://docs.google.com/a/pinscreen.com/document/d/1w7TLtCK7fTUK1dQIN20e->
- 7 [d48Oxem0O9PsJ1 k-SqzsQ/edit](http://docs.google.com/a/pinscreen.com/document/d/1w7TLtCK7fTUK1dQIN20e-)
- 8
- 9 11. Sadeghi's contributions regarding Pinscreen's Mobile Apps:
- 10 • [http://docs.google.com/a/pinscreen.com/document/d/1W2BudSk5fB1YzCQz0OzL\\_A080](http://docs.google.com/a/pinscreen.com/document/d/1W2BudSk5fB1YzCQz0OzL_A080)
- 11 [n1vZPGoNCSxf6ICcQ/edit](http://docs.google.com/a/pinscreen.com/document/d/1W2BudSk5fB1YzCQz0OzL_A080)
- 12
- 13 12. Sadeghi's contributions regarding Pinmojis (i.e. Pinscreen Emojis):
- 14 • <http://docs.google.com/a/pinscreen.com/document/d/1NzwUpKXjYyhGsCHokcRCMTgK>
- 15 [g3OC5ftFgBHIA5IjcgU/edit](http://docs.google.com/a/pinscreen.com/document/d/1NzwUpKXjYyhGsCHokcRCMTgK)
- 16
- 17 13. Sadeghi's planning and coordinating regarding Pinmoji Product Launch deliverables and
- 18 timeline:
- 19 • <http://docs.google.com/a/pinscreen.com/document/d/1iUPehGf9oTnWUV7SRuFnP9QWU>
- 20 [-KEopOvMK-ivdaUqQE/edit](http://docs.google.com/a/pinscreen.com/document/d/1iUPehGf9oTnWUV7SRuFnP9QWU)
- 21
- 22 14. Sadeghi's planning and coordinating regarding Pinscreen's SIGGRAPH 2017 Real-Time
- 23 Live (RTL) deliverables and timeline:
- 24 • <http://docs.google.com/a/pinscreen.com/document/d/1VOY9eDxirYK5NKd8RUaiLuW>
- 25 [mFKpZQKBhfbveqLnAw/edit](http://docs.google.com/a/pinscreen.com/document/d/1VOY9eDxirYK5NKd8RUaiLuW)
- 26
- 27 15. Sadeghi's planning and coordinating regarding Pinscreen's A2 Project deliverables and
- 28 timeline:

- 1 • [http://docs.google.com/a/pinscreen.com/document/d/1po3HvDQQKlIjvaCDveK4wfkP5R](http://docs.google.com/a/pinscreen.com/document/d/1po3HvDQQKlIjvaCDveK4wfkP5Rwa-Rb2RQiJZBoBuow/edit)  
2 [wa-Rb2RQiJZBoBuow/edit](http://docs.google.com/a/pinscreen.com/document/d/1po3HvDQQKlIjvaCDveK4wfkP5Rwa-Rb2RQiJZBoBuow/edit)

3  
4 16. Li's private messages to Sadeghi on Skype, dated April 17, 2017:

- 5 • [April 17, 2017] Li: "also might be good to sync with jens about his status"  
6 • [April 17, 2017] Li: "and make sure he reports to you about what his progress is"



9  
10 Contact request sent - Resend contact request

11 it is inefficient to talk asynchronously via messenger  
12 people don't respond on time, except for cosimo  
13 Monday, April 17, 2017

14 also might be good to sync with jens about his status  
15 and make sure he reports to you about what his progress is

16 17. Sadeghi's group messages on "PinscreenTeamAll" Skype thread, shared with Sadeghi and 14  
17 other participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund, Nagano, Hu,  
18 Yu, Saito, Xiang, Stephen Chen, and Zhou, on July 14, 2017:

- 19 • [July 14, 2017] Sadeghi: "How do you start your day? 😊"  
20 • [July 14, 2017] Sadeghi: "Koki Nagano and I are rotating spherical harmonics! 🤖"

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# ☆ PinscreenTeamAll

14 participants | <https://join.skype.com/L4luq1aWUhl2>



carrie sun

Cosimo Wei

Frances Chen

Han-Wei Kung

Hao Li

Jaewoo Seo

Jens Fursund

Koki Nagano

Liwen Hu

Ronald Yu

Shunsuke Saito

Sitao Xiang

Stephen Chen

Yi Zhou

Friday, July 14, 2017



6:19 AM

How do you start your day? 😊

6:19 AM

Koki Nagano and I are rotating spherical harmonics! ⚙️

6:21 AM

Sadeghi’s group message on “PinscreenTeamAll” Skype thread, shared with Sadeghi and 14 other participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund, Nagano, Hu, Yu, Saito, Xiang, Stephen Chen, and Zhou, dated July 14, 2017:

- [July 14, 2017] Sadeghi: “Also, Koki and I are still dealing with the Spherical Harmonics issues ...”



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☆ PinscreenTeamAll
14 participants | <https://join.skype.com/L4luq1aWUhl2>



🔔 carrie sun
🔔 Cosimo Wei
🔔 Frances Chen
✅ Han-Wei Kung
🔔 Hao Li
✅ Jaewoo Seo
🔔 Jens Fursund
🔔 Koki Nagano
🔔 Liwen Hu
🔔 Ronald Yu
🔔 Shunsuke Saito
🔔 Sitao Xiang
🔔 Stephen Chen
🔔 Yi Zhou

Friday, July 14, 2017

Google Sheets - cre...  
dots.google.com

Also, Koki and I are still dealing with the Spherical Harmonics issues ... 7:49 AM

Pinscreen employees’ group messages on “PinscreenTeamAll” Skype thread, shared with Sadeghi and 14 other participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund, Nagano, Hu, Yu, Saito, Xiang, Stephen Chen, and Zhou, dated July 14, 2017:

- [July 14, 2017] Fursund: “Really great results! Awesome you got it to work! And dynamic sh doesn’t seem to be a problem at all!”
- [July 14, 2017] Kung: “Congrats 🎉”
- [July 14, 2017] Sadeghi: “It was such an intense night. Koki and I will high five differently after this! 🍷”
- [July 14, 2017] Sadeghi: “Just got home safe. Going to sleep now 😊”
- [July 14, 2017] Li: “awesome thanks for the hard work!”



# ☆ PinscreenTeamAll

14 participants | <https://join.skype.com/L4luq1aWUh12>



- carrie sun
- Cosimo Wei
- Frances Chen
- Han-Wei Kung
- Hao Li
- Jaewoo Seo
- Jens Fursund
- Koki Nagano
- Liwen Hu
- Ronald Yu
- Shunsuke Saito
- Sitao Xiang
- Stephen Chen
- Yi Zhou

and also Unity's sh shading was wrong in terms of ours  
 the video shows the resp  
 Friday, July 14, 2017 10:20 AM

### Jens Fursund



Really great results! Awesome you got it to work! And dynamic sh doesn't seem to be a problem at all! 10:44 AM

### Han-Wei Kung



Congrats 👍 10:56 AM

It was such an intense night! Koki and I will high five differently after this! 🎉  
 Just got home safe. Going to sleep now 😊 11:51 AM

### Hao Li



awesome thanks for the hard work! 11:53 AM


**EXHIBIT E**


**Li's and Pinscreen's Data Fabrication and Academic Misconduct**


1. Li's private conversation with Sadeghi on Facebook, dated February 4, 2017:


- [February 4, 2017] Li: "has been very helpful so far"
- [February 4, 2017] Li: "koki will start officially in may"
- [February 4, 2017] Li: "at least has signed for that"
- [February 4, 2017] Li: "but can work part time in march"
- [February 4, 2017] Li: "however, i m helping him to make sure he can really start in may"
- [February 4, 2017] Li: "because his current phd advisor would block him from graduating if he joins pinscreen"
- [February 4, 2017] Li: "paul debevec is super jealous about what we do here"
- [February 4, 2017] Li: "paul is like trump"
- [February 4, 2017] Sadeghi: "Good to know about the VR politics!"
- [February 4, 2017] Li: "just a bunch of academic losers 😊"

← → ↻ 🏠 🔒 Secure | <https://m.facebook.com/messages/read/?fbid=722873752> ☆

 **Hao Li**  
has been very helpful so far  
koki will start officially in may  
at least has signed for that  
but can work part time in march  
however, i m helping him to make sure he can really start in may  
because his current phd advisor would block him from graduating if he joins pinscreen  
paul debevec is super jealous about what we do here  
Feb 4, 2017 · Sent from Web

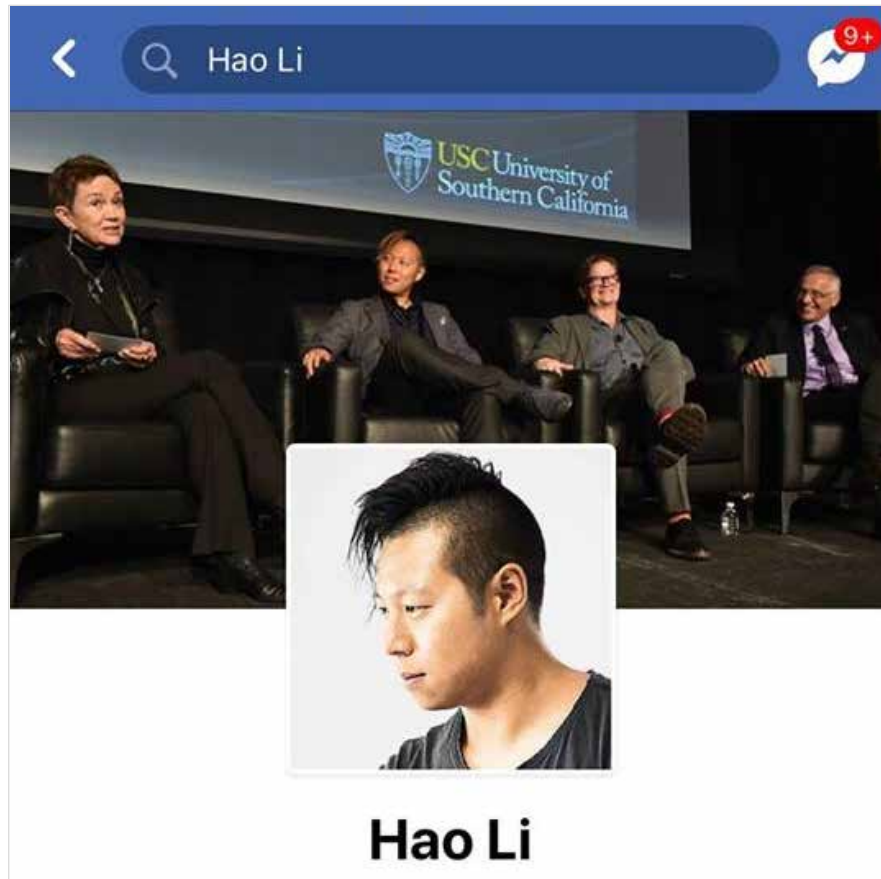
 **Hao Li**  
paul is like trump  
Feb 4, 2017 · Sent from Web

 **Iman Sadeghi**  
Good to know about the VR politics!  
Feb 4, 2017 ·

 **Hao Li**  
just a bunch of academic losers 😊

1 Li's Facebook profile with Facebook ID "li.hao":

- 2 • <https://www.facebook.com/li.hao>



18 Li's private messages to Sadeghi on Skype, dated June 5, 2017:

- 19 • [June 5, 2017] Li: "because his advisor does not want him to join us"
- 20 • [June 5, 2017] Li: "jernej is jealous"

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☆ Hao Li

ⓘ This person has not shared their details with y... | New York, New Y...



Contact request sent - [Resend contact request](#)

Why does his advisor [watch him go to work??](#) Tuesday, June 6, 2017


12:01 AM




because his advisor does not want him to join us  
jernej is jealous

12:01 AM

Li's Skype profile with Skype ID "hao.li.ethz":

 Contact profile ✕



☆ Hao Li

ⓘ This person has not shared their details with you.

New York, New York, United States

---

Skype: [hao.li.ethz](#)

Phone: [Add Number](#)

---

Website  
<http://www.hao-li.com/>

Birth date  
Saturday, January 17, 1981

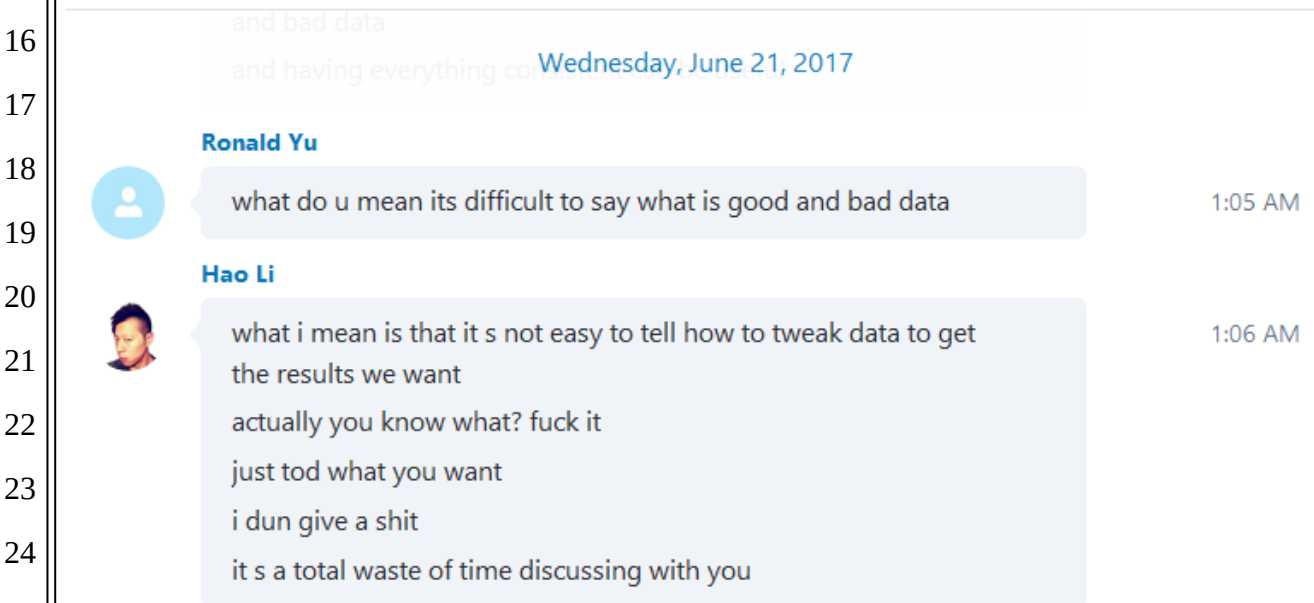
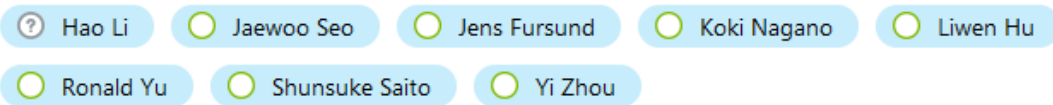
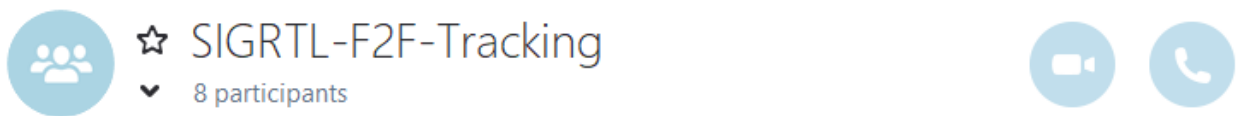
Age  
37

Gender  
Male

Language  
English

1 2. Li's group conversation with Yu on the "SIGRTL-F2F Tracking" Skype thread, shared with  
2 Sadeghi and 8 other participants, including Seo, Fursund, Nagano, Hu, Yu, Saito, and Zhou,  
3 dated June 21, 2017:

- 4 • [June 21, 2017] Yu: "what do u mean its difficult to say what is good and bad data"
- 5 • [June 21, 2017] Li: "what i mean is that it s not easy to tell how to tweak data to get the  
6 results we want"
- 7 • [June 21, 2017] Li: "actually you know what? fuck it"
- 8 • [June 21, 2017] Li: "just tod what you want"
- 9 • [June 21, 2017] Li: "i dun give a shit"
- 10 • [June 21, 2017] Li: "it s a total waste of time discussing with you"



1 Yu's Skype profile with Skype ID "hoolersae":



13

14 3. Li's group messages on "Pinscreen Team" Skype thread, shared with Sadeghi and 9 other

15 participants, including Wei, Yen-Chun Chen, Seo, Fursund, Nagano, Hu, and Saito, dated

16 March 27, 2017:

- 17
- 18 • [March 27, 2017] Li: "but what i m saying is that we should colelc it, then we know something"
  - 19 • [March 27, 2017] Li: "the issue is that we don't have time"
  - 20 • [March 27, 2017] Li: "we should start the collection asap"
  - 21 • [March 27, 2017] Li: "items are:"
  - 22 • [March 27, 2017] Li: "1) classification"
  - 23 • [March 27, 2017] Li: "we have never done this before, so no idea how long that will take"
  - 24 • [March 27, 2017] Li: "2) we dunno if handpicked are good"
  - 25 • [March 27, 2017] Li: "3) we still need hair rendering"
  - 26 • [March 27, 2017] Li: "4) we also need some tracking"
  - 27 • [March 27, 2017] Li: "it s basically 1 day per task"
  - 28 • [March 27, 2017] Li: "if we don't parallelize it, there is no way we can make it"



- 1 • [March 27, 2017] Li: “even if we fake things there is no time”



## ☆ Pinscreen Team

▼ 9 participants | <https://join.skype.com/S7mPXSLmVhsz>



- Cosimo Wei
- Frances Chen
- Hao Li
- Jaewoo Seo
- Jens Fursund
- Koki Nagano
- Liwen Hu
- Shunsuke Saito
- 璿依

So lets just see how to do quality time

Monday, March 27, 2017

6:33 PM

Hao Li



but what i m saying is that we should colelc it, then we know something

6:33 PM

the issue is that we don't have time

we should start the collection asap

items are:

1) classification

we have never done this before, so no idea how long that will take

2) we dunno if handpicked are good

3) we still need hair rendering

4) we also need some tracking

it s basically 1 day per task

if we don't parallelize it, there is no way we can make it

even if we fake things there is no time

1 Skype profile with Skype ID “lapislazuli225”:



13 4. Li’s group conversation with Saito on “RTL Demo ( Pinscreen: Creating Performance-Driven  
14 Avatars in seconds )” Skype thread, shared with Sadeghi and 6 other participants, including  
15 Wei, Fursund, Nagano, Hu, and Saito, dated March 27, 2017:

- 16
- 17
- 18
- 19
- 20
- [March 27, 2017] Saito: “maybe jens and i can setup meeting to see if it’s even doable”
  - [March 27, 2017] Li: “yes”
  - [March 27, 2017] Li: “we need a feasibility discussion first”
  - [March 27, 2017] Li: “i have doubts for now”
  - [March 27, 2017] Li: “we could build the model on time (via cheating)”
- 21
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☆ RTL Demo ( Pinscreen: Creating...

▼ 6 participants



○ Cosimo Wei

○ ? Hao Li

○ Jens Fursund

○ Koki Nagano

○ Liwen Hu

○ Shunsuke Saito

It would be as fast as the crappy shader that we have in unity right now.  
Monday, March 27, 2017



**Shunsuke Saito**

maybe jens and i can setup meeting to see if it's even doable

7:57 PM




**Hao Li**

yes  
we need a feasibility discussion first  
i have doubts for now  
we could build the model on time (via cheating)

7:58 PM

Saito's Skype profile with Skype ID "shunsuke-9981":

Contact profile



☆ Shunsuke Saito

○

足立区, 東京都, Japan

---

Skype: [shunsuke-9981](#)

Phone: [Add Number](#)

---

Website  
<http://www.facebook.com/shun9981>

Birth date  
Sunday, January 6, 1991

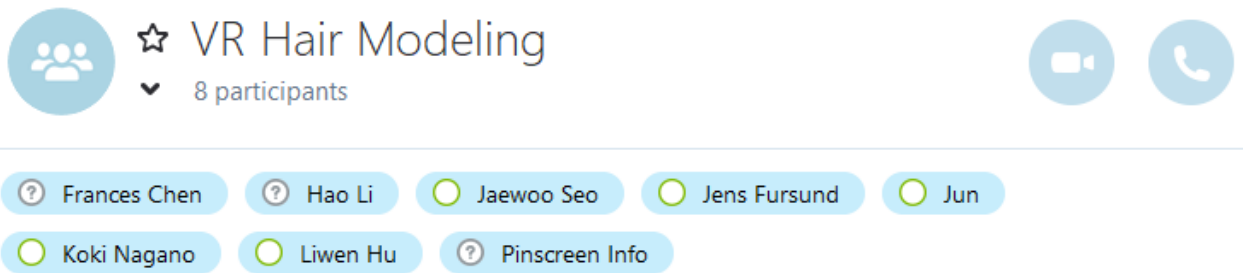
Age  
27

Gender  
Male

Language  
Japanese

1  
2 5. Li's group messages on "VR Hair Modeling" Skype thread, shared with Sadeghi and 8 other  
3 participants, including Yen-Chun Chen, Seo, Fursund, Xing, Nagano, and Hu, dated June 29,  
4 2017:

- 5 • [June 29, 2017] Li: "Okay let s push for full pipeline first":
- 6 • [June 29, 2017] Li: "And not fine tune":
- 7 • [June 29, 2017] Li: "I m really worried that nothing will work by tje rehearsal and we have  
8 to some shitty cheating again"



14 Will have all the steps for getting the hairs to the server and front  
15 end documented to (Thursday, June 29, 2017) automatic.

16 **Hao Li**



17 Okay let s push for full pipeline first  
18 And not fine tune  
19 I m really worried that nothing will work by tje rehearsal and we  
20 have to some shitty cheating again

12:51 AM

1 Xing's Skype profile with Skype ID "junxing2011":



12

13 6. Li's group messages on "PinscreenTeamAll" Skype thread, shared with Sadeghi and 14 other

14 participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund, Nagano, Hu, Yu,

15 Saito, Xiang, Stephen Chen, and Zhou, dated May 15, 2017:

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- 23
- [May 15, 2017] Li: "our eyes are wrong"
  - [May 15, 2017] Li: "the colors"
  - [May 15, 2017] Li: "we need to use a deep neural net for that"
  - [May 15, 2017] Fursund: "for the SIGAsia paper"
  - [May 15, 2017] Li: "or we just do it manually for siggraph asia for now"
  - [May 15, 2017] Fursund: "do you need unity rendering"
  - [May 15, 2017] Li: "let s do it manually for now"
  - [May 15, 2017] Li: "i think it s the only way"



# ☆ PinscreenTeamAll

14 participants | <https://join.skype.com/L4luq1aWUhI2>



- carrie sun
- Cosimo Wei
- ⊙ Frances Chen
- Han-Wei Kung
- ⊙ Hao Li
- Jaewoo Seo
- Jens Fursund
- Koki Nagano
- Liwen Hu
- Ronald Yu
- Shunsuke Saito
- Sitao Xiang
- ⊙ Stephen Chen
- Yi Zhou

just trying the first one 😊

anyway

Monday, May 15, 2017

**Hao Li**



our eyes are wrong  
the colors  
we need to use a deep neural net for that

2:07 AM

**Jens Fursund**



for the SIGAsia paper

2:08 AM

**Hao Li**



or we just do it manually for siggraph asia for now

2:08 AM

**Jens Fursund**



do you need unity rendering

2:08 AM

**Hao Li**



let s do it manually for now  
i think it s the only way

2:08 AM

1 Fursund's Skype profile with Skype ID "alt\_er\_ego":



16 7. Li's group messages on "RTL Demo ( Pinscreen: Creating Performance-Driven Avatars in  
17 seconds )" Skype thread, shared with Sadeghi and 6 other participants, including Wei,  
18 Fursund, Nagano, Hu, and Saito, dated March 27, 2017:

- 19
- 20
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- [March 27, 2017] Li: "it s even better to have not good looking hair real-time than good looking non real-time hair"
  - [March 27, 2017] Li: "but we should try to have some hair if we want to try to aim for it"
  - [March 27, 2017] Li: "the reconstruction part we probably have no choice but to cheat"
- 23
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RTL Demo ( Pinscreen: Creating...

6 participants | <https://join.skype.com/QxrqJMUmjDyJ>



Cosimo Wei



Hao Li



Jens Fursund



Koki Nagano



Liwen Hu



Shunsuke Saito

new HTML from Iman

Monday, March 27, 2017



Hao Li

it s even better to have not good looking hair real-time than good looking non real-time hair  
but we should try to have some hair if we want to try to aim for it  
the reconstruction part we probably have no choice but to cheat

10:39 PM

8. Li group messages on “PinscreenTeamAll” Skype thread, shared with Sadeghi and 14 other participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund, Nagano, Hu, Yu, Saito, Xiang, Stephen Chen, and Zhou, dated May 22, 2017:

- [May 22, 2017] Saito: “is the patch optimization working now?”
- [May 22, 2017] Nagano: “there are several issues in error computation and we are testing a new approach”
- [May 22, 2017] Nagano: “the hair guy is in the dream”
- [May 22, 2017] Wei: “hair guy!”
- [May 22, 2017] Nagano: “he is dead”
- [May 22, 2017] Saito: “oh no.”
- [May 22, 2017] Saito: “hairy guy!!”
- [May 22, 2017] Yen-Chun Chen: “@Hao Li asking @Koki Nagano liwen does the thing work?”
- [May 22, 2017] Yen-Chun Chen: “is @Liwen Hu dead?”
- [May 22, 2017] Nagano: “Liwen is back”
- [May 22, 2017] Nagano: “Jens coded a pipeline to directly output positions in raw from






- 1           unity and we are checking the output is correct or not”
- 2           • [May 22, 2017] Li: “okay guys i just wakey”
- 3           • [May 22, 2017] Li: “what s the status?”
- 4           • [May 22, 2017] Li: “@koki: does it work?”
- 5           • [May 22, 2017] Li: “is the internet fast now?”
- 6           • [May 22, 2017] Hu: “there is another bug”
- 7           • [May 22, 2017] Li: “>\_<”
- 8           • [May 22, 2017] Hu: “the gamma correction thing”
- 9           • [May 22, 2017] Li: “can u fix it?”
- 10          • [May 22, 2017] Li: “i knew it”
- 11          • [May 22, 2017] Li: “iuse lineartogamma”
- 12          • [May 22, 2017] Li: “gammatolinear(...)”
- 13          • [May 22, 2017] Hu: “now we are changing uv color to 3d position with Jens’ help”
- 14          • [May 22, 2017] Li: “okay”
- 15          • [May 22, 2017] Hu: “i tired use more bits for the color, it didn’t work. So I set the shader
- 16          output RGB(10, 0, 0) for all the pixel”
- 17          • [May 22, 2017] Li: “aha”
- 18          • [May 22, 2017] Hu: “but once i checked the color of the png in photoshop”
- 19          • [May 22, 2017] Hu: “it tells RGB(3, 0, 0)”
- 20          • [May 22, 2017] Li: “aha”
- 21          • [May 22, 2017] Li: “can u use gammatolinear?”
- 22          • [May 22, 2017] Nagano: “so we are checking the new pipeline which export positions”
- 23          • [May 22, 2017] Nagano: “but if we scale the value properly it might be ok”
- 24          • [May 22, 2017] Li: “will you guys have it in an hour?”
- 25          • [May 22, 2017] Li: “we spent 1 day on it. that s a o;t”
- 26          • [May 22, 2017] Li: “lot”
- 27          • [May 22, 2017] Nagano: “the gamma or something is only off for dark values”
- 28          • [May 22, 2017] Li: “what s the current ETA?”






- 1 • [May 22, 2017] Li: “I need it to see if we shouldn’t do something else?”
- 2 • [May 22, 2017] Li: “we are late by 6 hours”
- 3 • [May 22, 2017] Li: “we almost don’t have time to produce results and write the paper”
- 4 • [May 22, 2017] Li: “if in an hour it’s not working let’s do it manually
- 5 • [May 22, 2017] Li: “and give up on it”
- 6 • [May 22, 2017] Li: “i don’t think we can make it automatic”





7  ☆ PinscreenTeamAll  

8 ▼ 14 participants | <https://join.skype.com/L4luq1aWUhl2>

9


10  carrie sun  Cosimo Wei  Frances Chen  Han-Wei Kung  Hao Li


11  Jaewoo Seo  Jens Fursund  Koki Nagano  Liwen Hu  Ronald Yu


12  Shunsuke Saito  Sitao Xiang  Stephen Chen  Yi Zhou


13 I was going to ask


14 if we have hairs we are go **Monday, May 22, 2017**


15  **Shunsuke Saito** is the patch optimization working now? 1:22 PM

16  **Koki Nagano** there are several issues in error computation and we are testing a new approach the hair guy is in the dream 1:23 PM

17  **Cosimo Wei** 魏 hair guy! 1:23 PM

18  **Koki Nagano** he is dead 1:23 PM

19  **Shunsuke Saito** oh no. hairy guy!! 1:24 PM

20  **Frances Chen** @Hao Li asking @Koki Nagano liwen does the thing work? is @Liwen Hu dead? 1:53 PM

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# ☆ PinscreenTeamAll

14 participants | <https://join.skype.com/L4luq1aWUhl2>



- carrie sun
- Cosimo Wei
- Frances Chen
- Han-Wei Kung
- Hao Li
- Jaewoo Seo
- Jens Fursund
- Koki Nagano
- Liwen Hu
- Ronald Yu
- Shunsuke Saito
- Sitao Xiang
- Stephen Chen
- Yi Zhou

@hao: asking @koki nagano liwen does the thing work?  
 is @Liwen Hu dead? Monday, May 22, 2017

**Koki Nagano**  
 Liwen is back 2:00 PM

Jens coded a pipeline to directly output positions in raw from unity and we are checking the output is correct or not 2:01 PM

**Hao Li**  
 okay guys i just wakey 2:09 PM  
 what s the status?  
 @koki: does it work?  
 is the internet fast now?

**Liwen Hu**  
 there is another bug 2:10 PM

**Hao Li**  
 >\_< 2:10 PM

**Liwen Hu**  
 the gamma correction thing 2:10 PM

**Hao Li**  
 can u fix it? 2:10 PM

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# ☆ PinscreenTeamAll

14 participants | <https://join.skype.com/L4luq1aWUhl2>



- carrie sun
- Cosimo Wei
- Frances Chen
- Han-Wei Kung
- Hao Li
- Jaewoo Seo
- Jens Fursund
- Koki Nagano
- Liwen Hu
- Ronald Yu
- Shunsuke Saito
- Sitao Xiang
- Stephen Chen
- Yi Zhou

Liwen Hu



the gamma correction thing

Monday, May 22, 2017

2:10 PM

Hao Li



can u fix it?  
i knew it  
i use lineartogamma  
gammatolinear(...)

2:10 PM

Liwen Hu



now we are changing uv color to 3d position with Jens' help

2:11 PM

Hao Li



okay

2:11 PM

Liwen Hu



i tired use more bits for the color, it didn't work. So i set the  
shader output RGB(10, 0, 0) for all the pixel

2:12 PM

Hao Li



aha

2:12 PM



# ☆ PinscreenTeamAll

14 participants | <https://join.skype.com/L4luq1aWUhl2>



- carrie sun
- Cosimo Wei
- Frances Chen
- Han-Wei Kung
- Hao Li
- Jaewoo Seo
- Jens Fursund
- Koki Nagano
- Liwen Hu
- Ronald Yu
- Shunsuke Saito
- Sitao Xiang
- Stephen Chen
- Yi Zhou

i tired use more bits for the color, it didn't work. So i set the  
 shader output RGB(10, 0, 0) 2:12 PM

**Hao Li**



aha

2:12 PM

**Liwen Hu**



but once i checked the color of the png in photoshop  
it tells RGB(3, 0, 0)

2:12 PM

**Hao Li**



aha  
can u use gammatolinear?

2:12 PM

**Koki Nagano**



so we are checking the new pipeline which export positions  
but if we scale the value properly it might be ok

2:15 PM

**Hao Li**



will you guys have it in an hour?  
we spent 1 day on it. that s a o;t  
lot

2:15 PM

**Koki Nagano**



the gamma or something is only off for dark values

2:15 PM


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- carrie sun
- Cosimo Wei
- Frances Chen
- Han-Wei Kung
- Hao Li
- Jaewoo Seo
- Jens Fursund
- Koki Nagano
- Liwen Hu
- Ronald Yu
- Shunsuke Saito
- Sitao Xiang
- Stephen Chen
- Yi Zhou

Koki Nagano

the gamma or something is only on for dark values Monday, May 22, 2017 2:15 PM

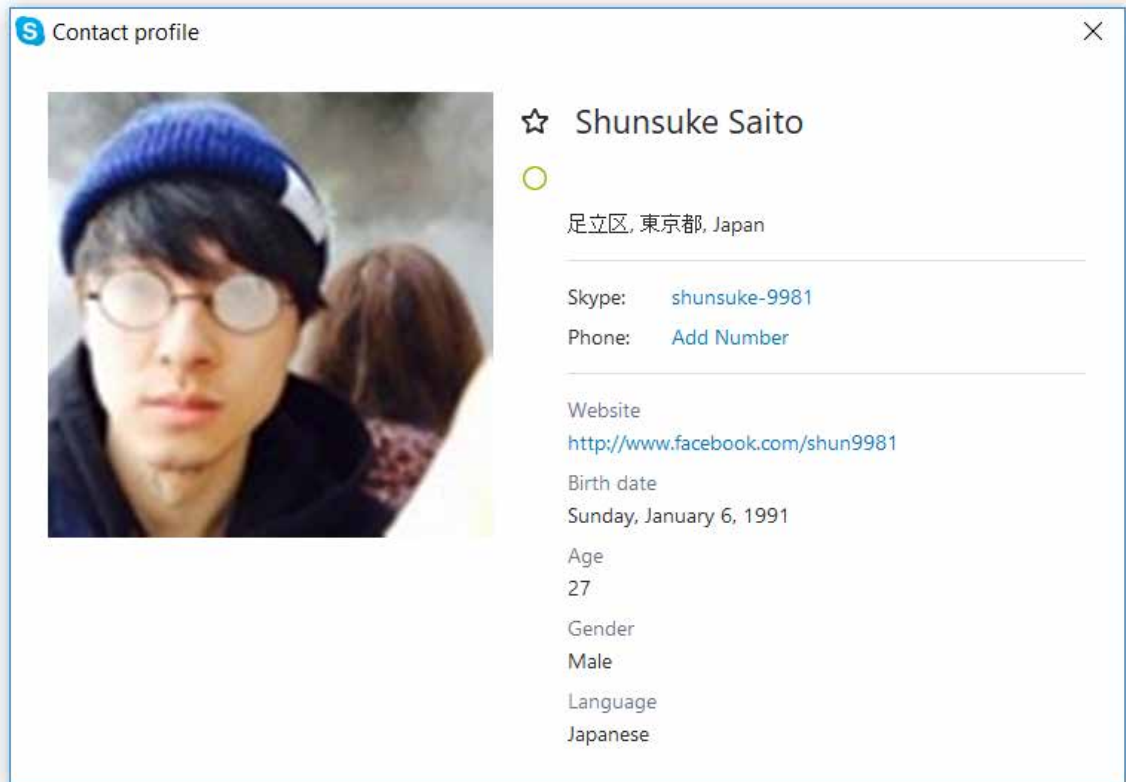
**Hao Li**

 what s the current ETA? 2:18 PM  
i need it to see if we shoudn't do something else?  
we are late by 6 hours  
we almost don't hzve time to produce results and write the paper  
if in an hour it s not working let s do it manually  
and give up on it  
i don't think we can make it automatic



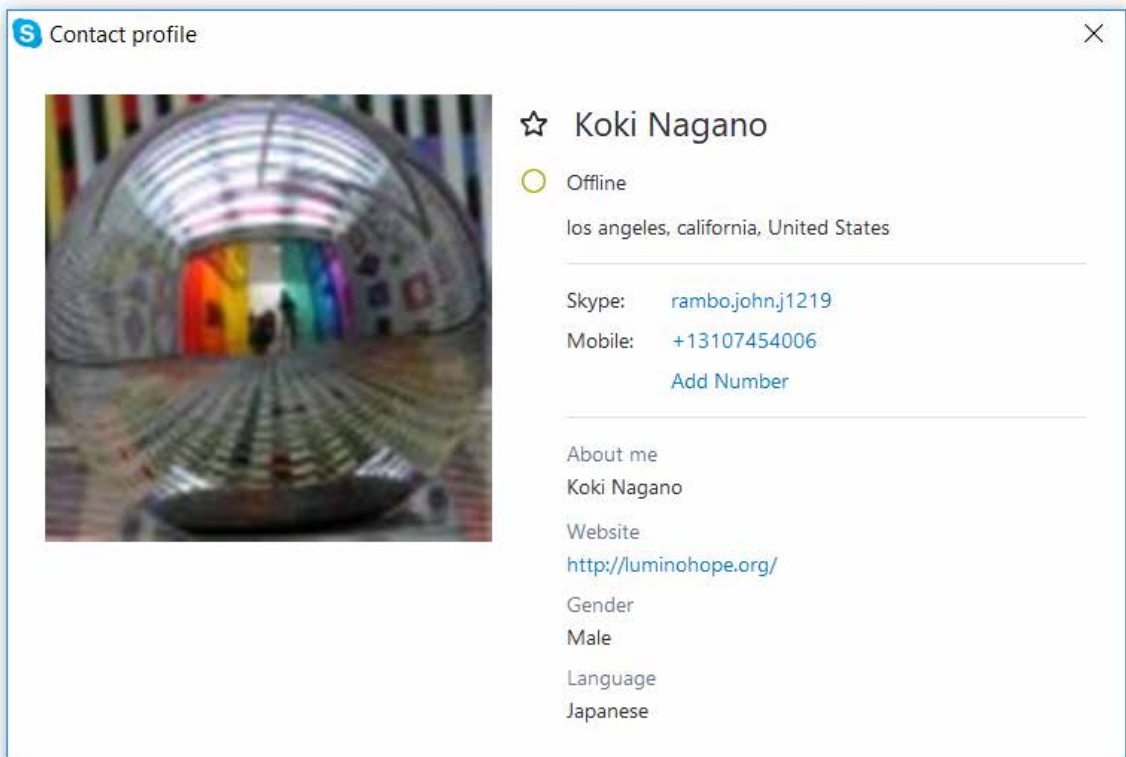
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Saito’s Skype profile with Skype ID “shunsuke-9981”:



The screenshot shows a Skype contact profile for Shunsuke Saito. On the left is a profile picture of a man with glasses and a blue beanie. To the right, the name "Shunsuke Saito" is displayed with a star icon and a green status indicator. Below the name, the location "足立区, 東京都, Japan" is listed. Further down, the Skype ID "shunsuke-9981" and a phone number "Add Number" are shown. A website link "http://www.facebook.com/shun9981" is provided. The birth date is "Sunday, January 6, 1991", the age is "27", the gender is "Male", and the language is "Japanese".

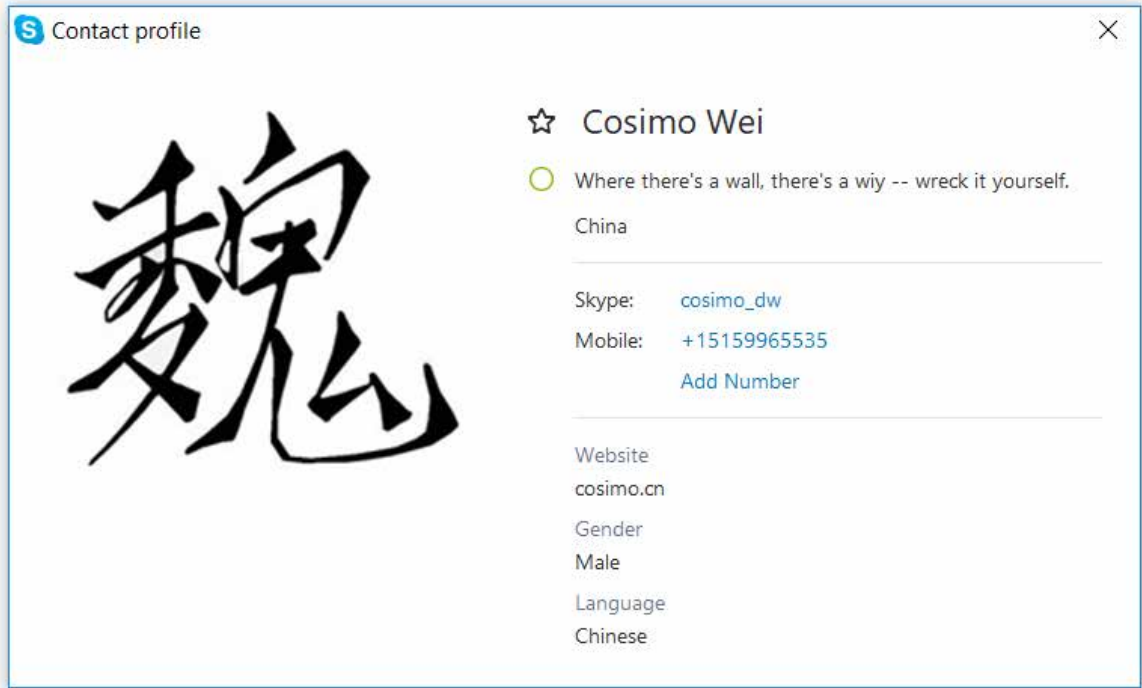
Nagano’s Skype profile with Skype ID “rambo.john.j1219”:



The screenshot shows a Skype contact profile for Koki Nagano. On the left is a profile picture of a colorful, illuminated tunnel. To the right, the name "Koki Nagano" is displayed with a star icon and a green status indicator labeled "Offline". Below the name, the location "los angeles, california, United States" is listed. Further down, the Skype ID "rambo.john.j1219" and a mobile number "+13107454006" are shown, along with an "Add Number" link. An "About me" section contains the name "Koki Nagano". A website link "http://luminohope.org/" is provided. The gender is "Male" and the language is "Japanese".

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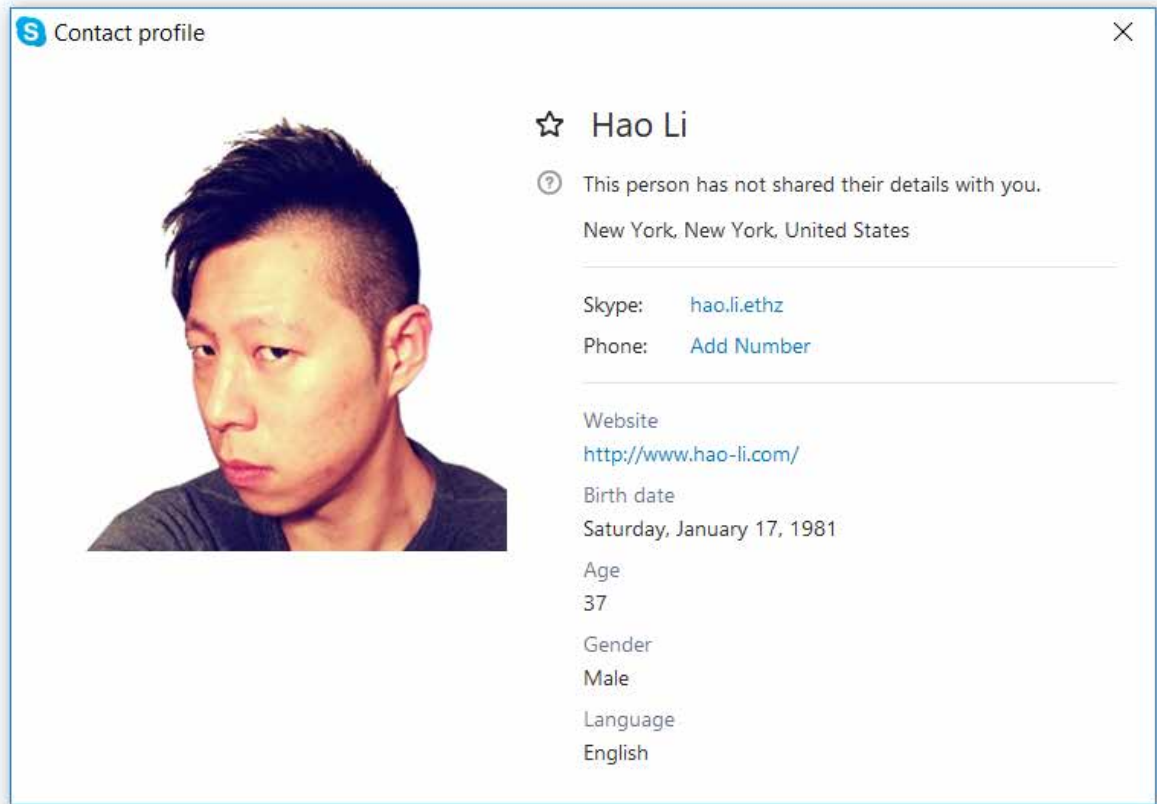
Wei's Skype profile with Skype ID "cosimo\_dw":



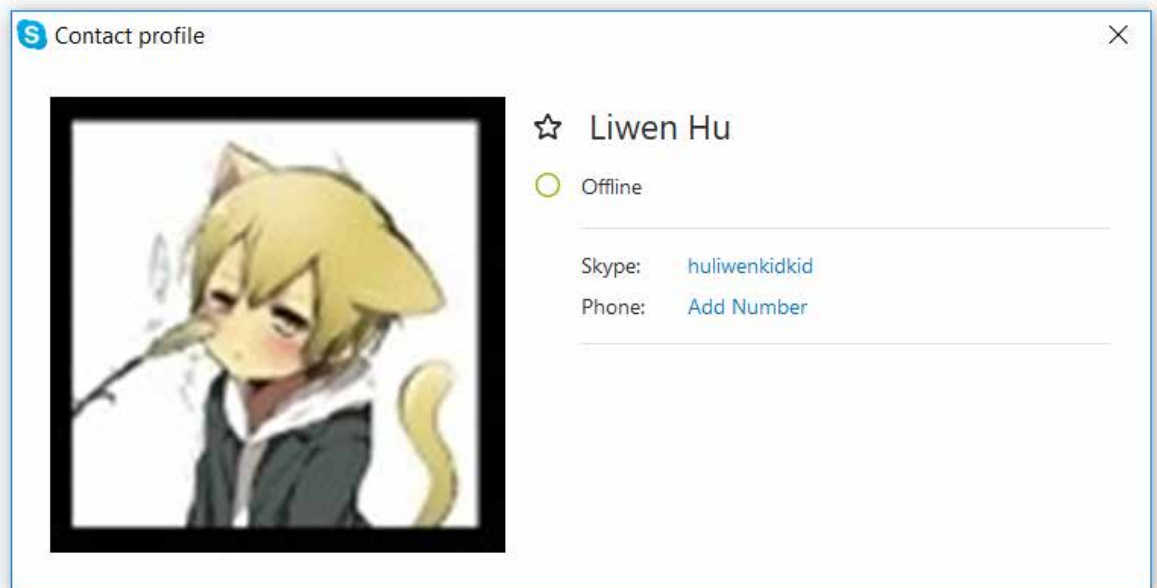
Yen-Chun Chen's Skype profile with Skype ID "layan19":



1 Li's Skype profile with Skype ID "hao.li.ethz":



15 Hu's Skype profile with Skype ID "huliwenkidkid":



27 Fursund's Skype profile with Skype ID "alt\_er\_ego":

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Contact profile



☆ Jens Fursund

Offline

Copenhagen, Denmark

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Skype: [alt\\_er\\_ego](#)

Phone: [Add Number](#)

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Website  
[jens.fursund.com](#)


Birth date  
Tuesday, May 1, 1984

Age  
34

Gender  
Male

Sun's Skype profile with Skype ID "live:carrie.k.sun":

Contact profile



☆ carrie sun

Offline

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Skype: [live:carrie.k.sun](#)

Phone: [Add Number](#)

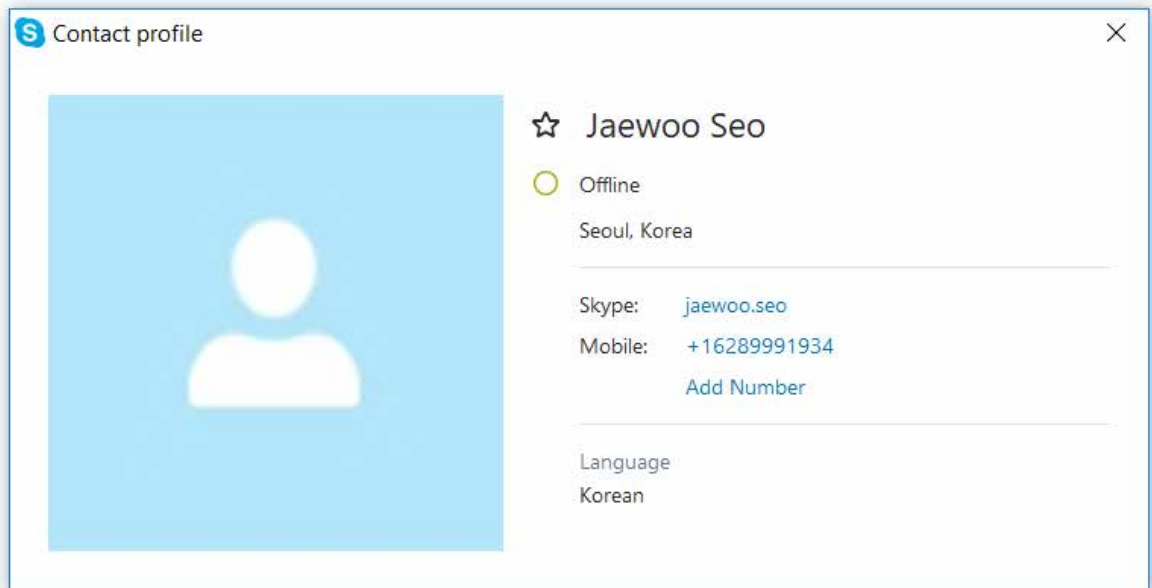
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Kung's Skype profile with Skype ID "kunglet":



Seo's Skype profile with Skype ID "jaewoo.seo":



1 Yu's Skype profile with Skype ID "hoolersae":



13 Xiang's Skype profile with Skype ID "sitao.xiang":





1 Stephen Chen's Skype profile with Skype ID "syhchen2012":



12 Zhou's Skype profile with Skype ID "live:zhouyisjtu2012":



24 Pinscreen's description of Hair Polystrip Patch Optimization in its SIGGRAPH Asia 2017  
25 Technical Papers publication, titled "Avatar Digitization from a Single Image for Real-Time  
26 Rendering," published on ACM Digital Library:

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- <https://dl.acm.org/citation.cfm?id=31310887>

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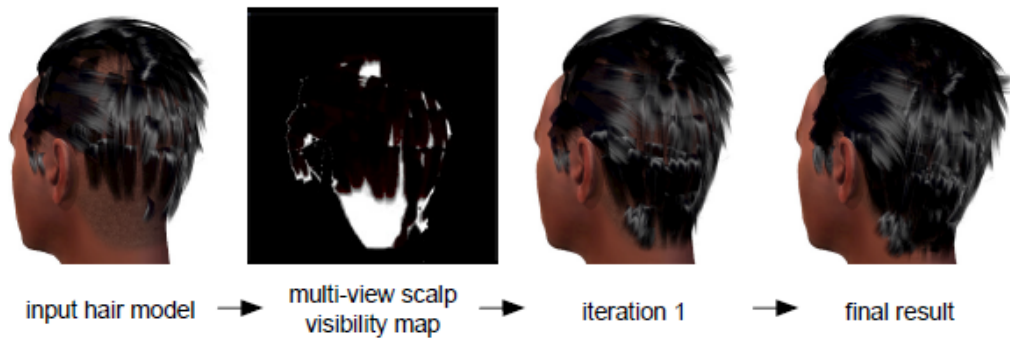


Fig. 8. Our iterative optimization algorithm for polystrip patching.

*Polystrip Patching Optimization.* With the benefit of having a low computational overhead, a polystrip-based rendering with a bump map and an alpha mask produces locally plausible hair appearance for a wide range of hairstyles. However, such rendering is prone to a lack of scalp coverage, especially for short hairstyles. We propose an iterative optimization method to ensure scalp coverage via patching with minimum increase in the number of triangles.

We measure the coverage by computing the absolute difference between the alpha map in a model view space with and without hair transparency from multiple view points (see Figure 8). Regions with high error expose the scalp surface and need to be covered by additional hair meshes. Without transparency, all polystrips are rendered with alpha value 1.0. When a hair alpha mask is assigned by the hair style classification, the polystrips are rendered via order-independent transparency (OIT), resulting in alpha values of range  $[0, 1]$ . First, we convert the error map into a binary map by thresholding if the error exceeds 0.5, and apply blob detection on the binary map. Given the blob with highest error, a new polystrip is then placed to cover the area.

We find the  $k$ -closest polystrips to the region with the highest error and resample two polystrips within this set so that their average produces a new one that covers this region. We use  $k = 6$  for all our examples. The two polystrips are re-sampled so that they have consistent vertex numbers for linear blending. By averaging the polystrips, we can guarantee that the resulting strips are inside the convex hull of the hair region. Thus, our method does not violate the overall hair silhouette after new strips are added. We iterate this process until the highest error has reached a certain threshold or when no more scalp region is visible.

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9. Article published by Venture Square on August 29, 2017:

- Title: “Softbank Ventures Invests in US Graphics Startup Pinscreen”
- <http://www.venturesquare.net/world/softbank-ventures-pinscreen>
- [August 29, 2017] Venture Square: “Softbank Ventures has invested in AI graphics startup Pinscreen in a funding round together with Lux Capital and Colopl Next.”
- [August 29, 2017] Venture Square: “The technology has been recognized by SIGGRAPH, one of the top authorities in the computer graphics industry, as one of the most innovative developments this year.”

10. Li’s private messages to Sadeghi on Skype, dated April 26, 2017:

- [April 26, 2017] Li: “if we just get a techcrunch article on our stuff, then the valuation could be much higher”
- [April 26, 2017] [...]
- [April 26, 2017] Li: “much higher = 5-10x”



☆ Hao Li

Ⓞ This person has not shared their det... | New York, New Y...



Contact request sent - [Resend contact request](#)

we are so close to launch  
the thing is **Wednesday, April 26, 2017**

if we just get a techcrunch article on our stuff, then the valuation could be much higher

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☆ Hao Li

ⓘ This person has not shared their det... | New York, New Y...



Contact request sent - Resend contact request

which is smethign that we always had  
so everyone is playing poker now  
Wednesday, April 26, 2017

much higher = 5-10x

Li's private message to Sadeghi on Skype, dated May 22, 2017:

- [May 22, 2017] Li: "techcrunch coverage should be our target"



☆ Hao Li

ⓘ This person has not shared their de... | New York, New Y...



Contact request sent - Resend contact request

Monday, May 22, 2017





techcrunch coverage should be our target

2:36 AM

Li's group message on "SIGRTL-F2F-Tracking" Skype thread, shared with Sadeghi and 8 other participants, including Seo, Fursund, Nagano, Hu, Yu, Saito, and Zhou, dated June 17, 2017:

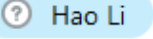
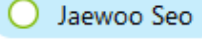
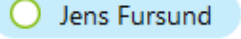
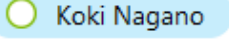
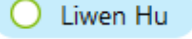
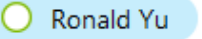
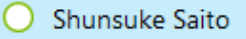
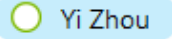
- [June 17, 2017] Li: "there will be techcrunch at siggraph rtl"

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  SIGRTL-F2F-Tracking  
8 participants


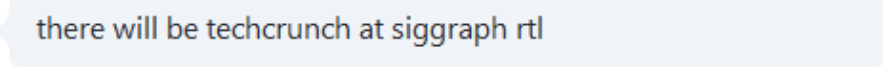


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  yes Saturday, June 17, 2017 7:27 PM

  there will be techcrunch at siggraph rtl 7:27 PM

11. Li's group messages on "RTL Demo ( Pinscreen: Creating Performance-Driven Avatars in seconds )" Skype thread, shared with Sadeghi and 6 other participants, including Wei, Fursund, Nagano, Hu, and Saito, dated March 30, 2017:

- [March 30, 2017] Li: "i just interviewed and hired a hair modelerer"
- [March 30, 2017] Li: "he ll try to get us something by tmr this time, or a bit later"
- [March 30, 2017] Li: "and by monday these five hair models"
- [March 30, 2017] Li: [leszek.zip]
- [March 30, 2017] Li: "@imam: can u produce the head model obj files for them?"
- [March 30, 2017] Sadeghi: "@Hao Where are these files from? The meshes are not that nice. Phil's hair:"
- [March 30, 2017] Sadeghi: [image]
- [March 30, 2017] Li: "Liwen computed"
- [March 30, 2017] Li: "I m asking an artist to create them from scratch"
- [March 30, 2017] Li: "And will fix them in parallel"
- [March 30, 2017] Li: "We need to think of a solution, artists are too slow and expensive"
- [March 30, 2017] Li: "I ll ask him create 5 for now"
- [March 30, 2017] Li: "100 euro per hair"

- [March 30, 2017] Li: “3 hours per hair they need”

RTL Demo ( Pinscreen... 6 participants

Video call icon Phone icon Add person icon

- Cosimo Wei
- Hao Li
- Jens Fursund
- Koki Nagano
- Liwen Hu
- Shunsuke Saito

Thursday, March 30, 2017

Hao Li



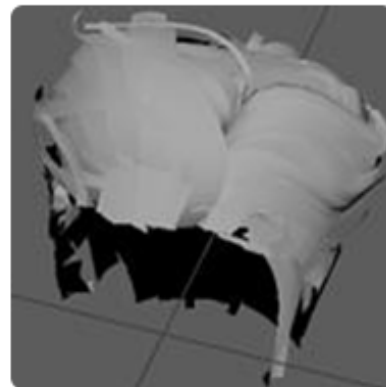
i just interviewed and hired a hair modeler  
he ll try to get us something by tmr this time, or a bit  
later  
and by monday these five hair models



leszek.zip  
3.9 MB  
Cancel

@imam: can u produce the head model obj files for  
them?

@Hao Where are these files from? The meshes are  
not that nice. Phil's hair:





★ RTL Demo ( Pinscreen...  
 ▼ 6 participants



Cosimo Wei



Hao Li



Jens Fursund



Koki Nagano



Liwen Hu



Shunsuke Saito

Thursday, March 30, 2017

Hao Li



Liwen computed

2:54 PM

I m asking an artist to create them from scratch

And will fix them in parallel

We need to think of a solution artists are too slow  
and expensive

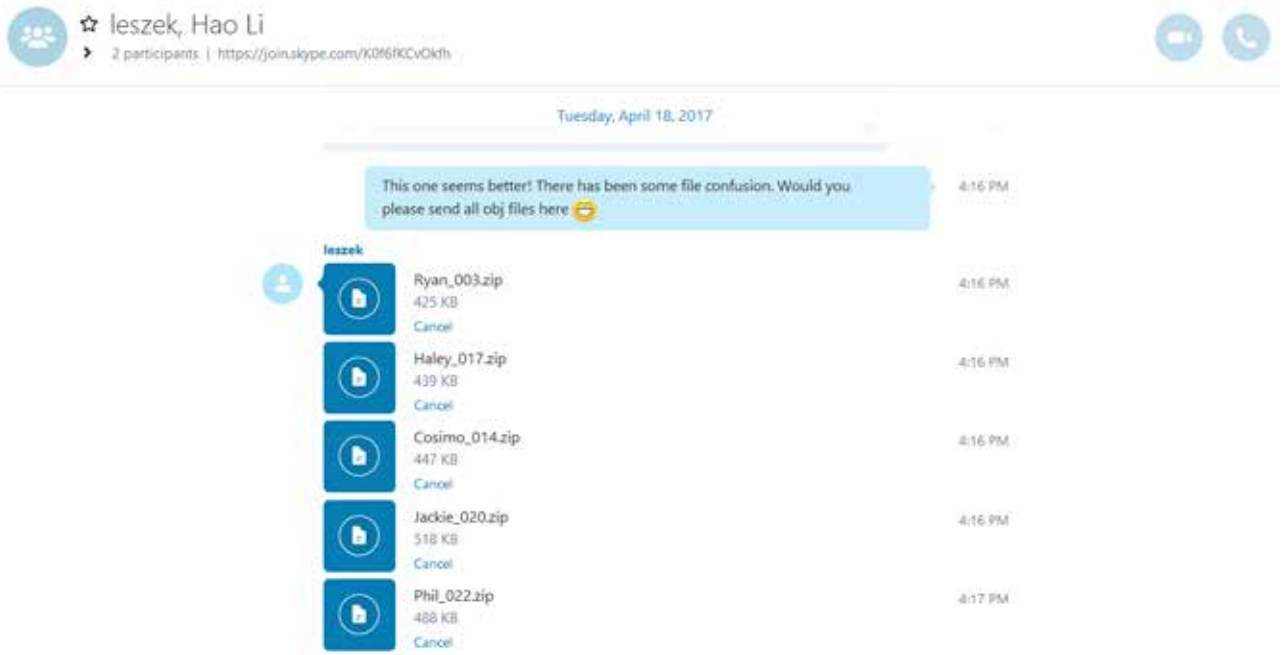
I ll ask him create 5 for now

100 euro per hair

3 hours per hair they need

Leszek’s group messages to Li and Sadeghi on Skype, dated April 18, 2017:

- [April 18, 2017] Sadeghi: “This one seems better! There has been some file confusion!  
Would you please send all obj files here 😊”
- [April 18, 2017] Leszek: [Ryan\_003.zip]
- [April 18, 2017] Leszek: [Haley\_017.zip]
- [April 18, 2017] Leszek: [Cosimo\_014.zip]
- [April 18, 2017] Leszek: [Jackie\_020.zip]
- [April 18, 2017] Leszek: [Phil\_022.zip]






12 Leszek’s Skype profile with Skype ID “spawnie76”:

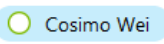
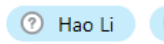
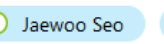
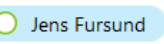
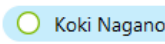
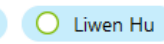
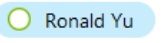
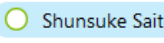
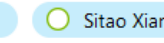
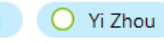











1 12. Li's, Nagano's, and Fursund's group messages on "R&D Weekly" Skype thread, shared with  
2 Sadeghi and 10 other participants, including Wei, Seo, Fursund, Nagano, Hu, Yu, Saito,  
3 Xiang, and Zhou, dated March 29, 2017:

- 4 • [March 29, 2017] Nagano: "<http://s2016.siggraph.org/content/real-time-live>"
- 5 • [March 29, 2017] Li: "From Previs to Final in Five minutes: A Breakthrough in Live  
6 Performance Capture"
- 7 • [March 29, 2017] Li: "Pinscreen: Creating Animated Avatars without Artists in 5 seconds"
- 8 • [March 29, 2017] Li: "Avatar Digitization from a Single Image"
- 9 • [March 29, 2017] Fursund: "Pinscreen: 3D Avatar from a Single Image"
- 10 • [March 29, 2017] Li: "Pinscreen: Creating Performance-Driven Avatars in seconds"
- 11 • [March 29, 2017] [📞 Call ended, duration 1:22:58]

12  ☆ R&D Weekly    
13 ▼ 10 participants

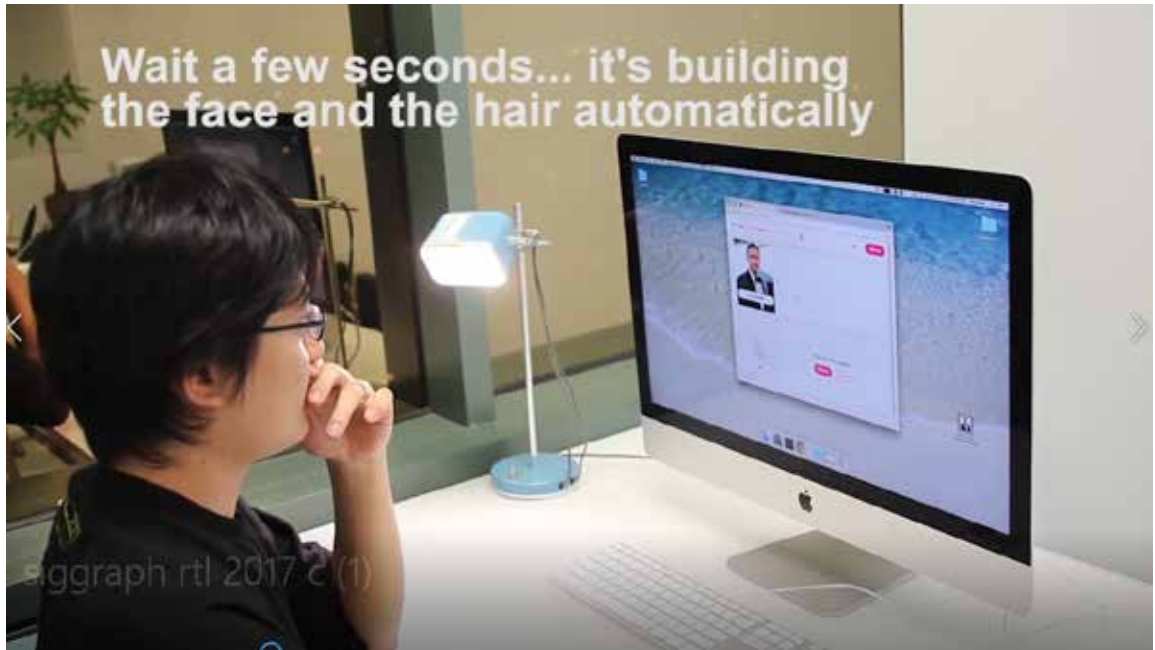
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16 Jessica Alba  
17 Mila Kunis  
Wednesday, March 29, 2017

18  <http://s2016.siggraph.org/content/real-time-live> 12:23 PM  
19  From Previs to Final in Five minutes: A Breakthrough in Live Performance  
20 Capture  
21 Pinscreen: Creating Animated Avatars without Artists in 5 seconds   
22 Avatar Digitization From a Single Image 12:25 PM  
23  Pinscreen: 3D Avatar from a Single Image 12:25 PM  
24  Pinscreen: Creating Performance-Driven Avatars in seconds  12:26 PM  
25  Call ended, duration 1:22:58 12:27 PM  
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1 Video submitted by Pinscreen to SIGGRAPH RTL, on April 4, 2017:

- 2 • <https://www.youtube.com/watch?v=OZ2O3SXF0tE>
- 3 • “Wait a few seconds ... it’s building the face and the hair automatically.”



15  
16 13. Li’s group messages on “PinscreenTeamAll” Skype thread, shared with Sadeghi and 14 other  
17 participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund, Nagano, Hu, Yu,  
18 Saito, Xiang, Stephen Chen, and Zhou, dated May 15, 2017:






- 19 • [May 15, 2017] Li: [c118-f118\_2-a506-paper-v7.pdf]
- 20 • [May 15, 2017] Li: [506 – Submission Reviews – By Person.pdf]
- 21 • [May 15, 2017] Li: “paper review”
- 22 • [May 15, 2017] Li: “we hhad 7 reviewers”
- 23 • [May 15, 2017] Li: [SIGA17 TODO LIST]
- 24 • [May 15, 2017] Li: “-Evaluate/compare for choice of hair system (comparison to  
25 AutoHair)”
- 26 • [May 15, 2017] Li: “-Explain how the eye balls, mouth was chosen”
- 27 • [May 15, 2017] Li: “-Present all the results for 100 tested photos”






28





- 1 • [May 15, 2017] Li: “-Explain how the chosen blend shapes method affects the animation
- 2 across diverse people”
- 3 • [May 15, 2017] Li: “Present full models, front and back views”
- 4 • [May 15, 2017] Li: “Show comparison to loom.ai”

5  ☆ PinscreenTeamAll  


6 ▼ 14 participants | <https://join.skype.com/L4luq1aWUhl2>

8  carrie sun  Cosimo Wei  Frances Chen  Han-Wei Kung  Hao Li

9  Jaewoo Seo  Jens Fursund  Koki Nagano  Liwen Hu  Ronald Yu



10  Shunsuke Saito  Sitao Xiang  Stephen Chen  Yi Zhou

11 Koki Nagano

12  oh wow it works Monday, May 15, 2017 1:41 AM


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13 **Hao Li**

14   c118-f118\_2-a506-paper-v7.pdf 1:41 AM


15 10.3 MB

16 [Cancel](#)

17  506 - Submission Reviews - By Person.pdf 1:42 AM

18 80 KB

18 [Cancel](#)

19  paper review 1:43 AM

20 we hhad 7 reviewers



☆ PinscreenTeamAll

▼ 14 participants



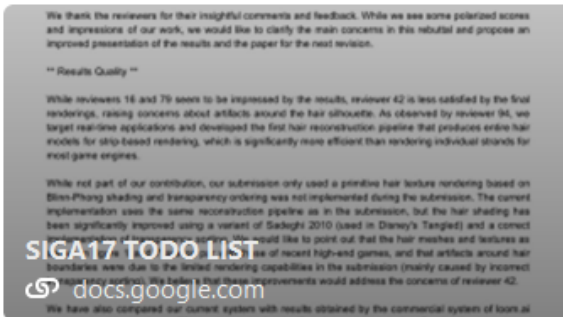
- carrie sun
- Cosimo Wei
- ? Frances Chen
- Han-Wei Kung
- ? Hao Li
- Jaewoo Seo
- Jens Fursund
- Koki Nagano
- Liwen Hu
- Ronald Yu
- Shunsuke Saito
- Sitao Xiang
- ? Stephen Chen
- Yi Zhou

Monday, May 15, 2017

paper review

1:43 AM

we hhad 7 reviewers



1:49 AM


- Evaluate/compare for choice of hair system (comparison to AutoHair)
- Explain how the eye balls, mouth was chosen
- Present all the results for 100 tested photos
- Explain how the chosen blend shapes method affects the animation across diverse people
- Present full models, front and back views
- Show comparison to loom.ai


1:49 AM

14. Li's group messages to Sadeghi and Saito on Skype, dated April 18, 2017:


- [April 18, 2017] Li: "hey shunsuke"
- [April 18, 2017] Li: "for siggraph asia"
- [April 18, 2017] Li: "we need 100 fitted faces"
- [April 18, 2017] Li: "do u think u can prepare a database for benchmarking"
- [April 18, 2017] Li: "based on what we have?"
- [April 18, 2017] Saito: "sure"


- 1 • [April 18, 2017] Li: “then we can aim for that too, so the others can focus on hair”
- 2 • [April 18, 2017] Li: “so maybe it would be good to select 100 faces and we have similar
- 3 hairstyles that correspond to our selection thing”
- 4 • [April 18, 2017] Li: “then i have an artist create all 100 hairs”
- 5 • [April 18, 2017] Li: “ahahaha”

6  Shunsuke Saito, Hao Li  
2 participants | <https://join.skype.com/NHwDzVcttDpu>

8  Hao Li Shunsuke Saito


9 Tuesday, April 18, 2017

10 


11 **Hao Li**  
 hey shunsuke  
for siggraph asia  
we need 100 fitted faces  
do u think u can prepare a database for benchmarking  
based on what we have? 6:49 PM

12

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14 **Shunsuke Saito**  
 sure 6:50 PM

15

16 **Hao Li**  
 then we can aim for that too, so the others can focus on hair  
so maybe it woud be good to select 100 faces and we have similar hairstyles  
that correspond to our selection thing  
then i have an artist create all 100 hairs  
ahahaha 6:50 PM

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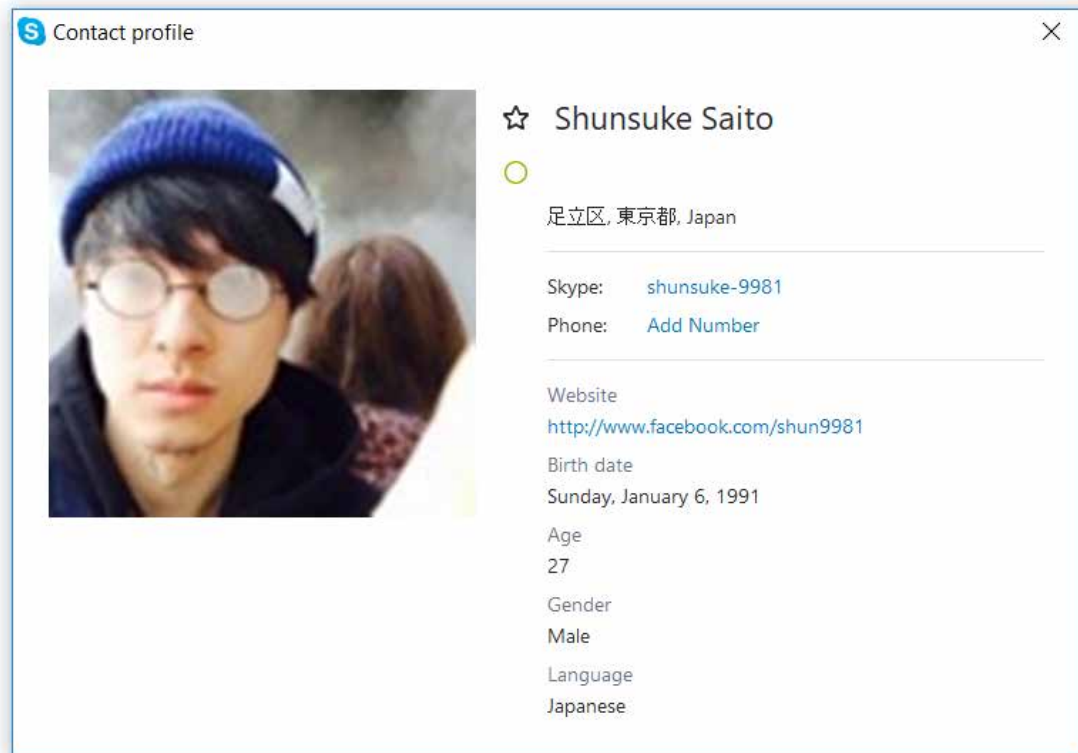
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1 Saito's Skype profile with Skype ID "shunsuke-9981":



15. Li's private messages to Sadeghi on Skype, dated May 17, 2017:

- 16
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- [May 17, 2017] Li: "High Priority"
  - [May 17, 2017] Li: [...]
  - [May 17, 2017] Li: "11) hao: get hair models for all 100 results (hard)"
  - [May 17, 2017] Li: [...]



☆ Hao Li

⊙ This person has not shared their details with y... | New York, New Y...



Contact request sent - Resend contact request

works

Wednesday, May 17, 2017

we might need to label those in our database

High Priority

2:55 AM

- 1) cosimo: add pinscreen database classification into training (easy)
- 2) cosimo: train hair classifier (easy, needs 20)
- 4) cosimo: synthesize hair textures (medium, needs 9)
- 5) liwen: do hair UV mapping (medium)
- 6) liwen: duplicate hair strips + perturbation (medium)
- 7) liwen: deformation pipeline (hard)
- 8) shunsuke: train hair segmentation using pinscreen face database (easy, but needs 21)
- 9) iman: create script to batch process all face models in Pinscreen Face Database (easy)
- 10) iman: figure out target hair textures for high quality hair strip rendering (straight, curly, wavy, dreadlocks, afro) (hard)
- 11) hao: get hair models for all 100 results (hard)
- 12) hao: get comparison from kun zhou (easy)
- 13) hao: do video/write paper (medium)
- 14) iman: help write paper hair part (medium)
- 15) jens: create grey faces and improved face texture shading, black and white bg (easy)
- 20) frances: help label the 100 input images (easy, needs 1)
- 21) frances: help segment hair models (easy)

Medium Priority

- 3) cosimo: add photorealistic synthesis (CVPR 2017 paper)



1 Li's group conversation with Fursund on "PinscreenTeamAll" Skype thread, shared with  
2 Sadeghi and 14 other participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund,  
3 Nagano, Hu, Yu, Saito, Xiang, Stephen Chen, and Zhou, dated May 17, 2017:

- 4 • [May 17, 2017] Li: "High Priority"
- 5 • [May 17, 2017] Li: [...]
- 6 • [May 17, 2017] Li: "11) hao: get hair models for all 100 results (hard)"
- 7 • [May 17, 2017] Li: [...]
- 8 • [May 17, 2017] Li: "jens: might get baby on weekend (or before)"
- 9 • [May 17, 2017] Fursund: "(or before)"
- 10 • [May 17, 2017] Fursund: "I think 9, 11 I can definitely do as well"
- 11 • [May 17, 2017] Li: "i think iman should be done with 9"
- 12 • [May 17, 2017] Fursund: "cool"
- 13 • [May 17, 2017] Li: "how can i do 11?"
- 14 • [May 17, 2017] Li: "u can model in 3D?"
- 15 • [May 17, 2017] Fursund: "arh! 😊"
- 16 • [May 17, 2017] Fursund: "no"
- 17 • [May 17, 2017] Fursund: "sorry"
- 18 • [May 17, 2017] Li: "so basically i need to create 3D hair models for 100 people"
- 19 • [May 17, 2017] Li: "or get 3D modelers to do it"
- 20 • [May 17, 2017] Fursund: "you meant get from 3D artis?"
- 21 • [May 17, 2017] Li: "yes"

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# ☆ PinscreenTeamAll

14 participants | <https://join.skype.com/L4luq1aWUhl2>



- carrie sun
- Cosimo Wei
- ? Frances Chen
- Han-Wei Kung
- ? Hao Li
- Jaewoo Seo
- Jens Fursund
- Koki Nagano
- Liwen Hu
- Ronald Yu
- Shunsuke Saito
- Sitao Xiang
- ? Stephen Chen
- Yi Zhou

good

perhaps koki can do 3) add ~~pin~~ ~~screen~~ ~~database~~ ~~classification~~ ~~into~~ ~~training~~

Wednesday, May 17, 2017

sorted with priority  
High Priority

2:38 AM

- 1) cosimo: add pinscreen database classification into training
- 2) cosimo: train hair classifier
- 4) cosimo: synthesize hair textures
- 5) liwen: do hair UV mapping
- 6) liwen: duplicate hair strips + pertubation
- 7) liwen: deformation pipeline
- 8) shunsuke: segmentation using pinscreen face database
- 9) iman: create script to batch process all face models in Pinscreen Face Database
- 10) iman: figure out target hair textures for high quality hair strip rendering (straight, curly, wavy, dreadlocks, afro)
- 11) hao: get hair models for all 100 results
- 12) hao: get comparison from kun zhou
- 13) hao: do video/write paper
- 14) iman: help write paper hair part
- 15) jens: create grey faces and improved face texture shading, black and white bg



# ☆ PinscreenTeamAll

14 participants | <https://join.skype.com/L4luq1aWUhl2>



- carrie sun
- Cosimo Wei
- ? Frances Chen
- Han-Wei Kung
- ? Hao Li
- Jaewoo Seo
- Jens Fursund
- Koki Nagano
- Liwen Hu
- Ronald Yu
- Shunsuke Saito
- Sitao Xiang
- ? Stephen Chen
- Yi Zhou

Wednesday, May 17, 2017

14) iman: help write paper hair part  
15) jens: create grey faces and improved face texture shading, black

and white bg

20) frances: help label the 100 input images

### Medium Priority

3) cosimo: add photorealistic synthesis (CVPR 2017 paper)

17) koki: support with system evaluation

19) jaewoo: implement avatar retargeting (generate anim curves for head capture)

### Low Priority

16) koki: get ICT images

18) koki: remove black line on the back of head

constraints: cosimo at adobe (but can work on this paper until the deadline from adobe), shunsuke at oculus (can only work after work)

iman (gone friday to sunday and tuesday)



jens: might get baby on weekend (or before)





# ☆ PinscreenTeamAll

14 participants | <https://join.skype.com/L4luq1aWUhl2>



- carrie sun
- Cosimo Wei
- ⊙ Frances Chen
- Han-Wei Kung
- ⊙ Hao Li
- Jaewoo Seo
- Jens Fursund
- Koki Nagano
- Liwen Hu
- Ronald Yu
- Shunsuke Saito
- Sitao Xiang
- ⊙ Stephen Chen
- Yi Zhou

deadline from adobe), shunsuke at oculus (can only work after work)

Wednesday, May 17, 2017

iman (gone friday to sunday and tuesday)

jens: might get baby on weekend (or before)

**Jens Fursund**

(or before)

2:40 AM

I think 9, 11 I can definitely do as well

2:41 AM

**Hao Li**

i think iman should be done with 9

2:41 AM

**Jens Fursund**

cool

2:41 AM

**Hao Li**

how can i do 11?

2:41 AM

u can model in 3D?

**Jens Fursund**

arh! 😊

2:42 AM

no

sorry



# ☆ PinscreenTeamAll

14 participants | <https://join.skype.com/L4luq1aWUh2>



- carrie sun
- Cosimo Wei
- Frances Chen
- Han-Wei Kung
- Hao Li
- Jaewoo Seo
- Jens Fursund
- Koki Nagano
- Liwen Hu
- Ronald Yu
- Shunsuke Saito
- Sitao Xiang
- Stephen Chen
- Yi Zhou



cool

Wednesday, May 17, 2017

2:41 AM

**Hao Li**



how can i do 11?  
u can model in 3D?

2:41 AM

**Jens Fursund**



arh! 😊  
no  
sorry

2:42 AM

**Hao Li**



so basically i need to create 3D hair models for 100 people  
or get 3D modelers to do it

2:42 AM

**Jens Fursund**



you meant get from 3d artis?

2:42 AM

**Hao Li**



yes

2:42 AM

1 Fursund's Skype profile with Skype ID "alt\_er\_ego":



14

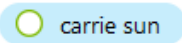
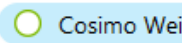
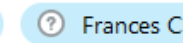


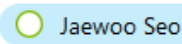
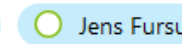



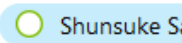



15 16. Li's group messages on "PinscreenTeamAll" Skype thread, shared with Sadeghi and 14 other

16 participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund, Nagano, Hu, Yu,


17 Saito, Xiang, Stephen Chen, and Zhou, dated May 18, 2017:

- 18
- [May 18, 2017] Li: "okay so i m generating all the avatars"
  - [May 18, 2017] Li: "we need someone to manually fix all the eye colors"
- 19
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1  ☆ PinscreenTeamAll    
2 ▼ 14 participants | <https://join.skype.com/L4luq1aWUhl2>


3  
4  carrie sun  Cosimo Wei  ? Frances Chen  Han-Wei Kung  ? Hao Li  
5  Jaewoo Seo  Jens Fursund  Koki Nagano  Liwen Hu  Ronald Yu  
6  Shunsuke Saito  Sitao Xiang  ? Stephen Chen  Yi Zhou

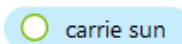
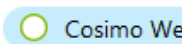
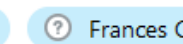

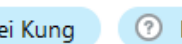
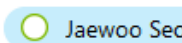
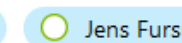



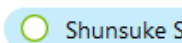


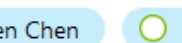
7 Thursday, May 18, 2017  
8 Thursday, May 18, 2017



9  Hao Li  
10 okay so i m generating all the avatars 12:00 AM  
11 we need someone to manually fix all the eye colors

12 17. Li's group message on "PinscreenTeamAll" Skype thread, shared with Sadeghi and 14 other  
13 participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund, Nagano, Hu, Yu,  
14 Saito, Xiang, Stephen Chen, and Zhou, dated May 18, 2017:

- 15 • [May 18, 2017] Li: "we also need someone to manually adjust the eye colors"

16  ☆ PinscreenTeamAll    
17 ▼ 14 participants | <https://join.skype.com/L4luq1aWUhl2>

18  
19  carrie sun  Cosimo Wei  ? Frances Chen  Han-Wei Kung  ? Hao Li  
20  Jaewoo Seo  Jens Fursund  Koki Nagano  Liwen Hu  Ronald Yu  
21  Shunsuke Saito  Sitao Xiang  ? Stephen Chen  Yi Zhou

22  Jens Fursund  
23 ok Thursday, May 18, 2017 1:15 AM  
24  Hao Li  
25 we also need someone to manually adjust the eye colors 1:15 AM



1 18. Li's group conversation with Fursund shared with Sadeghi and Nagano, dated May 18, 2017:









- 2 • [May 18, 2017] Li: "btw we also have nothing that can guess hair color"
- 3 • [May 18, 2017] Li: "maybe i ll ask shunsuke to work on it"
- 4 • [May 18, 2017] Fursund: "yeah hair color"
- 5 • [May 18, 2017] Fursund: "we could do something similar to eye color for now"
- 6 • [May 18, 2017] Fursund: "just for making a quick guess"
- 7 • [May 18, 2017] Li: "the eye color is total shit"
- 8 • [May 18, 2017] Li: "it s completely random"
- 9 • [May 18, 2017] Fursund: "Iknow 😊"
- 10 • [May 18, 2017] Li: "we really need a better algorithm"
- 11 • [May 18, 2017] Fursund: "but at least it's quick to implement"
- 12 • [May 18, 2017] Li: "yeah"
- 13 • [May 18, 2017] Fursund: "but do we have time for a new algo?"
- 14 • [May 18, 2017] Li: "i guess a deep neural net would be the way to go"
- 15 • [May 18, 2017] Fursund: "so no 😊"
- 16 • [May 18, 2017] Li: "i would say medium priority"
- 17 • [May 18, 2017] Li: "i would say let s do them manually for now"
- 18 • [May 18, 2017] Fursund: "ok"

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 ☆ Koki Nagano, Hao Li, Jens Fursund, ...  
4 participants | <https://join.skype.com/PBwW2KKtf7gE>

Thursday, May 18, 2017

-  **Hao Li**  
btw we also have nothing that can guess hair color  
maybe i ll ask shunsuke to work on it 1:17 AM
-  **Jens Fursund**  
yeah hair color  
we could do something similar to eye color for now  
just for making a quick guess 1:18 AM
-  **Hao Li**  
the eye color is total shit  
it s completely random 1:18 AM
-  **Jens Fursund**  
iknow 😊 1:18 AM
-  **Hao Li**  
we really need a better algorithm 1:18 AM
-  **Jens Fursund**  
but at least it's quick to implement 1:18 AM
-  **Hao Li**  
yeah 1:19 AM
-  **Jens Fursund**  
but do we have time for a new algo? 1:19 AM

 ☆ Koki Nagano, Hao Li, Jens Fursund, ...  
4 participants | <https://join.skype.com/PBwW2KKtf7gE>

Thursday, May 18, 2017

-  **Jens Fursund**  
but do we have time for a new algo? 1:19 AM
-  **Hao Li**  
i guess a deep neural net would be the way to go 1:19 AM
-  **Jens Fursund**  
so no 😊 1:19 AM
-  **Hao Li**  
i would say medium priority  
i would say let s do them manually for now 1:19 AM
-  **Jens Fursund**  
ok 1:20 AM

1 Fursund's Skype profile with Skype ID "alt\_er\_ego":



14

15 19. Li's group messages on "PinscreenTeamAll" Skype thread, shared with Sadeghi and 14 other

16 participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund, Nagano, Hu, Yu,

17 Saito, Xiang, Stephen Chen, and Zhou, dated May 18, 2017:

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- [May 18, 2017] Li: "what s the status with the hair texture part?"
  - [May 18, 2017] Li: "btw i m regenerating all the 160 faces"
  - [May 18, 2017] Li: "because of the spacing issue only 122 were generated"
  - [May 18, 2017] Li: "i will upload dropbox folder once i m done"
  - [May 18, 2017] Li: "then need koki to work on eye colors"
  - [May 18, 2017] Li: "shunsuke on focal length adjustments per person"



☆ PinscreenTeamAll

▼ 14 participants | <https://join.skype.com/L4luq1aWUhI2>



- carrie sun
- Cosimo Wei
- ⊙ Frances Chen
- Han-Wei Kung
- ⊙ Hao Li
- Jaewoo Seo
- Jens Fursund
- Koki Nagano
- Liwen Hu
- Ronald Yu
- Shunsuke Saito
- Sitao Xiang
- ⊙ Stephen Chen
- Yi Zhou

Thursday, May 18, 2017



4:24 PM

Hao Li



what s the status with the hair texture part?


4:24 PM

btw i m regenerating all the 160 faces  
 because of the spacing issue only 122 were generated  
 i will upload dropbox folder once i m done  
 then need koki to work on eye colors  
 shunsuke on focal length adjustments per person

4:25 PM

Nagano’s Skype profile with Skype ID “rambo.john.j1219”:

**S** Contact profile ×



☆ **Koki Nagano**

○ Offline

los angeles, california, United States

---

Skype: [rambo.john.j1219](#)

Mobile: [+13107454006](#)

[Add Number](#)

---

About me

Koki Nagano

Website

<http://luminohope.org/>

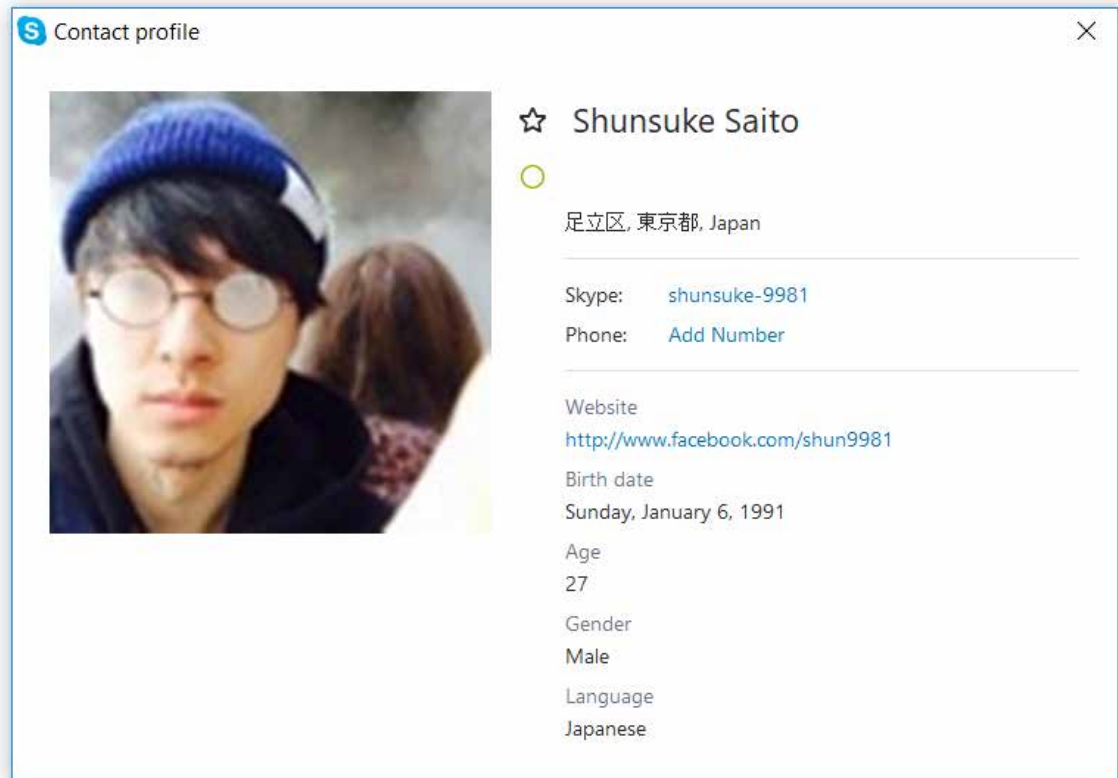
Gender

Male

Language

Japanese

1 Saito's Skype profile with Skype ID "shunsuke-9981":



15

16 20. Pinscreen's claims in its SIGGRAPH Asia 2017 Technical Paper, titled "Avatar Digitization

17 from a Single Image for Real-Time Rendering," published on ACM Digital Library:

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- <https://dl.acm.org/citation.cfm?id=31310887>
  - "The effectiveness of our methodology is grounded on a careful integration of state-of-the-art modeling and synthesis techniques for faces and hair. Several key components, such as segmentation, semantic hair attributes extraction, and eye color recognition are only possible due to recent advances in deep learning. Our experiments also indicate the robustness of our system, where consistent results of the same subject can be obtained when captured from different angles, under contrasting lighting conditions, and with different input expressions."

1 The effectiveness of our methodology is grounded on a careful  
2 integration of state-of-the-art modeling and synthesis techniques  
3 for faces and hair. Several key components, such as segmentation,  
4 semantic hair attributes extraction, and eye color recognition, are  
5 only possible due to recent advances in deep learning. Our experi-  
6 ments also indicate the robustness of our system, where consistent  
7 results of the same subject can be obtained when captured from  
8 different angles, under contrasting lighting conditions, and with  
9 different input expressions.

10 21. Nagano’s and Hu’s group messages on “PinscreenTeamAll” Skype thread, shared with  
11 Sadeghi and 14 other participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund,  
12 Nagano, Hu, Yu, Saito, Xiang, Stephen Chen, and Zhou, dated May 19, 2017:

- 13 • [May 19, 2017] Nagano: “Hairs to do:”
- 14 • [May 19, 2017] Nagano: [...]
- 15 • [May 19, 2017] Nagano: “Load hair color from txt file”
- 16 • [May 19, 2017] Nagano: “-Manually pick up hair color and store it in .txt in Hex (Jens)”
- 17 • [May 19, 2017] Hu: “another thing missing is the hair segmentation”
- 18 • [May19, 2017] Fursund: “actually... what folder do you use for the images?”
- 19 • [May19, 2017] Fursund: “just the images in the repo?”
- 20 • [May 19, 2017] Hu: “now the current automatic segmentation results are not always very  
21 good”
- 22 • [May 19, 2017] Hu: “so I think we need manually refine them”

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# ☆ PinscreenTeamAll

14 participants | <https://join.skype.com/L4luq1aWUhl2>



- carrie sun
- Cosimo Wei
- Frances Chen
- Han-Wei Kung
- Hao Li
- Jaewoo Seo
- Jens Fursund
- Koki Nagano
- Liwen Hu
- Ronald Yu
- Shunsuke Saito
- Sitao Xiang
- Stephen Chen
- Yi Zhou



thx 😊

Friday, May 19, 2017

12:08 AM



Koki Nagano

Hairs to do:  
Geometry  
-Hair strip uv assignment to texture (Iman)  
-Hair segmentation improvement (Shunsuke, Koki ETA tomorrow)  
-Hair classification (Cosimo, ETA tomorrow)  
-Hair model (Hao)  
-Check hair pipeline (Liwen) -> needs FaceFiting projection matrix dump out (Jens)  
  
Texture  
-Prepare all 10 input textures (iman, a few are already done)  
-Texture synthesis (cosimo)  
  
Rendering  
-Test rendering with duplicated hair strips (Liwen, Iman?)  
-Load hair color from txt file  
-Manually pick up hair color and store it in .txt in Hex (Jens)

12:08 AM



Liwen Hu

another thing missing is the hair segmentation

12:09 AM



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☆ PinscreenTeamAll


14 participants




- carrie sun
- Cosimo Wei
- ⊙ Frances Chen
- Han-Wei Kung
- ⊙ Hao Li
- Jaewoo Seo
- Jens Fursund
- Koki Nagano
- Liwen Hu
- Ronald Yu
- Shunsuke Saito
- Sitao Xiang
- ⊙ Stephen Chen
- Yi Zhou

-Load hair color from txt file  
 -Manually pick up hair color from image (Jens)


Friday, May 19, 2017

- 

**Liwen Hu**  
 another thing missing is the hair segmentation

12:09 AM
- 

**Jens Fursund**  
 actually... what folder do you use for the images?  
 just the images in the repo?

12:09 AM
- 

**Liwen Hu**  
 now the current automatic segmentation results are not always  
 very good  
 so i think we need manually refine them

12:10 AM

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Nagano's Skype profile with Skype ID "rambo.john.j1219":

Contact profile

☆ Koki Nagano

Offline

los angeles, california, United States

---

Skype: [rambo.john.j1219](#)

Mobile: [+13107454006](#)

[Add Number](#)

---

About me

Koki Nagano

Website

<http://luminohope.org/>

Gender

Male

Language

Japanese

Fursund's Skype profile with Skype ID "alt\_er\_ego":

Contact profile

☆ Jens Fursund

Offline

Copenhagen, Denmark

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Skype: [alt\\_er\\_ego](#)

Phone: [Add Number](#)

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Website

[jens.fursund.com](http://jens.fursund.com)

Birth date

Tuesday, May 1, 1984

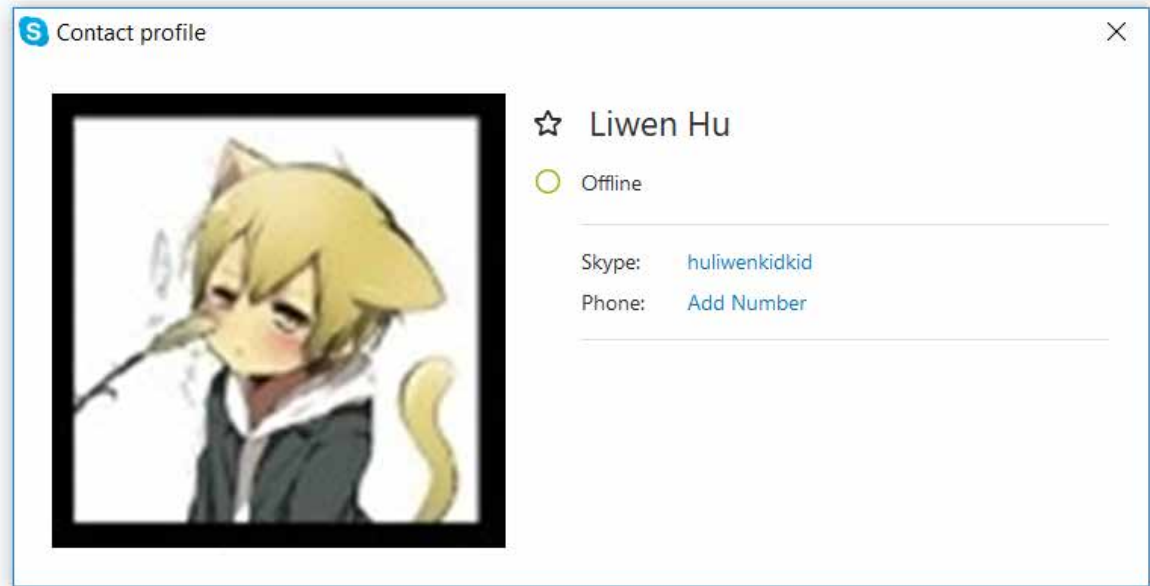
Age

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Gender

Male

1 Hu's Skype profile with Skype ID "huliwenkidkid":



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14 22. Pinscreen's claims in its SIGGRAPH Asia 2017 Technical Papers publication, titled "Avatar

15 Digitization from a Single Image for Real-Time Rendering," published on ACM Digital

16 Library:

- 17
- <https://dl.acm.org/citation.cfm?id=31310887>
  - "The eye color texture (black, brown, green, blue) is computed using a similar convolutional neural network for semantic attributes inference as the one used for hair color classification."
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21 The eye color texture (black, brown, green, blue) is computed using a similar convolutional neural network for semantic attribute

22 inference as the one used for hair color classification. The input

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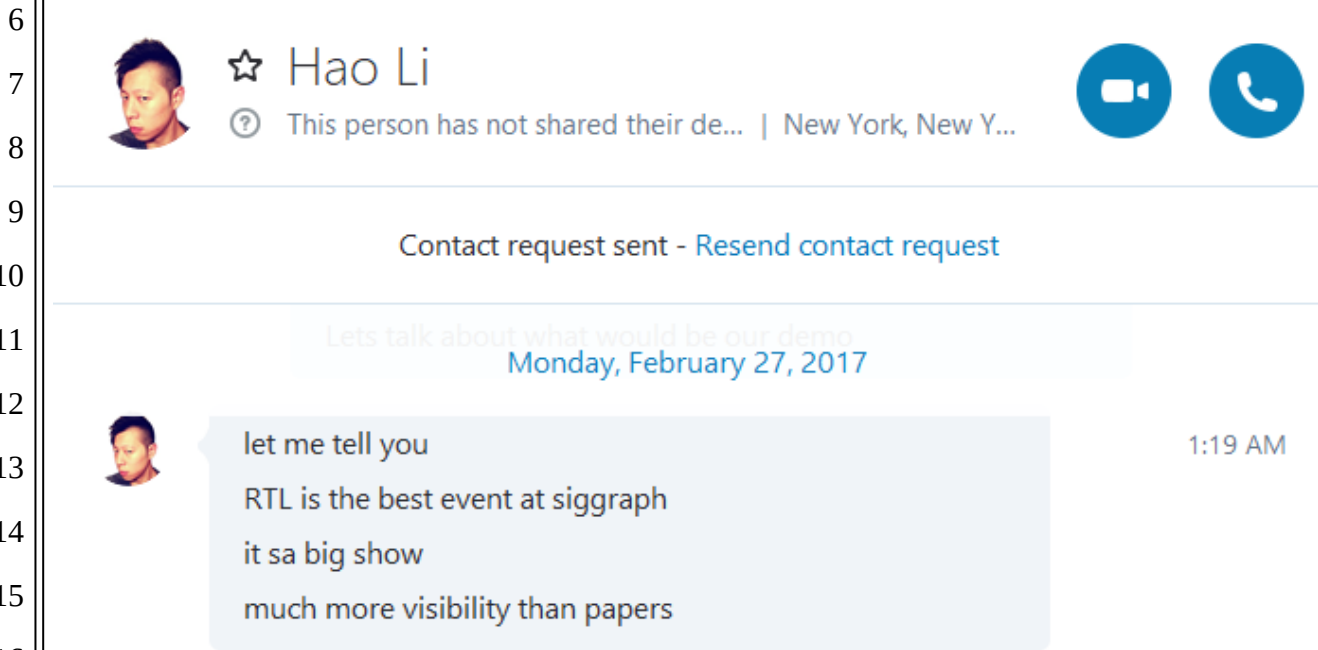
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1 23. Li's private messages to Sadeghi on Skype, dated February 27, 2017:

- 2 • [February 27, 2017] Li: "let me tell you"
- 3 • [February 27, 2017] Li: "RTL is the best event at siggraph"
- 4 • [February 27, 2017] Li: "it sa big show"
- 5 • [February 27, 2017] Li: "much more visibility than papers"



17 Li's group messages on "PinscreenTeamAll" Skype thread, shared with Sadeghi and 14 other  
18 participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund, Nagano, Hu, Yu,  
19 Saito, Xiang, Stephen Chen, and Zhou, dated June 1, 2017:

- 20 • [June 1, 2017] Li: "realtime live"
- 21 • [June 1, 2017] Li: "it s the hardest thing to get in"
- 22 • [June 1, 2017] Li: "it s much harder than paper"

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☆ PinscreenTeamAll  
14 participants | <https://join.skype.com/L4luq1aWUhl2>

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carrie sun Cosimo Wei Frances Chen Han-Wei Kung Hao Li  
Jaewoo Seo Jens Fursund Koki Nagano Liwen Hu Ronald Yu  
Shunsuke Saito Sitao Xiang Stephen Chen Yi Zhou

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Koki Nagano  
Thursday, June 1, 2017  
Wow with all the r&d work we need to do serious lookdev 2:10 PM

**Hao Li**  
realtime live 2:11 PM  
it s the hardest thing to get in  
it s much harder than paper

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Li’s group messages on “PinscreenTeamAll” Skype thread, shared with Sadeghi and 14 other participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund, Nagano, Hu, Yu, Saito, Xiang, Stephen Chen, and Zhou, dated June 1, 2017:






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- [June 1, 2017] Li: “if someone asks you at siggraph if you have a siggraph paper, you say we don’t always publish papers but when we do, we go straight to real-time live!”
  - [June 1, 2017] Li: “it s the only show that matters at siggraph”
  - [June 1, 2017] Li: “we did the minimum work to get it in”
  - [June 1, 2017] Li: “we were one spot away”
  - [June 1, 2017] Li: “baker baker!”
  - [June 1, 2017] Li: “baker baker!”
  - [June 1, 2017] Li: “mamamammama ma er duo”
  - [June 1, 2017] Li: “ma er duo!”
  - [June 1, 2017] Li: “avatar”
  - [June 1, 2017] Li: “let me tell you”





- 1 • [June 1, 2017] Nagano: “It doesn’t matter if we pull off the best demo”
- 2 • [June 1, 2017] Li: “@cosimo: let s just cash everything”
- 3 • [June 1, 2017] Li: “yes!”

4  ☆ PinscreenTeamAll    
5 ▼ 14 participants | <https://join.skype.com/L4luq1aWUhl2>


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7  carrie sun  Cosimo Wei  ? Frances Chen  Han-Wei Kung  ? Hao Li


8  Jaewoo Seo  Jens Fursund  Koki Nagano  Liwen Hu  Ronald Yu

9  Shunsuke Saito  Sitao Xiang  ? Stephen Chen  Yi Zhou

10 Koki Nagano

11  Yes very important Thursday, June 1, 2017 2:16 PM

12 **Hao Li**

13  if someone asks you at siggraph if you have a siggraph 2:16 PM

14 paper, you say we don't always publish papers but when

15 we do, we go straight to real-time live!

16 it s the only show that matters at siggraph

17 we did the minimum work to get it in

18 we were one spot away

19 baker baker!

20 baker baker!


21 mamamammama ma er duo

22 ma er duo!


23 avatar

24 let me tell you

25 **Koki Nagano**

26  It doesn't matter if we pull off the best demo 2:18 PM

27 **Hao Li**

28  @cosimo: let s just cash everything 2:18 PM

yes!

1 24. Li's group messages on "PinscreenTeamAll" Skype thread, shared with Sadeghi and 14 other  
2 participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund, Nagano, Hu, Yu,  
3 Saito, Xiang, Stephen Chen, and Zhou, dated May 5, 2017:

- 4 • [May 5, 2017] Li: "loom.ai needs 1:30 min to reconstruct face"
- 5 • [May 5, 2017] Li: "quality is still the same as the one they have released"
- 6 • [May 5, 2017] Li: "so we beat them in terms of face accuracy"
- 7 • [May 5, 2017] Li: "they have no solution for hair yet"
- 8 • [May 5, 2017] Li: "they are planning to do loomojis"
- 9 • [May 5, 2017] Li: "similar to us"
- 10 • [May 5, 2017] Li: "we need to be first"
- 11 • [May 5, 2017] Li: "their API is quite advanced and they have plugins to both unity and  
12 unreal"
- 13 • [May 5, 2017] Li: "but fuck APIs for now, we need to create high end pinmojis and high  
14 end interface"
- 15 • [May 5, 2017] Li: "i told everyone we do deep nearning, ahahahaha!"
- 16 • [May 5, 2017] Li: "now everyone is nervous"

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# ☆ PinscreenTeamAll

14 participants | <https://join.skype.com/L4luq1aWUhl2>



- carrie sun
- Cosimo Wei
- ? Frances Chen
- Han-Wei Kung
- ? Hao Li
- Jaewoo Seo
- Jens Fursund
- Koki Nagano
- Liwen Hu
- Ronald Yu
- Shunsuke Saito
- Sitao Xiang
- ? Stephen Chen
- Yi Zhou

How do we pick the representative color for each eye? 12:11 PM  
 @Shunsuke Saito ? Friday, May 5, 2017

**Hao Li**



loom.ai needs 1:30 min to reconstruct face  
 quality is still the same as the one they have released  
 so we beat them in terms of face accuracy  
 they have no solution for hair yet  
 they are planning to do loomojis  
 similar to us  
 we need to be first  
 their API is quite advanced and they have plugins to both  
 unity and unreal  
 but fuck APIs for now, we need to create high end pinmojis  
 and high end interface  
 i told everyone we do deep nearning, ahahahaha!  
 now everyone is nervous

12:12 PM

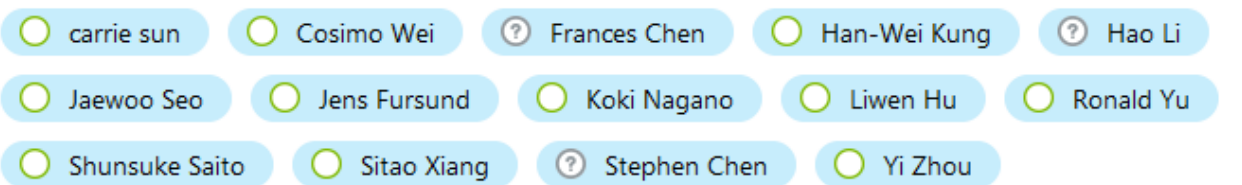
25. Sadeghi's group message on Skype:


- Sadeghi: "For the rehearsal, if we don't generate a brand new avatar, then we have full control and everything can be cached."


For the rehearsal, if we don't generate a brand new avatar, then we have full control and everything can be cached.


1 26. Li's group conversation with Sun on "PinscreenTeamAll" Skype thread, shared with Sadeghi  
2 and 14 other participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund, Nagano,  
3 Hu, Yu, Saito, Xiang, Stephen Chen, and Zhou, dated July 20, 2017:

- 4 • [July 20, 2017] Sun: "in that case is it necessary to have the file upload UI? maybe just  
5 load the whole app wiht the thumbnails at the bottom?"
- 6 • [July 20, 2017] Sun: "plus with many images, if we fake the loading time, it can add up"
- 7 • [July 20, 2017] Li: "i think file load is reasonable because it give the people the feeling the  
8 avatar is not pre-built"
- 9 • [July 20, 2017] Li: "we should give them a sense that it is computing"
- 10 • [July 20, 2017] Li: "if it s just loaded it s not impressive"

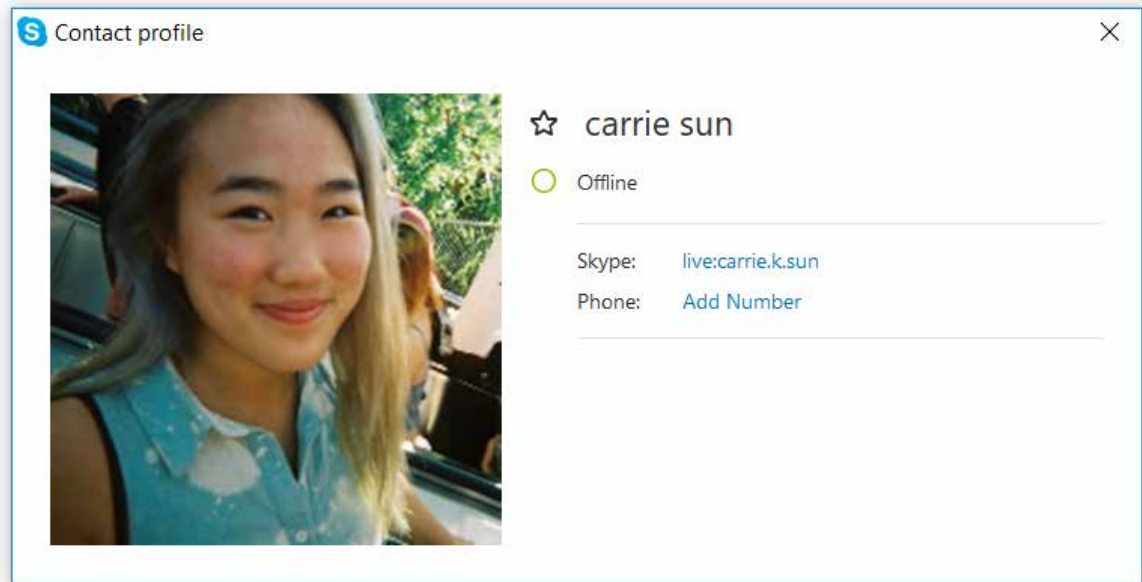


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18  probably  
i think it s not a bad idea  
Thursday, July 20, 2017 2:41 PM

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20 **carrie sun**  
  
21 in that case is it necessary to have the file upload UI?  
22 maybe just load the whole app wiht the thumbnails at the  
23 bottom?  
24 plus with many images, if we fake the loading time, it can  
add up 2:41 PM

25 **Hao Li**  
  
26 i think file load is reasonable because it give the people the  
27 feeling the avatar is not pre-built  
we should give them a sense that it is computing  
28 if it s just loaded it s not impressive 2:42 PM

1 Sun's Skype profile with Skype ID "live:carrie.k.sun":



12 27. Sadeghi's group messages on "PinscreenTeamAll" Skype thread, shared with Sadeghi and 14  
13 other participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund, Nagano, Hu,  
14 Yu, Saito, Xiang, Stephen Chen, and Zhou, dated July 22, 2017:


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- [July 22, 2017] Sadeghi: [image]
  - [July 22, 2017] Sadeghi: [image]
  - [July 22, 2017] Sadeghi: "The creation took ~90 seconds."


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☆ PinscreenTeamAll  
14 participants | <https://join.skype.com/Pnpuje9QIkEZ>

carrie sun Cosimo Wei Frances Chen Han-Wei Kung Hao Li Jaewoo Seo Jens Fursund  
Koki Nagano Liwen Hu Ronald Yu Shunsuke Saito Sitao Xiang Stephen Chen Yi Zhou

Saturday, July 22, 2017

3:13 PM 

3:15 PM 

3:16 PM The creation took ~90 seconds.

Sadeghi’s Skype profile with Skype ID “iman.sadeghi”:

Contact profile

 ☆ Iman Sadeghi

Online  
Los Angeles, California, United States

Skype: [iman.sadeghi](#)  
Phone: [Add Number](#)

Website  
<http://www.sadeghi.com>

Language  
English

1 28. Sadeghi’s private messages to Li on Skype, dated July 22, 2017:

- 2 • [July 22, 2017] Sadeghi: “Heya! 😊”
- 3 • [July 22, 2017] Sadeghi: “So for the live webcam avatar generation at RTL, are you
- 4 thinking we will compute everything from scratch (~90 seconds now with some risk for a
- 5 hairstyle miss) or we cache some stuff?”



9 Contact request sent - [Resend contact request](#)

10 Saturday, July 22, 2017

11 Saturday, July 22, 2017

12 Heya! 😊

4:28 PM

13 So for the live webcam avatar generation at RTL, are

14 you thinking we will compute everything from scratch

15 (~90 seconds now with some risk for a hairstyle miss)

16 or we cache some stuff?

17

18 Monday, July 24, 2017

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20 29. Li’s group messages on “PinscreenTeamAll” Skype thread, shared with Sadeghi and 14 other

21 participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund, Nagano, Hu, Yu,















22 Saito, Xiang, Stephen Chen, and Zhou, dated July 28, 2017:

- 23 • [July 28, 2017] Li: “oh no”
  - 24 • [July 28, 2017] Li: “we are all screwed”
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☆ PinscreenTeamAll
14 participants | <https://join.skype.com/L4luq1aWUhl2>



-  carrie sun
-  Cosimo Wei
-  Frances Chen
-  Han-Wei Kung
-  Hao Li
-  Jaewoo Seo
-  Jens Fursund
-  Koki Nagano
-  Liwen Hu
-  Ronald Yu
-  Shunsuke Saito
-  Sitao Xiang
-  Stephen Chen
-  Yi Zhou

stream is off, and only retargeting is on. And it seems to be maxing out all the cores

Friday, July 28, 2017

**Hao Li**

 oh no















1:00 AM

we are all screwed

- [July 28, 2017] Li: “everyone will laugh at us”
- [July 28, 2017] Li: “😞”



☆ PinscreenTeamAll
14 participants | <https://join.skype.com/L4luq1aWUhl2>




-  carrie sun
-  Cosimo Wei
-  Frances Chen
-  Han-Wei Kung
-  Hao Li
-  Jaewoo Seo
-  Jens Fursund
-  Koki Nagano
-  Liwen Hu
-  Ronald Yu
-  Shunsuke Saito
-  Sitao Xiang
-  Stephen Chen
-  Yi Zhou

Friday, July 28, 2017

**Hao Li**

 everyone will laugh at us




1:00 AM

 1:00 AM

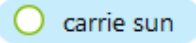
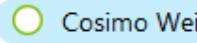
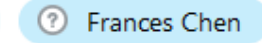
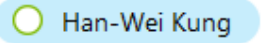
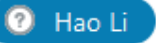
1 30. Fursund's and Sadeghi's group messages on "PinscreenTeamAll" Skype thread, shared with  
2 Sadeghi and 14 other participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund,  
3 Nagano, Hu, Yu, Saito, Xiang, Stephen Chen, and Zhou, dated July 24, 2017:

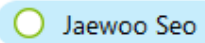
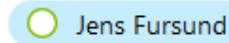
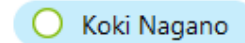
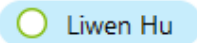
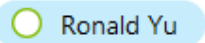
- 4 • [July 24, 2017] Fursund: "anyway... it's important that we know exactly who is using the  
5 webcam to generate the avatar"
- 6 • [July 24, 2017] Fursund: "since we're just using pre-cached avatars"
- 7 • [July 24, 2017] Sadeghi: "Right. The plan is that I am using it."
- 8 • [July 24, 2017] Fursund: "cool"

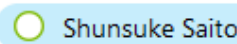
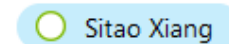
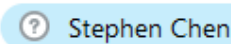
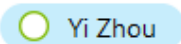
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10  ☆ PinscreenTeamAll  


11 ▼ 14 participants | <https://join.skype.com/L4luq1aWUhi2>

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15 Jens Fursund


16  Monday, July 24, 2017 2:05 PM

17 yeah well not high pri with skin 😊

18 anyway... it's important that we know exactly who is  
19 using the webcam to generate the avatar  
20 since we're just using pre-cached avatars

21 Right. The plan is that I am using it. 2:06 PM

22 Jens Fursund

23  cool 2:06 PM



1 Fursund's Skype profile with Skype ID "alt\_er\_ego":



14 31. Li's group messages on "PinscreenTeamAll" Skype thread, shared with Sadeghi and 14 other

15 participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund, Nagano, Hu, Yu,

16 Saito, Xiang, Stephen Chen, and Zhou, dated July 17, 2017:

- 17
- 18 • [July 17, 2017] Li: "hair models/avatars: carrie"
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# ☆ PinscreenTeamAll

14 participants | <https://join.skype.com/L4luq1aWUhl2>



- carrie sun
- Cosimo Wei
- Frances Chen
- Han-Wei Kung
- Hao Li
- Jaewoo Seo
- Jens Fursund
- Koki Nagano
- Liwen Hu
- Ronald Yu
- Shunsuke Saito
- Sitao Xiang
- Stephen Chen
- Yi Zhou

\* people will be able to try this  
 \* swap faces  
 Monday, July 17, 2017

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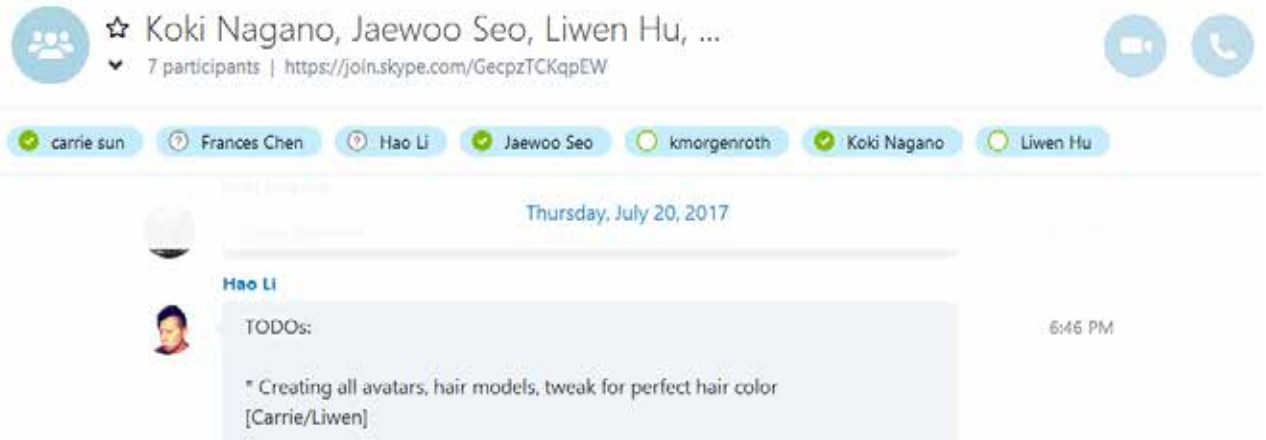
=====

* performance koki/jaewoo
* webcam thing: carrie/kyle/cosimo
* fixing webcam with unity app: Kyle
* simplify the progress bar color/add sleep(); -> Kyle
* switching: Jens/Kyle
* visualization mesh / skeleton: Han Wei Kung
* hair models/avatars: carrie
  
```

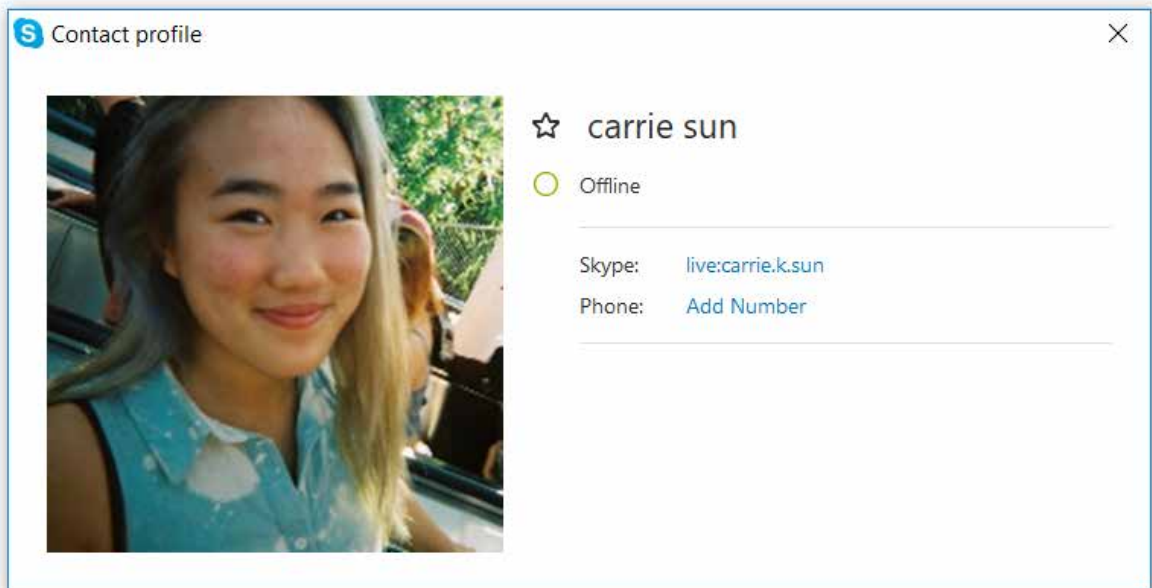
Li's group messages on Skype, shared with Sadeghi and 7 other participants, including Sun, Yen-Chun Chen, Seo, Morgenroth, Nagano, and Hu, dated July 20, 2017:

- [July 20, 2017] Li: "TODOs:"
- [July 20, 2017] Li: "\* Creating all avatars, hair models, tweak for perfect hair color [Carrie /Liwen]"

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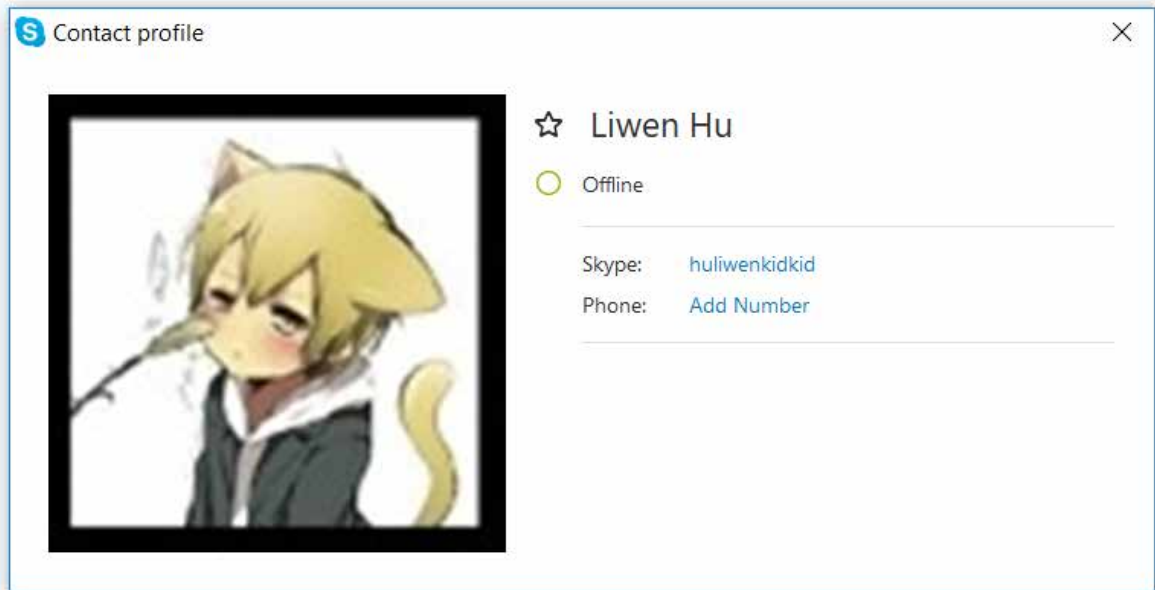


Sun's Skype profile with Skype ID "live:carrie.k.sun":

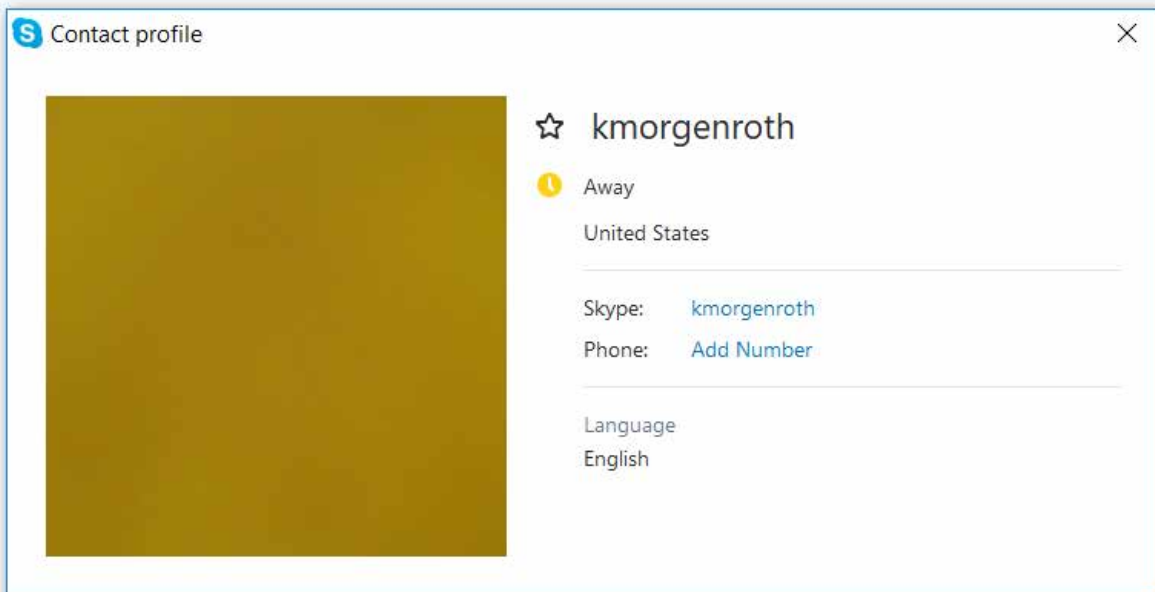


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Hu's Skype profile with Skype ID "huliwenkidkid":



Morgenroth's Skype profile with Skype ID "kmorgenroth":




Sun's private messages to Sadeghi on Skype, dated July 24, 2017:

- [July 24, 2017] Sun: "hey"
- [July 24, 2017] Sun: "i created a hair for koki's avatar"

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 ☆ carrie sun  
Offline   

Monday, July 24, 2017

 hey 11:32 AM  
i created a hair for koki's avatar

Sun’s and Nagano’s group messages on “PinscreenTeamAll” Skype thread, shared with Sadeghi and 14 other participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund, Nagano, Hu, Yu, Saito, Xiang, Stephen Chen, and Zhou, dated July 26, 2017:

- [July 26, 2017] Sun: “oh btw I also fixed my hair – I’ll upload the updated mesh”
- [July 26, 2017] Sun: “it looks like there are some intersections for your hair too, should i fix?”
- [July 26, 2017] Nagano: “Thanks! Yeah this video shows the current status of the avatars / hairs. So anything you can improve in the asset would be great like the hair intersection”
- [July 26, 2017] Nagano: “oh and for my hair if you can lower it down a bit if it’s not too hard, that would be nice. (I don;t think my forehead is that large 😊)”

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# ☆ PinscreenTeamAll

14 participants | <https://join.skype.com/L4luq1aWUhl2>



- carrie sun
- Cosimo Wei
- Frances Chen
- Han-Wei Kung
- Hao Li
- Jaewoo Seo
- Jens Fursund
- Koki Nagano
- Liwen Hu
- Ronald Yu
- Shunsuke Saito
- Sitao Xiang
- Stephen Chen
- Yi Zhou

Chatting scene

Wednesday, July 26, 2017

Iman, do you think you can make the hair look better? 2:59 PM

**carrie sun**



oh btw i also fixed my hair - i'll upload the updated mesh  
it looks like there are some intersections for your hair too,  
should i fix?

3:02 PM

**Koki Nagano**



Thanks! Yeah this video shows the current status of the  
avatars / hairs. So anything you can improve in the asset  
would be great like the hair intersection

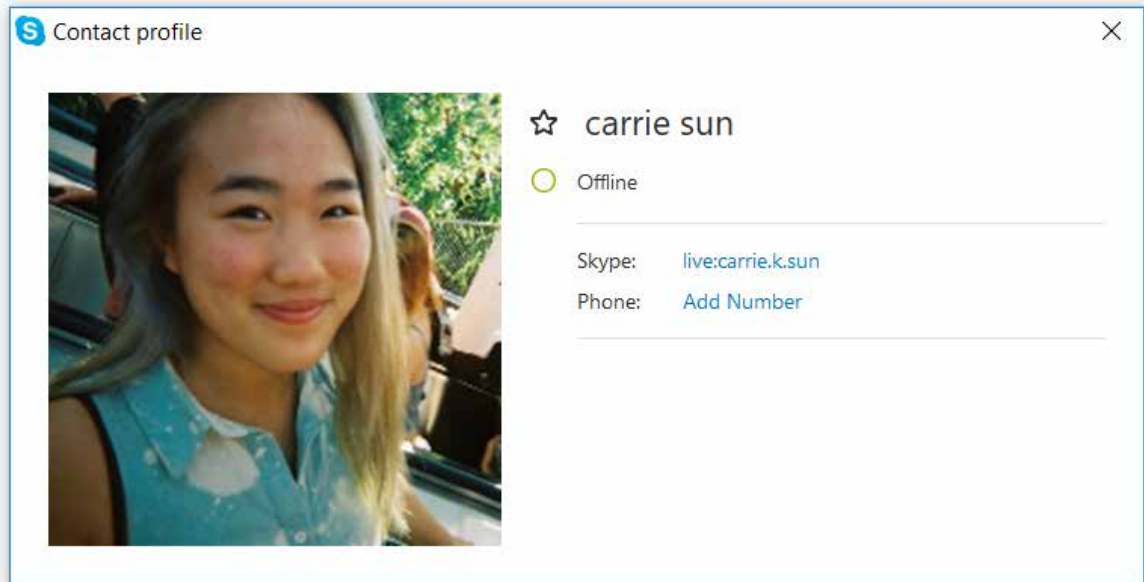
3:12 PM

oh and for my hair if you can lower it down a bit if it's not  
too hard, that would be nice. (I don;t think my forehead is  
that large 😊)

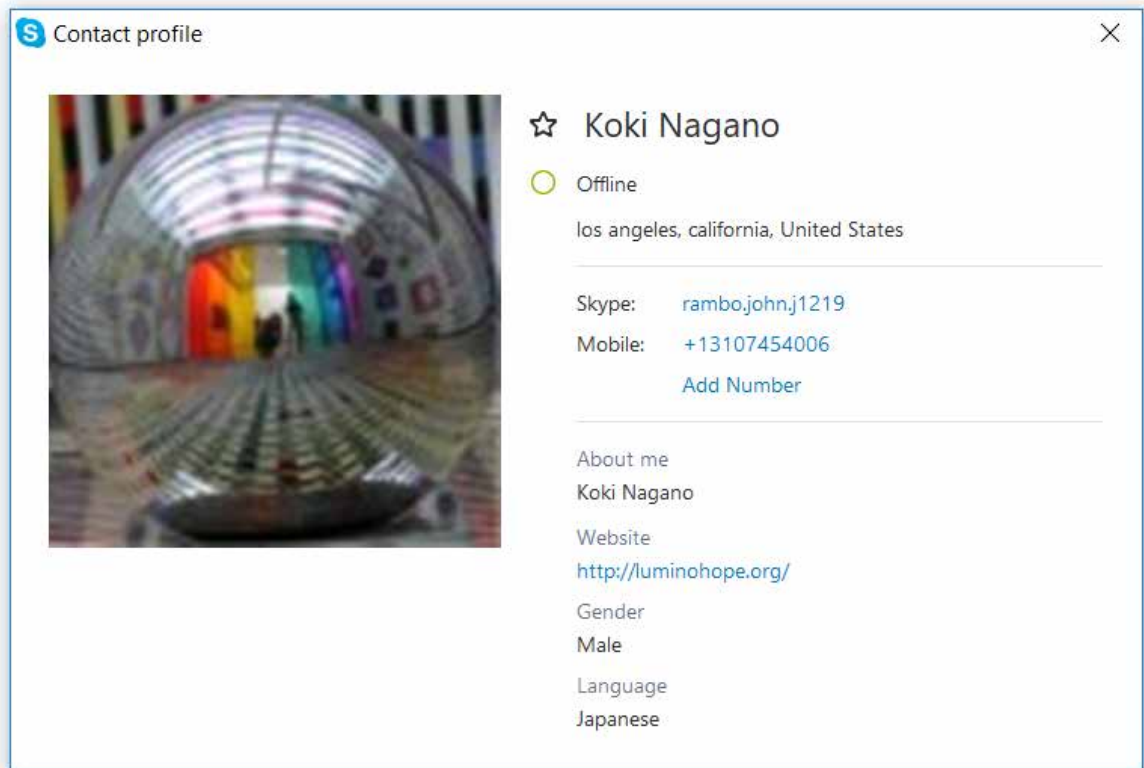
3:23 PM

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Sun’s Skype profile with Skype ID “live:carrie.k.sun”:



Nagano’s Skype profile with Skype ID “rambo.john.j1219”:




















1 Sun's group messages on "PinscreenTeamAll" Skype thread, shared with Sadeghi and 14  
2 other participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund, Nagano, Hu,  
3 Yu, Saito, Xiang, Stephen Chen, and Zhou, dated July 28, 2017:

- 4 • [July 28, 2017] Sun: "koki's new hair (with fewer intersections in the front) is in the  
5 dropbox folder here:"
- 6 • [July 28, 2017] Sun:  
7 "[https://www.dropbox.com/home/Pinscreen%20Team%20Folder/SIG17RTL/AvatarCandi  
9 dates/AvatarData/Koki\\_new](https://www.dropbox.com/home/Pinscreen%20Team%20Folder/SIG17RTL/AvatarCandi<br/>8 dates/AvatarData/Koki_new)"

10  ☆ PinscreenTeamAll    
11 ▼ 14 participants | <https://join.skype.com/L4luq1aWUh2>

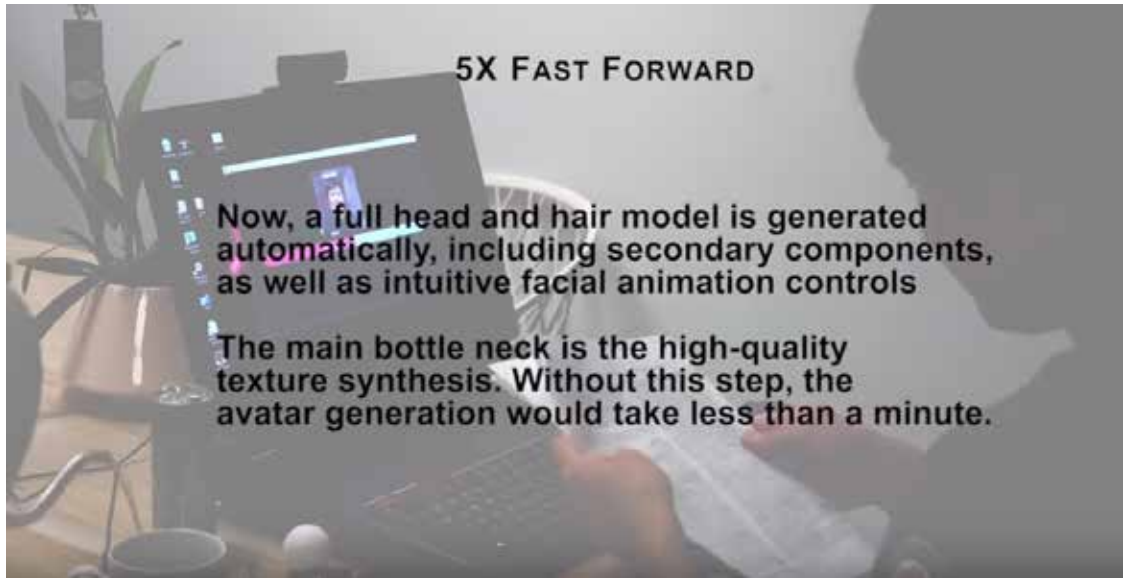
12  carrie sun  Cosimo Wei  ? Frances Chen  Han-Wei Kung  ? Hao Li  
13  Jaewoo Seo  Jens Fursund  Koki Nagano  Liwen Hu  Ronald Yu  
14  Shunsuke Saito  Sitao Xiang  ? Stephen Chen  Yi Zhou

15 I'm looking into the Unity side  
16 Koobideh are you coming soon? Friday, July 28, 2017

17 **carrie sun**  
18  koki's new hair (with fewer intersections in the front) is in the  
19 dropbox folder here: 1:23 PM  
20 [https://www.dropbox.com/home/Pinscreen%20Team  
21 %20Folder/SIG17RTL/AvatarCandidates/AvatarData/Koki\\_new](https://www.dropbox.com/home/Pinscreen%20Team%20Folder/SIG17RTL/AvatarCandidates/AvatarData/Koki_new)  
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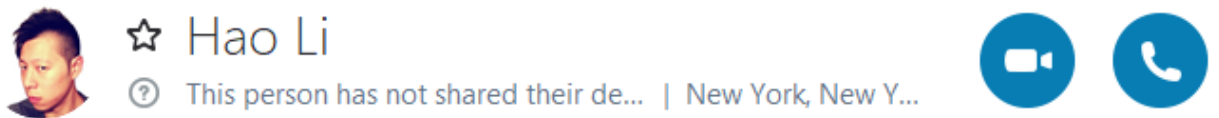
1 32. Pinscreen’s SIGGRAPH Asia 2017 Technical Paper video, published on November 14, 2017:

- 2 • <https://www.youtube.com/watch?v=dERjpAaoNjk>



13 33. Li’s private messages with Sadeghi on Skype, dated March 3, 2017:

- 14 • [March 3, 2017] Li: “don’t share this paper”
- 15 • [March 3, 2017] Li: “it s under review”



19 Contact request sent - [Resend contact request](#)

20 somehow the face is not similar enough  
21 something is off Friday, March 3, 2017

22 don't share this paper  
23 it s under review

- 1 • [March 3, 2017] Li: “not from us”
- 2 • [March 3, 2017] Li: “incremental work”
- 3 • [March 3, 2017] Li: “but the results are not bad”
- 4 • [March 3, 2017] Li: [c118-f118\_2-a53-paper-v3.pdf]
- 5 • [March 3, 2017] Li: “doing very similar stuff as we do”
- 6 • [March 3, 2017] Li: “but always good to see if there are some details that can be used”



☆ Hao Li

ⓘ This person has not shared their de... | New York, New Y...



Contact request sent - [Resend contact request](#)

yeah I agree 😊

Friday, March 3, 2017

7:30 PM



not from us  
incremental work  
but the results are not bad

7:30 PM



c118-f118\_2-a53-paper-v3.pdf

15.4 MB

[Cancel](#)

7:31 PM

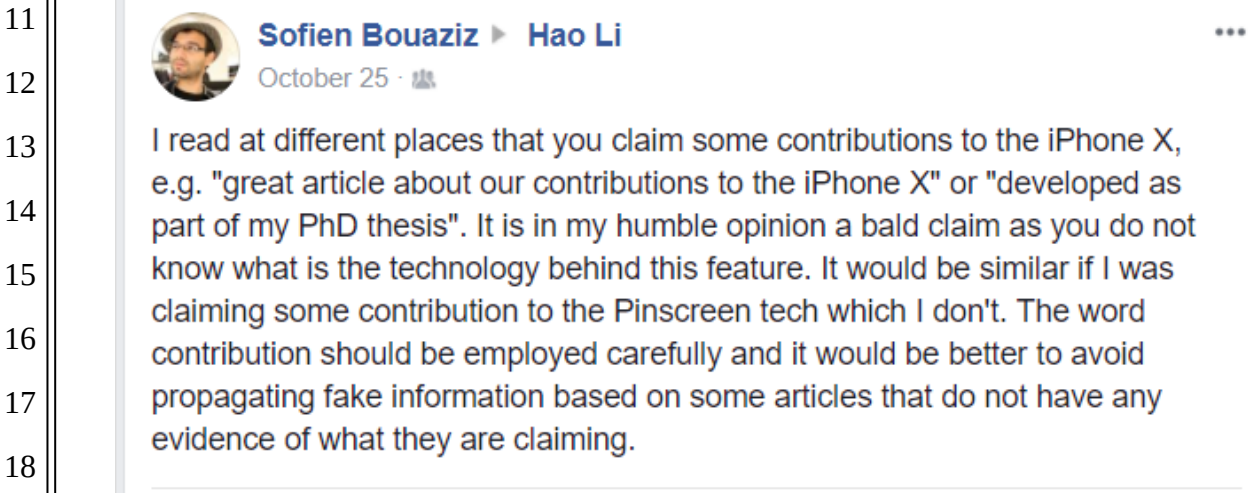
doing very similar stuff as we do  
but always good to see if there are some details that can  
be used

7:31 PM

1 34. Bouaziz’s post, on Li’s Facebook, on October 25, 2017:

- 2 • <https://www.facebook.com/li.hao/posts/10155155647648753>
- 3 • [October 25, 2017] Bouaziz: “I read at different places that you claim some contributions  
4 to the iPhone X, e.g. ‘great article about our contributions to the iPhone X’ or ‘developed  
5 as part of my PhD thesis’. It is in my humble opinion a bald claim as you do not know  
6 what is the technology behind this feature. It would be similar if I was claiming some  
7 contribution to the Pinscreen tech which I don't. The word contribution should be  
8 employed carefully and it would be better to avoid propagating fake information based on  
9 some articles that do not have any evidence of what they are claiming.”

10



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20 35. Li’s private messages to Sadeghi on Skype, dated February 27:

- 21 • [February 27, 2017] Li: “actually most VCs are assholes”
- 22 • [February 27, 2017] Li: “hahahaha”
- 23 • [February 27, 2017] Li: “never trust them”

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☆ Hao Li

Ⓜ This person has not shared their de... | New York, New Y...



Contact request sent - [Resend contact request](#)

every VC will potentially try to figure out everything they can  
Monday, February 27, 2017

actually most VCs are assholes  
hahahaha  
never trust them

Li's private messages to Sadeghi on Skype, dated March 6:

- [March 6, 2017] Li: “also good VCs smell when u bullshit 😊”
- [March 6, 2017] Li: “unless u bullshit like a pro”
- [March 6, 2017] Li: “ahahahah!”



☆ Hao Li

Ⓜ This person has not shared their de... | New York, New Y...



Contact request sent - [Resend contact request](#)

2) we are not making any mistakes by overpromising things etc  
Monday, March 6, 2017

also good VCs smell when u bullshit 😊  
unless u bullshit like a pro  
ahahahah!

Li's group messages on “PinscreenTeamAll” Skype thread, shared with Sadeghi and 14 other participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund, Nagano, Hu, Yu, Saito, Xiang, Stephen Chen, and Zhou, dated June 15:

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- [June 15, 2017] Li: “Awesome”
- [June 15, 2017] Li: “In any case very important thing for startups, never trust VCs regardless how nice they are”

Thursday, June 15, 2017

**Hao Li**  
 Awesome  
 In any case very important thing for startups, never trust VCs regardless how nice they are  
 3:29 PM

36. Li’s private message to Sadeghi on Skype, dated February 27, 2017:

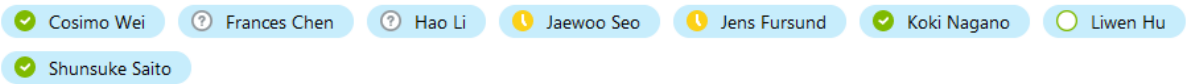
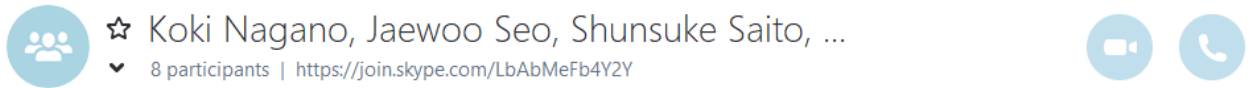
- [February 27, 2017] Li: “we will have very important visits on 3/6 from softbank, they will be checking our technology”

Contact request sent - Resend contact request

Monday, February 27, 2017  
 12:40 AM  
 we will have very important visits on 3/6 from softbank, they will be checking our technology  
 12:41 AM

1 Li's group messages on Skype, shared with Sadeghi and 8 other participants, including Wei,  
2 Yen-Chun Chen, Seo, Fursund, Nagano, Hu, and Saito, dated March 6, 2017:

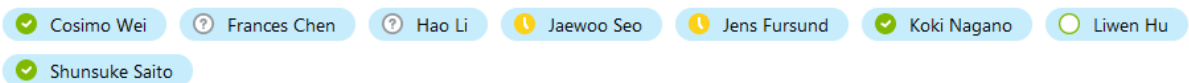
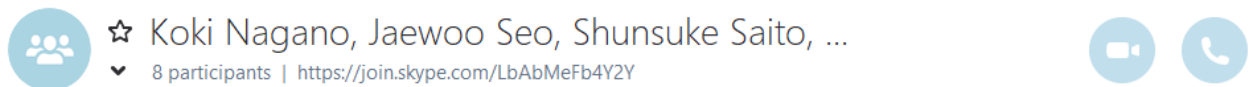
- 3 • [March 6, 2017] Li: "we need to get these three guys working"
- 4 • [March 6, 2017] Li: "@liwen: please pick the best possible hair"
- 5 • [March 6, 2017] Li: "if we get that we are golden"



10 There was a problem receiving this image. Monday, March 06, 2017

11 we need to get these three guys working 11:43 PM  
12 @liwen: please pick the best possible hair  
13 if we get that we are golden

- 14
- 15 • [March 6, 2017] Li: "hao der"
- 16 • [March 6, 2017] Li: "it is related to our investment"
- 17 • [March 6, 2017] Li: "let me tell you"



22 I'll help with the rendering. I know Monday, March 06, 2017 related to naver? 11:52 PM

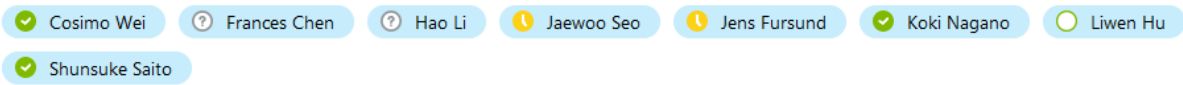
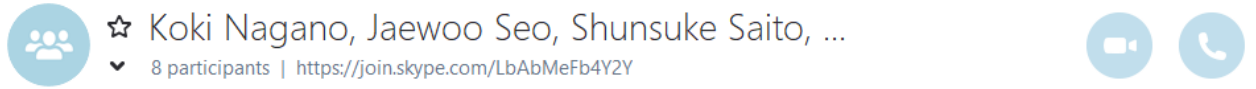
23 Hao Li  
24 hao der 11:55 PM  
25 it is related to our investment  
26 let me tell you

27 Li's group messages on Skype, shared with Sadeghi and 8 other participants, including Wei,  
28



1 Yen-Chun Chen, Seo, Fursund, Nagano, Hu, and Saito, dated March 7, 2017:

- 2 • [March 7, 2017] Li: “let’s generate the 3 models at really high quality”
- 3 • [March 7, 2017] Li: “@liwen: can u pick the best hair for the 3 photographs that i
- 4 sent?”



9 The caption of this image Tuesday, March 07, 2017

10 Hao Li



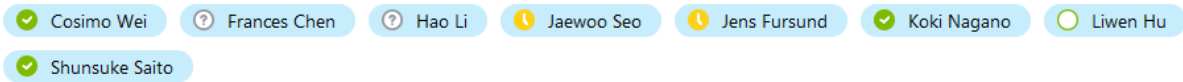
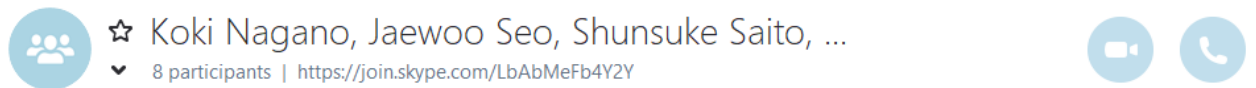
11 let's generate the 3 models at really high quality

7:09 AM

12 @liwen: can u pick the best hair for the 3 photographs that i sent?

7:42 AM

- 14 • [March 7, 2017] Li: “i dun have the names”
- 15 • [March 7, 2017] Li: “but its the founder of naver”
- 16 • [March 7, 2017] Li: “the ceo of snow”
- 17 • [March 7, 2017] Li: “and GD from bang”



22 Let's find a bunch of perfect frontal face images for each one. Can we all  
23 have their full names please?

Tuesday, March 07, 2017

24 Hao Li



25 i dun have the names  
26 but its the founder of naver  
the ceo of snow  
and GD from bang

9:01 AM


- 27 • [March 7, 2017] Li: “the hair has to be match perfectly to those they gave us”

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☆ Koki Nagano, Jaewoo Seo, Shunsuke Saito, ...  
8 participants | https://join.skype.com/LbAbMeFb4Y2Y

- ✓ Cosimo Wei
- ⊙ Frances Chen
- ⊙ Hao Li
- ⌚ Jaewoo Seo
- ⌚ Jens Fursund
- ✓ Koki Nagano
- Liwen Hu
- ✓ Shunsuke Saito

Should be easy to find their names then. 9:02 AM  
Let me see ... Tuesday, March 07, 2017

**Hao Li**  
 the hair has to be match perfectly to those they gave us 9:02 AM

Li's private messages to Sadeghi on Skype, dated March 7, 2017:

- [March 7, 2017] Li: "we wanna close the deal with them this week"
- [March 7, 2017] Li: "they want to invest 4M in us 😊"

 ☆ Hao Li  
⊙ This person has not shared their de... | New York, New Y...  

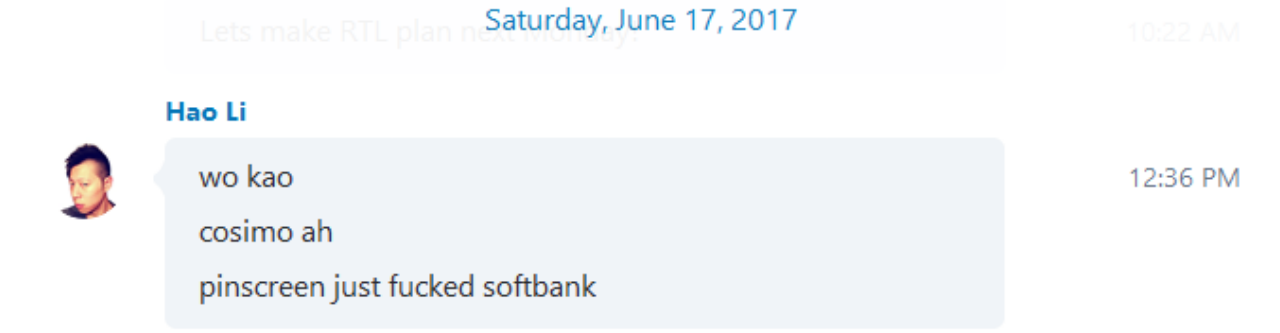
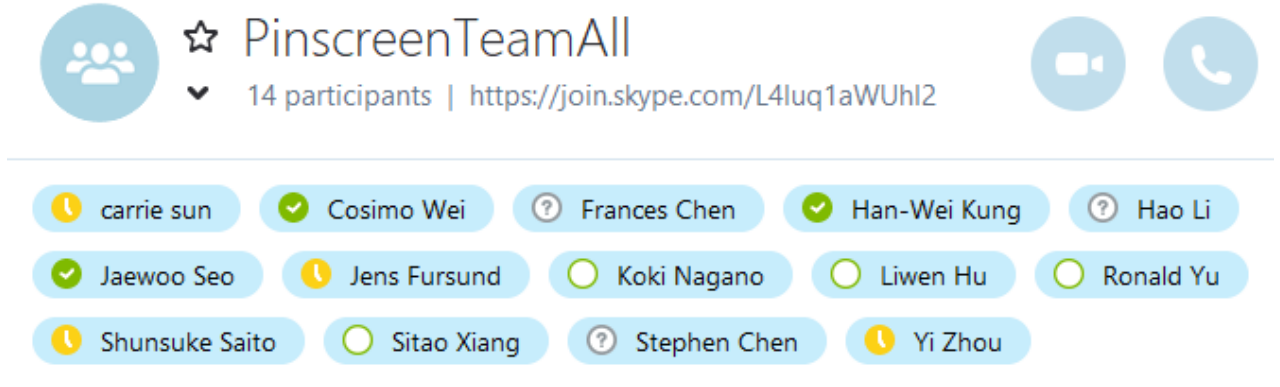
Contact request sent - [Resend contact request](#)

oh when u have a chance, can u make sure we 3 perfect models of the input images I showed you?  
Tuesday, March 7, 2017

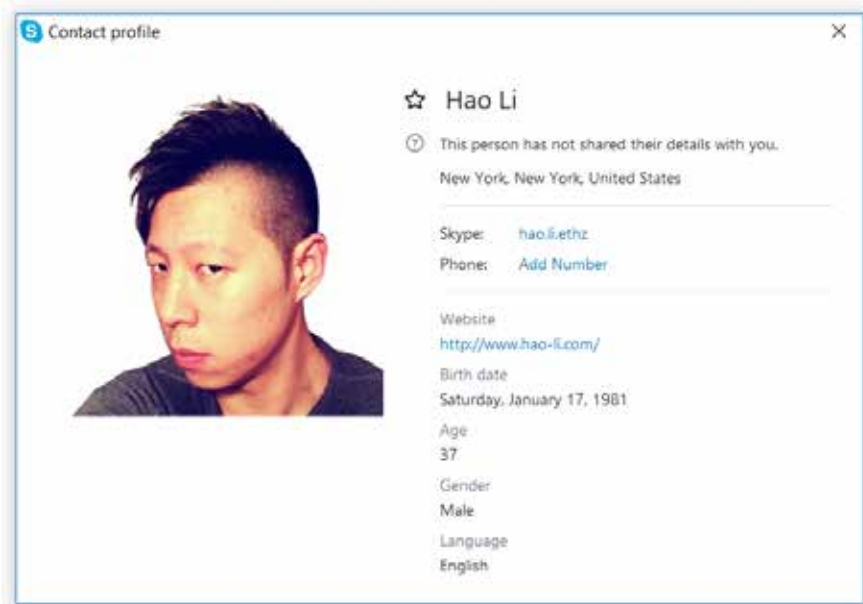
we wanna close the deal with them this week  
they want to invest 4M in us 😊

1 37. Li's group messages on "PinscreenTeamAll" Skype thread, shared with Sadeghi and 14 other  
2 participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund, Nagano, Hu, Yu,  
3 Saito, Xiang, Stephen Chen, and Zhou, dated June 17, 2017:

- 4 • [June 17, 2017] Li: "pinscreen just fucked softbank"

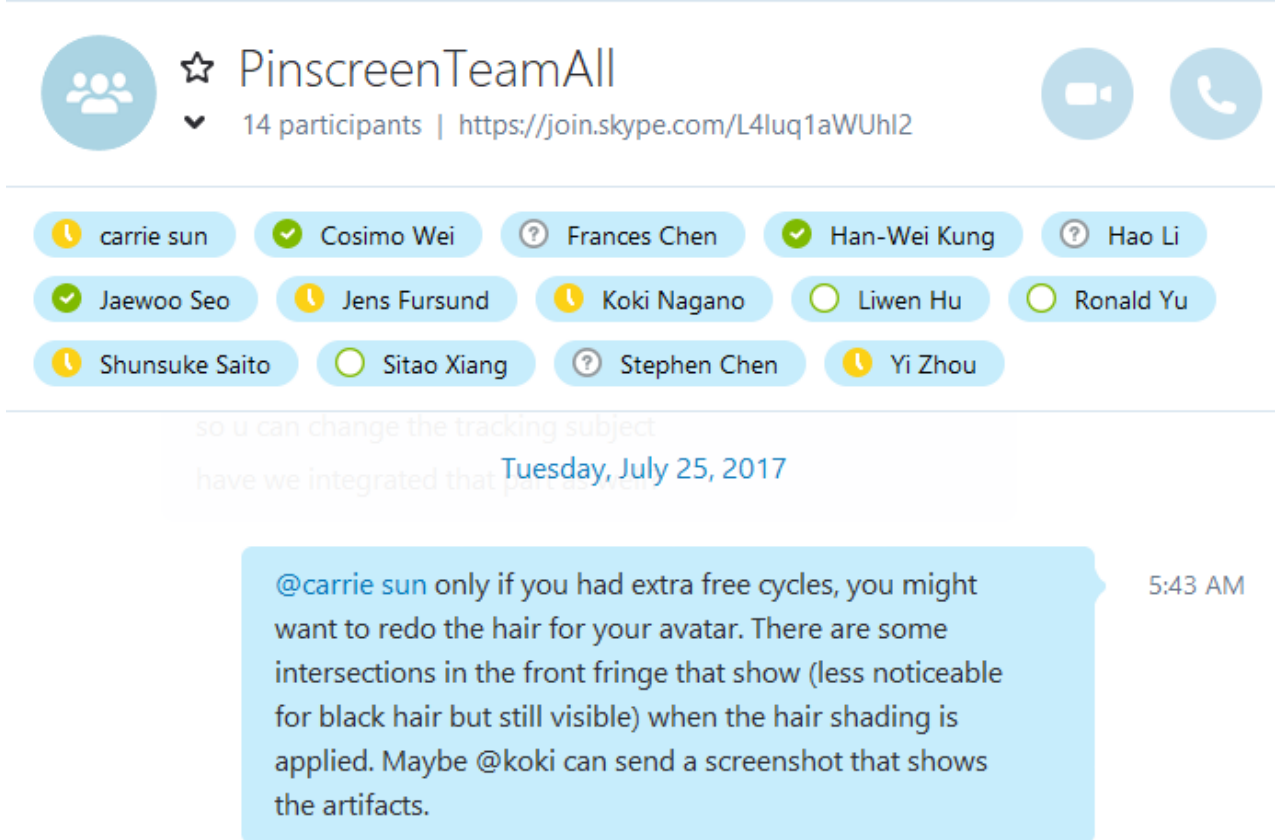


18 Li's Skype profile with Skype ID "hao.li.ethz":



1 38. Sadeghi’s group message on “PinscreenTeamAll” Skype thread, shared with Sadeghi and 14  
2 other participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund, Nagano, Hu,  
3 Yu, Saito, Xiang, Stephen Chen, and Zhou, dated July 25, 2017:

- 4 • [July 25, 2017] Sadeghi: “@carrie sun only if you had extra free cycles, you might want to  
5 redo the hair for your avatar. There are some intersections in the front fringe that show  
6 (less noticeable for black hair but still visible) when the hair shading is applied. Maybe  
7 @koki can send a screenshot that shows the artifacts.



1 39. Sadeghi's private conversation with Sun on Skype, dated July 25, 2017 and July 26, 2017:

- 2 • [July 25, 2017] Sadeghi: "Thanks for adding my avatar."
- 3 • [July 25, 2017] Sadeghi: "Looks like around my ears the hair is missing."
- 4 • [July 25, 2017] Sadeghi: "Due to the transparency."
- 5 • [July 25, 2017] Sadeghi: [image]
- 6 • [July 26, 2017] Sun: "i'll add the hair around your ears today"



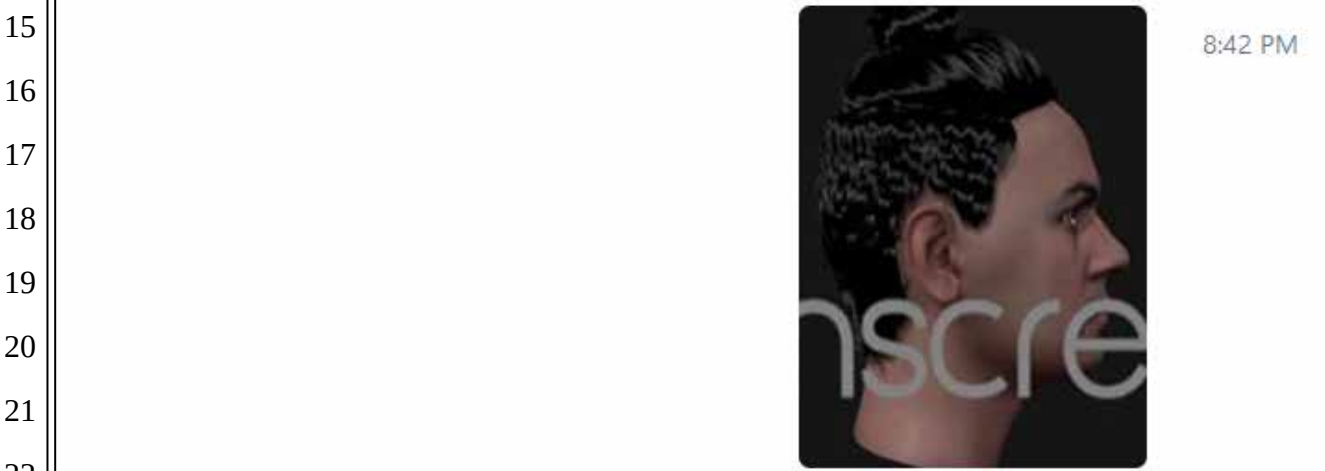
10 Tuesday, July 25, 2017

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12 Thanks for adding my avatar. 8:41 PM

13 Looks like around my ears the hair is missing.

14 Due to the transparency



23 Wednesday, July 26, 2017

24  i'll add the hair around your ears today 12:47 PM

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40. Sadeghi’s group conversation with Sun on “PinscreenTeamAll” Skype thread, shared with Sadeghi and 14 other participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund, Nagano, Hu, Yu, Saito, Xiang, Stephen Chen, and Zhou, dated July 28, 2017:

- [July 28, 2017] Sadeghi: “I am finalizing the avatars. Cristobal hair around his ears can use some more love if you have time @carrie sun Maybe a good practice to show @frances while she is learning from you 😊”
- [July 28, 2017] Sadeghi: [image]
- [July 28, 2017] Sun: “do you think we’re going to be showing the sides? haa”
- [July 28, 2017] Sadeghi: [image]
- [July 28, 2017] Sadeghi: “It shows if I rotate him a tiny bit.”
- [July 28, 2017] Hu: @iman u are the hair modeling master, I think u can fix it very quick by yourself 😊”
- [July 28, 2017] Sadeghi: “Thank thank you! ❤️”
- [July 28, 2017] Sadeghi: “I will do it if Carrie doesn’t get to it and after all avatars are in good shape both in RTLmaster and the Live scene. There is bunch of adjustments to be done in both.”
- [July 28, 2017] Sun: “i will be able to do it 😊 just letting frances use the VR a bit”

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# ☆ PinscreenTeamAll

14 participants | <https://join.skype.com/L4luq1aWUhl2>



- carrie sun
- Cosimo Wei
- Frances Chen
- Han-Wei Kung
- Hao Li
- Jaewoo Seo
- Jens Fursund
- Koki Nagano
- Liwen Hu
- Ronald Yu
- Shunsuke Saito
- Sitao Xiang
- Stephen Chen
- Yi Zhou

Haha so good! 😄 Friday, July 28, 2017

4:01 PM

I am finalizing the avatars. Cristobal hair around his ears can use some more love if you have time @carrie sun Maybe a good practice to show @frances while she is learning from you 😊



4:02 PM

**carrie sun**



do you think we're going to be showing the sides? haa

4:08 PM



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# ☆ PinscreenTeamAll

14 participants | <https://join.skype.com/L4luq1aWUhl2>



- carrie sun
- Cosimo Wei
- Frances Chen
- Han-Wei Kung
- Hao Li
- Jaewoo Seo
- Jens Fursund
- Koki Nagano
- Liwen Hu
- Ronald Yu
- Shunsuke Saito
- Sitao Xiang
- Stephen Chen
- Yi Zhou

Friday, July 28, 2017

**carrie sun**



do you think we're going to be showing the sides? haa

4:08 PM



4:08 PM

It shows if I rotate him a tiny bit.

4:09 PM

**Liwen Hu**



@iman u are the hair modeling master, I think u can fix it very quick by yourself 😊

4:26 PM

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# ☆ PinscreenTeamAll

14 participants | <https://join.skype.com/L4luq1aWUhl2>



- carrie sun
- Cosimo Wei
- Frances Chen
- Han-Wei Kung
- Hao Li
- Jaewoo Seo
- Jens Fursund
- Koki Nagano
- Liwen Hu
- Ronald Yu
- Shunsuke Saito
- Sitao Xiang
- Stephen Chen
- Yi Zhou

it shows if I rotate h... Friday, July 28, 2017 4:09 PM



**Liwen Hu**

@iman u are the hair modeling master, I think u can fix it very quick by yourself 😊

4:26 PM

Thank thank you! ❤️  
I will do it if Carrie doesn't get to it and after all avatars are in good shape both in RTLmaster and the Live scene. There is bunch of adjustments to be done in both.

4:30 PM



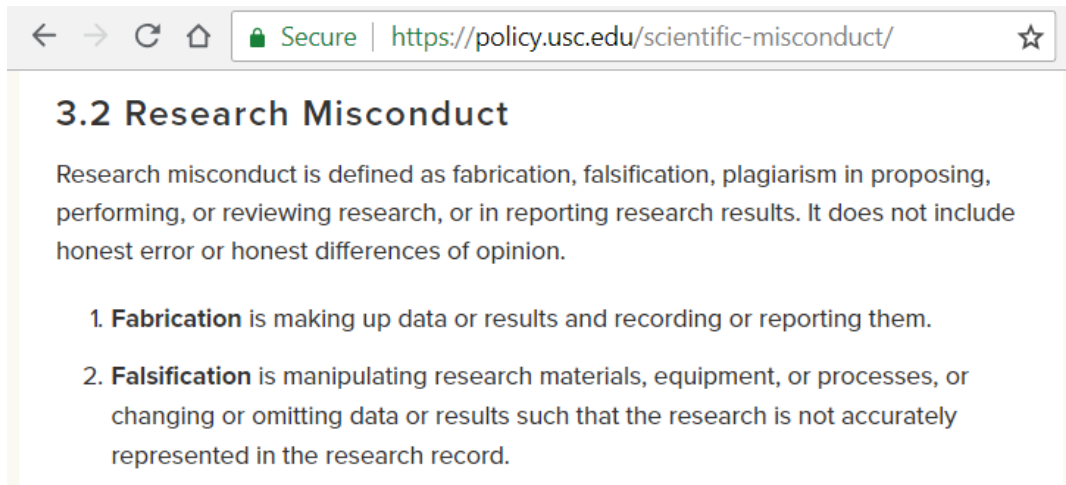
**carrie sun**

i will be able to do it 😊 just letting frances use the VR a bit

4:31 PM

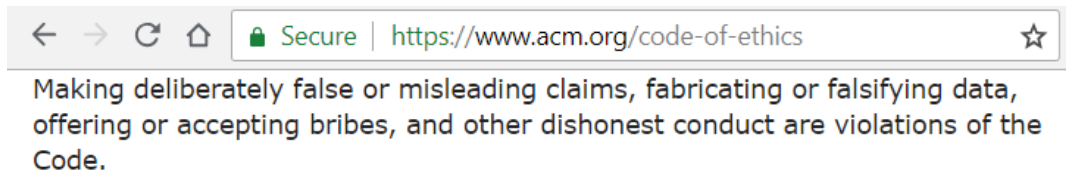
1 41. USC’s policy regarding “Scientific Misconduct”:

- 2 • <https://policy.usc.edu/scientific-misconduct/>
- 3 • “Research misconduct is defined as fabrication, falsification, plagiarism in proposing,
- 4 performing, or reviewing research, or in reporting research results.”
- 5 • “**Fabrication** is making up data or results and recording or reporting them.”
- 6 • “**Falsification** is manipulating research materials, equipment, or processes, or changing or
- 7 omitting data or results such that the research is not accurately represented in the research
- 8 record.”



17 ACM’s “Code of Ethics and Professional Conduct”:

- 18 • <https://www.acm.org/code-of-ethics>
- 19 • “Making deliberately false or misleading claims, fabricating or falsifying data, offering or
- 20 accepting bribes, and other dishonest conduct are violations of the Code.”



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**EXHIBIT F**

**Li's and Pinscreen's Labor Law and Immigration Law Violations**

1. Li's private message to Sadeghi on Skype, dated June 18, 2017:

- [June 18, 2017] Li: "please push the students more, they are getting lazy and only work half of the day"



☆ Hao Li

ⓧ This person has not shared their det... | New York, New Y...



Contact request sent - [Resend contact request](#)

if possible organize group meetings with hair  
directly with everyone **Sunday, June 18, 2017**

please push the students more, they are getting lazy  
and only work half of the day

8:43 PM

2. Wikipedia article on “Karōshi”:

- <https://en.wikipedia.org/wiki/Karōshi>
- “Karōshi, which can be translated literally as ‘overwork death’ in Japanese, is occupational sudden mortality.”



The screenshot shows the Wikipedia article for "Karōshi". At the top, the browser address bar displays "Secure | https://en.wikipedia.org/wiki/Karōshi". The page header includes "Not logged in" and links for "Talk", "Contributions", "Create account", and "Log in". The article title "Karōshi" is prominently displayed, followed by the text "From Wikipedia, the free encyclopedia". A disclaimer states: "This article is about the Japanese term. For the operating system, see *The Linux Schools Project*. For the puzzle platformer game, see *Karoshi (video game)*. 'Worked to death' redirects here. For killing method using forced labour, see *Extermination through labour*." The main text explains that "Karōshi" (過労死), which can be translated literally as "overwork death" in Japanese, is occupational sudden mortality. It notes that the major medical causes of "karōshi" deaths are heart attack and stroke due to stress and a starvation diet, and that this phenomenon is also widespread in other parts of Asia as well. To the right of the text is an image of a "No More Karōshi" protest in Tokyo, 2018, with a caption below it. The left sidebar contains navigation links such as "Main page", "Contents", "Featured content", "Current events", "Random article", "Donate to Wikipedia", "Wikipedia store", "Interaction", "Help", "About Wikipedia", "Community portal", "Recent changes", "Contact page", and "Tools".

3. Wikipedia article on “Salaryman”:

- <https://en.wikipedia.org/wiki/Salaryman>
- “Salarymen are expected to work long hours, additional overtime [...], and to value work over all else.”
- “Other popular notions surrounding salarymen include *karōshi*, or death from overwork.”



The screenshot shows the Wikipedia article for "Salaryman". At the top, the browser address bar displays "https://en.wikipedia.org/wiki/Salaryman". The article title "Salaryman" is prominently displayed. Below the title, a sub-header reads "From Wikipedia, the free encyclopedia". The main text begins with "A **Salaryman** (サラリーマン, *Sararīman*) is a salaried worker and, more specifically, a Japanese white-collar worker who shows overriding loyalty to the corporation where he works." To the right of this text is a photograph of a crowded train station platform with many people. Below the photo is a caption: "‘Sararīman’ take their train daily to work in the Tokyo metropolitan area." The article continues with "Japan's society prepares its people to work primarily for the good of the whole society rather than just the individual<sup>[original research?]</sup>, and the salaryman is a part of that. Salarymen are expected to work long hours,<sup>[1]</sup> additional overtime, to participate in after-work leisure activities such as drinking and visiting hostess bars with colleagues, and to value work over all else. The salaryman typically enters a company after graduating college and stays with that corporation his whole career." The final sentence states "Other popular notions surrounding salarymen include *karōshi*, or death from overwork."

1 4. Li's public posts on Facebook, dated May 23, 2017:

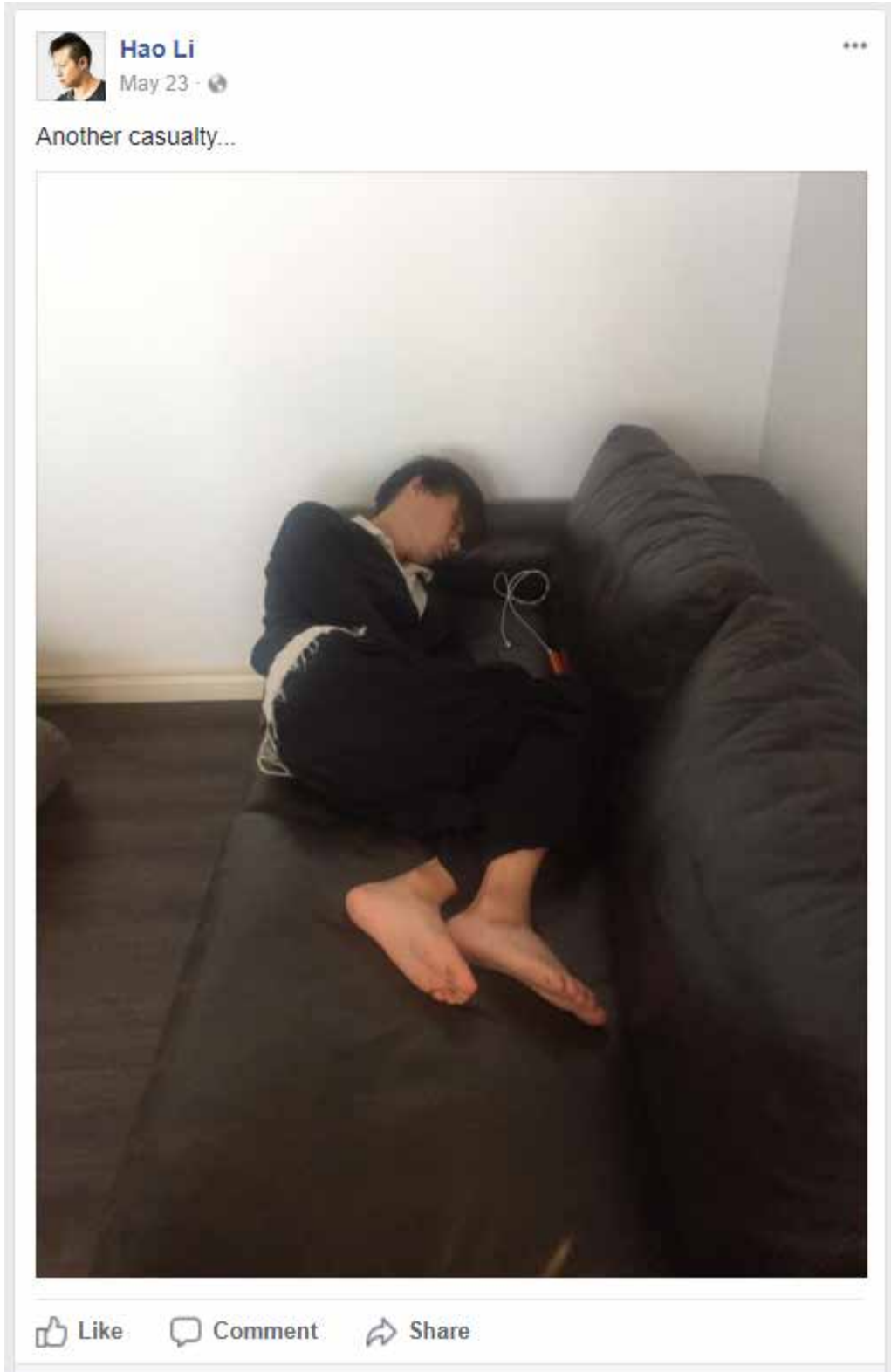
- 2 • <https://www.facebook.com/li.hao/posts/10154694660253753>
- 3 • [May 23, 2017] Li: "Siggraph asia casualties"





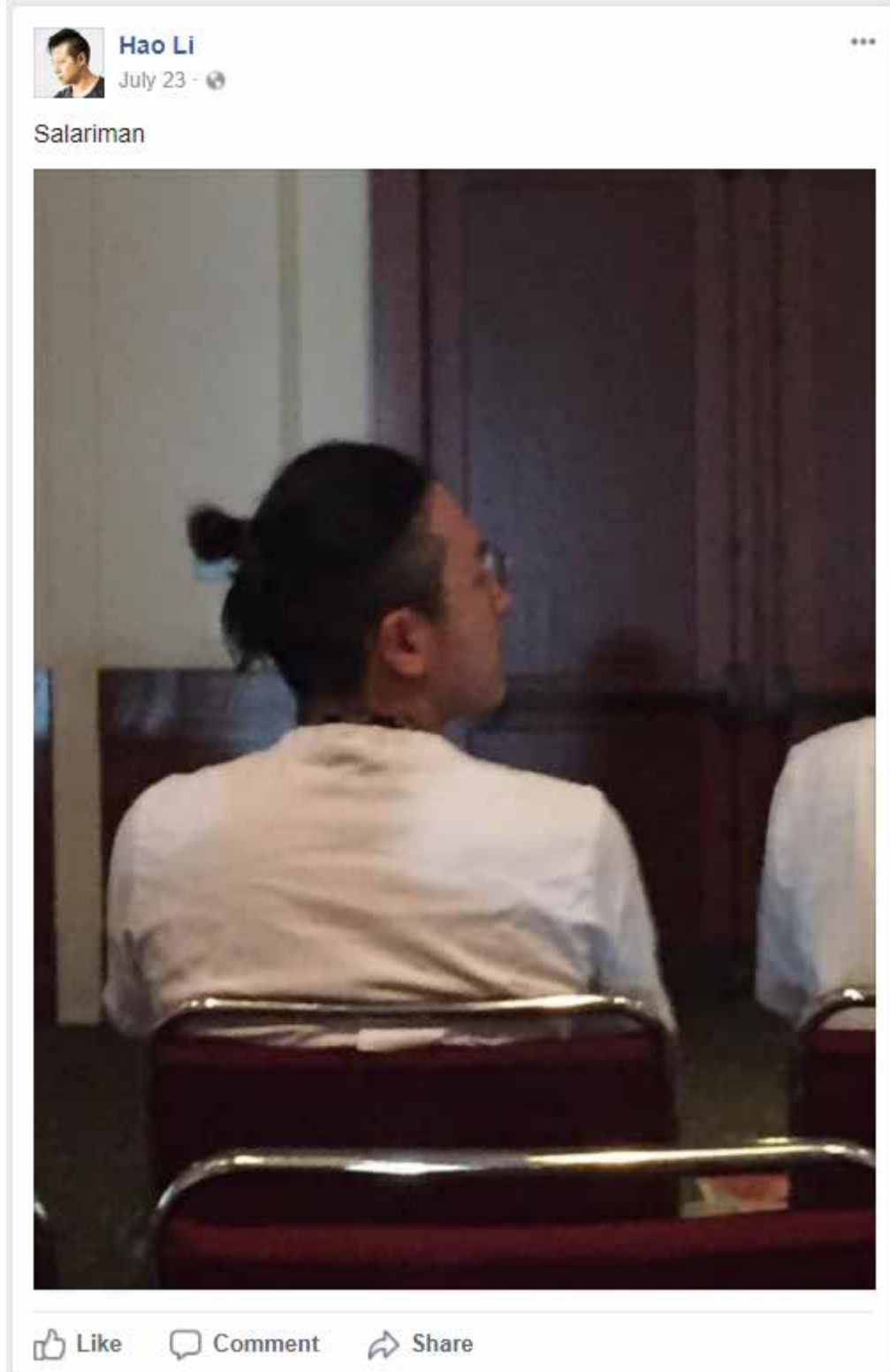
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- <https://www.facebook.com/li.hao/posts/10154695254708753>
- [May 23, 2017] Li: “Another casualty...”



1 5. Li's public posts on Facebook, dated July 23, 2017:

- 2 • <https://www.facebook.com/li.hao/posts/10154887576718753>
- 3 • [July 23, 2017] Li: "Salariman"

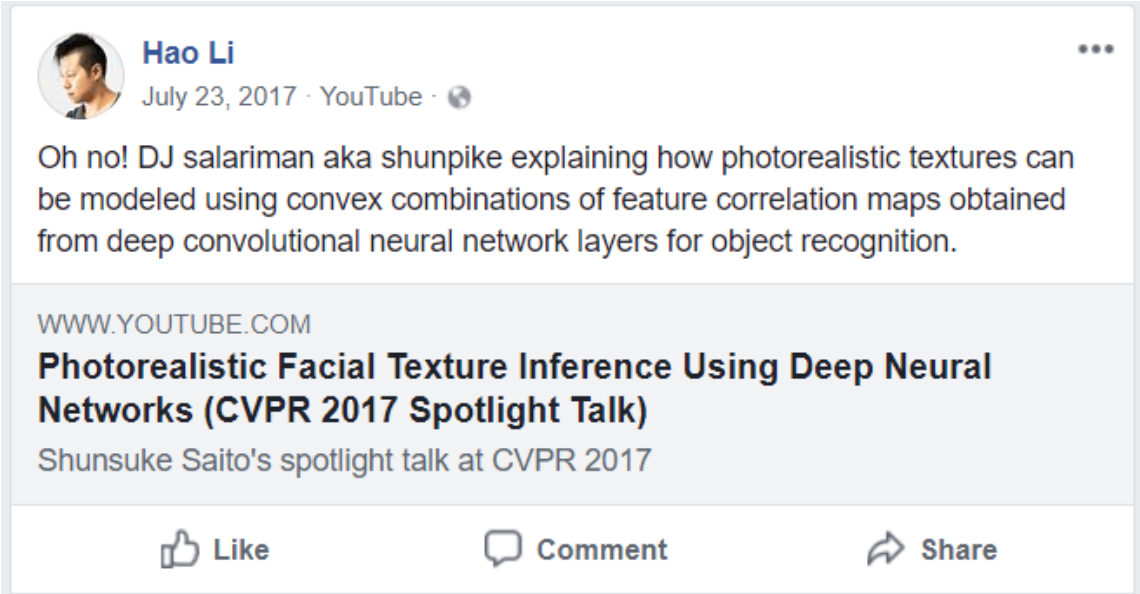


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Li's public posts on Facebook, dated July 23, 2017:

- <https://www.facebook.com/li.hao/posts/10154887707163753>
- [July 23, 2017] Li: "Oh no! DJ salariman aka shunpike explaining [...]"
- [July 23, 2017] Li: [Shunsuke Saito's spotlight talk at CVPR 2017]



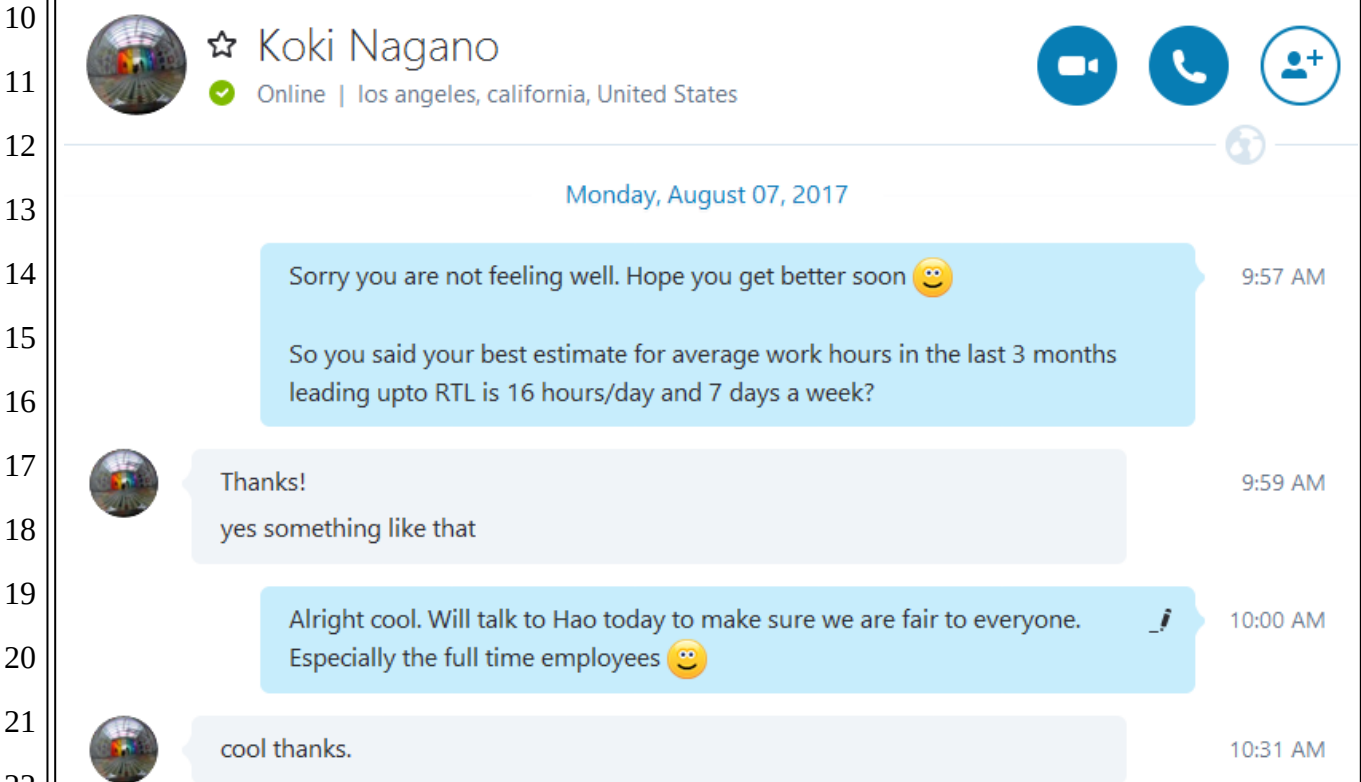
1 6. Li's post on Facebook, dated October 5, 2017:

- 2 • [October 5, 2017] Li: "Karoshi! let me tell you! Sleep is for the weak!"



1 7. Sadeghi’s private conversation with Nagano on Skype, dated August 7, 2017:

- 2 • [August 7, 2017] Sadeghi: “Sorry you are not feeling well. Hope you get better soon 😊”
- 3 • [August 7, 2017] Sadeghi: “So you said your best estimate for average work hours in the
- 4 last 3 months leading upto RTL is 16 hours/day and 7 days a week?”
- 5 • [August 7, 2017] Nagano: “Thanks!”
- 6 • [August 7, 2017] Nagano: “yes something like that”
- 7 • [August 7, 2017] Sadeghi: “Alright cool. Will talk to Hao today to make sure we are fair to
- 8 everyone. Especially the full time employees 😊”
- 9 • [August 7, 2017] Nagano: “cool thanks.”



24 8. Sadeghi’s private conversation with Seo on Skype, dated August 6, 2017 and August 7, 2017:

- 25 • [August 6, 2017] Sadeghi: “Hey my man Jaewoo, What would be your best estimate on the
- 26 average hours you worked per day/week in the past 3 months and upto RTL? 😊”
- 27 • [August 7, 2017] Seo: “I don’t know. Maybe around 100-120 hrs/wk? :-[ ”

28

- 1 • [August 7, 2017] Sadeghi: “Yes that’s a lot of hours. Alright cool. Will talk to Hao today  
2 to make sure we are fair to everyone. Especially the full time employees 😊”



3  
4  
5 Sunday, August 06, 2017

6  
7 Hey my man Jaewoo, What would be your best estimate on the average  
8 hours you worked per day/week in the past 3 months and upto RTL? 😊 11:39 PM

9 Monday, August 07, 2017

10 I don't know. maybe around 100-120 hrs/wk? :-[ 12:36 AM

11  
12 Yes that's a lot of hours. Alright cool. Will talk to Hao today to make sure we  
13 are fair to everyone. Especially the full time employees 😊 10:01 AM

- 14 9. Li’s group conversation with Zhou on “NN Classifications” thread, on Skype, shared with  
15 Sadeghi and 5 other participants, including Wei, Hu, Xiang, and Zhou, dated June 15, 2017:

- 16 • [June 15, 2017]: Li: “yes”
- 17 • [June 15, 2017]: Li: “talk to him in person, on skype: he sometimes decide to fully ignore  
18 communication”
- 19 • [June 15, 2017]: Li: “or does not have the ability to respond”
- 20 • [June 15, 2017] Li: “adding yi, seems like having yi to communicate with sitao is easier”
- 21 • [June 15, 2017] Li: “@yi we need you to check on sitao if he has obtained the data for eye  
22 color classification and if he has started training, also we need to know the classification  
23 statistics about it”
- 24 • [June 15, 2017] Zhou: “Ok. I will talk to him when he arrives to the office. Can’t contact  
25 him in the morning..”
- 26 • [June 15, 2017] Zhou: “(Actually I think, without me, you can still communicate with  
27 Sitao perfectly.)”



# ★ NN Classifications

5 participants



- Cosimo Wei
- Hao Li
- Liwen Hu
- Sitao Xiang
- Yi Zhou

Liwen Hu



I'll check with him

Thursday, June 15, 2017

12:44 PM

**Hao Li**



yes  
 talk to him in person, on skype: he sometimes decide to fully ignore communication or does not have the ability to respond

12:45 PM

**Hao Li added Yi Zhou**

12:45 PM

**Hao Li**



adding yi, seems like having yi to communicate with sitao is easier  
 @yi we need you to check on sitao if he has obtained the data for eye color classification and if he has started training, also we need to know the classification statistics about it

12:46 PM

**Yi Zhou**



Ok. I will talk to him when he arrives to the office. Can't contact him in the morning..

1:34 PM

(Actually I think, without me, you can still communicate with Sitao perfectly.)

1:45 PM



1 Zhou's Skype profile with Skype ID "live:zhouyisjtu2012":



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Li's group messages on "PinscreenTeamAll" Skype thread, shared with Sadeghi and 14 other participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund, Nagano, Hu, Yu, Saito, Xiang, Stephen Chen, and Zhou, dated June 23, 2017:

- 17
- 18
- 19
- [June 23, 2017]: Li: "Sitao can u provide some updates and also reduce the amount of time drawing? We are not fucking paying u for that!"
  - [June 23, 2017]: Li: "Also make sure to throw the trash away like an adult"



# PinscreenTeamAll

14 participants | <https://join.skype.com/L4luq1aWUhl2>



- carrie sun
- Cosimo Wei
- Frances Chen
- Han-Wei Kung
- Hao Li
- Jaewoo Seo
- Jens Fursund
- Koki Nagano
- Liwen Hu
- Ronald Yu
- Shunsuke Saito
- Sitao Xiang
- Stephen Chen
- Yi Zhou

Friday, June 23, 2017



**Hao Li**

Sitao can u provide some updates and also reduce the amount of time drawing? We are not fucking paying u for that!

7:08 PM

Also make sure to throw the trash away like an adult

7:09 PM

Li's group conversation with Xiang on "PinscreenTeamAll" Skype thread, shared with Sadeghi and 14 other participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund, Nagano, Hu, Yu, Saito, Xiang, Stephen Chen, and Zhou, dated June 23, 2017:

- [June 23, 2017] Xiang: "94.9%on hair length"
- [June 23, 2017] Xiang: "also sometimes a certain augmentation make some attributes better but others worse"
- [June 23, 2017] Li: "What are u doing different than liwens framework?"
- [June 23, 2017] Li: "Also do h only have one attribute?"
- [June 23, 2017]: Li: "An u be a little more specific? I feel like i m talking to a wall"



# ☆ PinscreenTeamAll

14 participants | <https://join.skype.com/L4luq1aWUhl2>



- carrie sun
- Cosimo Wei
- ? Frances Chen
- Han-Wei Kung
- ? Hao Li
- Jaewoo Seo
- Jens Fursund
- Koki Nagano
- Liwen Hu
- Ronald Yu
- Shunsuke Saito
- Sitao Xiang
- ? Stephen Chen
- Yi Zhou

We need to carefully divide the work

Can u delegate the work to your friends? **Friday, June 23, 2017**

**Sitao Xiang**



94.9%on hair length  
also sometimes a certain augmentation make some attributes better but others worse

7:33 PM

**Hao Li**




What are u doing different than liwens framework?  
Also do h only have one attribute?  
An u be a little more specific? I feel like i m talking to a wall

7:34 PM

Xiang's Skype profile with Skype ID "sitao.xiang":

**S** Contact profile ✕



☆ **Sitao Xiang**

○ Offline

Los Angeles, California, United States

---

Skype: [sitao.xiang](#)

Mobile: [+12134589097](#)

[Add Number](#)

---

Birth date  
Monday, April 18, 1994

Age  
24

Gender  
Male






Language  
Chinese






1 Li's group conversation with Xiang on "PinscreenTeamAll" Skype thread, shared with  
2 Sadeghi and 14 other participants, including Sun, Wei, Yen-Chun Chen, Kung, Seo, Fursund,  
3 Nagano, Hu, Yu, Saito, Xiang, Stephen Chen, and Zhou, dated June 23, 2017:





- 4 • [June 23, 2017] Xiang: "the main difference is in data augmentation / training / testing etc"
- 5 • [June 23, 2017] Xiang: "the structure is the same"
- 6 • [June 23, 2017] Li: "Are u fucking shitting me???"
- 7 • [June 23, 2017] Li: "Can you do proper assessment, with every attribute"

8  ☆ PinscreenTeamAll    
9 14 participants | <https://join.skype.com/L4luq1aWUhl2>


10

11  carrie sun  Cosimo Wei  ? Frances Chen  Han-Wei Kung  ? Hao Li


12  Jaewoo Seo  Jens Fursund  Koki Nagano  Liwen Hu  Ronald Yu

13  Shunsuke Saito  Sitao Xiang  ? Stephen Chen  Yi Zhou

14


15  Hao Li **Friday, June 23, 2017** 7:37 PM  
Every week i ask something i get a single number

16 **Sitao Xiang**

17  the main difference is in data augmentation / training / testing  
etc  
the structure is the same 7:37 PM

18

19 **Hao Li**

20  Are u fucking shitting me???

21 Can you do proper assessment, with every attribute 7:37 PM

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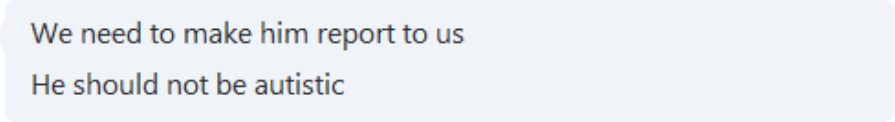
1 Li's private messages with Sadeghi on Skype, dated June 23, 2017:

- 2 • [June 23, 2017]: Li: "We need to make him report to us"
- 3 • [June 23, 2017]: Li: "He should not be autistic"




4  ☆ Hao Li    
5 ⓘ This person has not shared their details... | New York, New Y...

6  
7 Contact request sent - [Resend contact request](#)

8  
9 *Liwen didn't have anything left for a short time but now is busy with the retargeting.*  
Friday, June 23, 2017


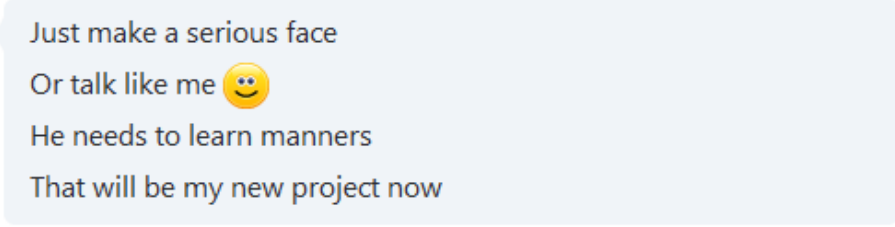
10   8:03 PM  
11 We need to make him report to us  
12 He should not be autistic

- 13
- 14 • [June 23, 2017]: Li: "Just make a serious face"
- 15 • [June 23, 2017]: Li: "Or talk like me 😊"
- 16 • [June 23, 2017]: Li: "He needs to learn manners"
- 17 • [June 23, 2017]: Li: "That will be my new project now"

18  ☆ Hao Li    
19 ⓘ This person has not shared their details... | New York, New Y...

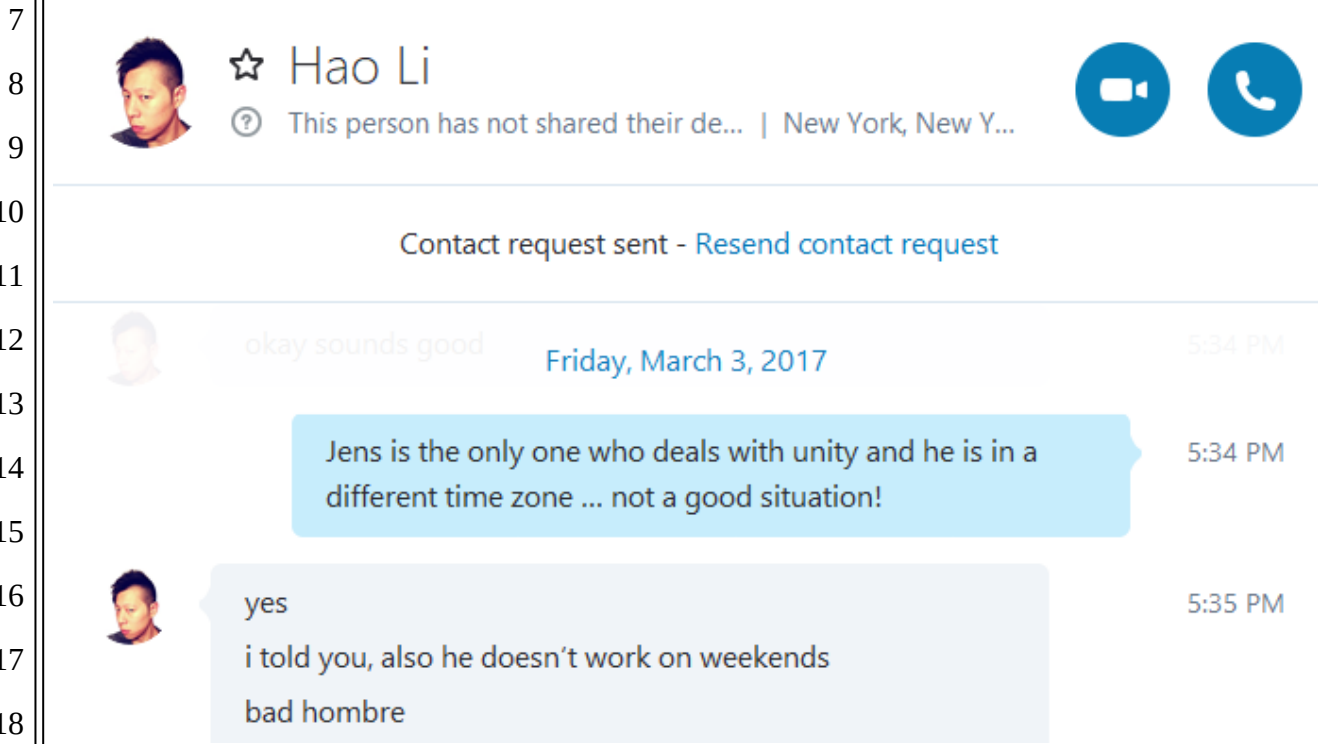
20  
21 Contact request sent - [Resend contact request](#)

22  
23 *so I asked him for the update and setup a meeting with Liwen. But he doesn't seem to have a sense of urgency.*  
Friday, June 23, 2017

24   8:09 PM  
25 Just make a serious face  
26 Or talk like me 😊  
27 He needs to learn manners  
28 That will be my new project now

1 10. Li's private conversation with Sadeghi on Skype, dated March 3, 2017:

- 2 • [March 3, 2017] Sadeghi: "Jens is the only one who deals with unity and he is in a
- 3 different time zone ... not a good situation!"
- 4 • [March 3, 2017] Li: "yes"
- 5 • [March 3, 2017] Li: "i told you, also he doesn't work on weekends"
- 6 • [March 3, 2017] Li: "bad hombre"



19

20 Li's private messages with Sadeghi on Skype, dated March 4, 2017:

- 21 • [March 4, 2017] Li: "How can CTO be in denmark 😊"
- 22 • [March 4, 2017] Li: "makes no sense"
- 23 • [March 4, 2017] Sadeghi: "Yeah it's almost impractical to work as a tab on the same issues
- 24 remotely .... Given the distance and time difference."
- 25 • [March 4, 2017] Li: "we actually agreed that he would come"
- 26 • [March 4, 2017] Li: "but out of a sudden he had a child"

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☆ Hao Li

ⓘ This person has not shared their de... | New York, New Y...



Contact request sent - [Resend contact request](#)

and shunsuke too

Saturday, March 4, 2017

yes

how can CTO be in denmark 😊

makes no sense

Yeah it's almost impractical to work as a tab on the same issues remotely .... Given the distance and time difference.

8:28 PM



we actually agreed that he would come

but out of a sudden he had a child

8:28 PM

Li's group message to Sadeghi and Yen-Chun Chen on Skype, dated April 1, 2017:

- [April 1, 2017] Li: "jens is sick at every deadline we have this year, some folks are not around and it's annoying that others have to stay late and figure out the rest"



☆ Hao Li, Frances Chen

> 2 participants | <https://join.skype.com/Ga1QQGrPJvLF>



my issue is that there are items that we need urgently, and things have been dragged forever

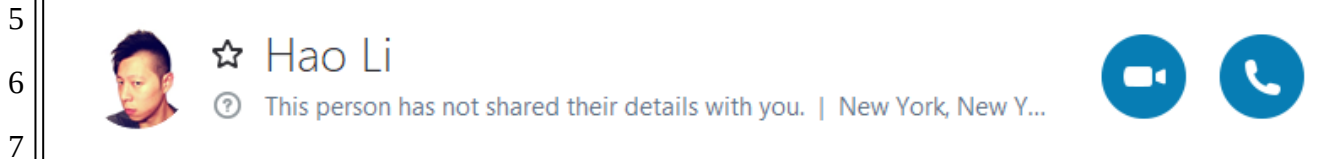
Saturday, April 1, 2017

jens is sick at every deadline we have this year, some folks are not around and it's annoying that others have to stay late and figure out the rest

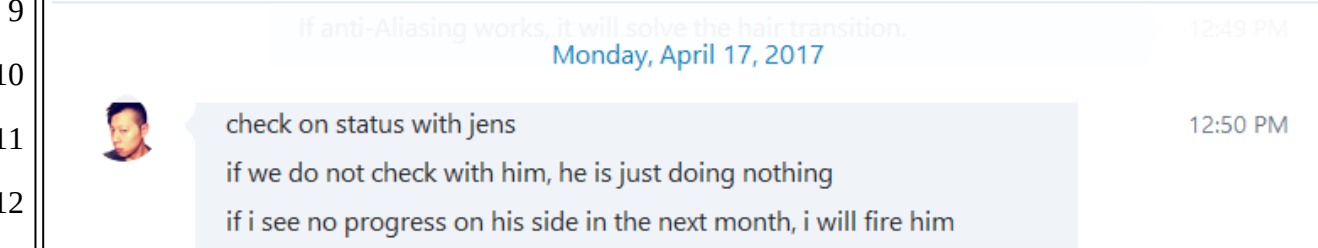


1 Li's private messages to Sadeghi on Skype, dated April 17, 2017:

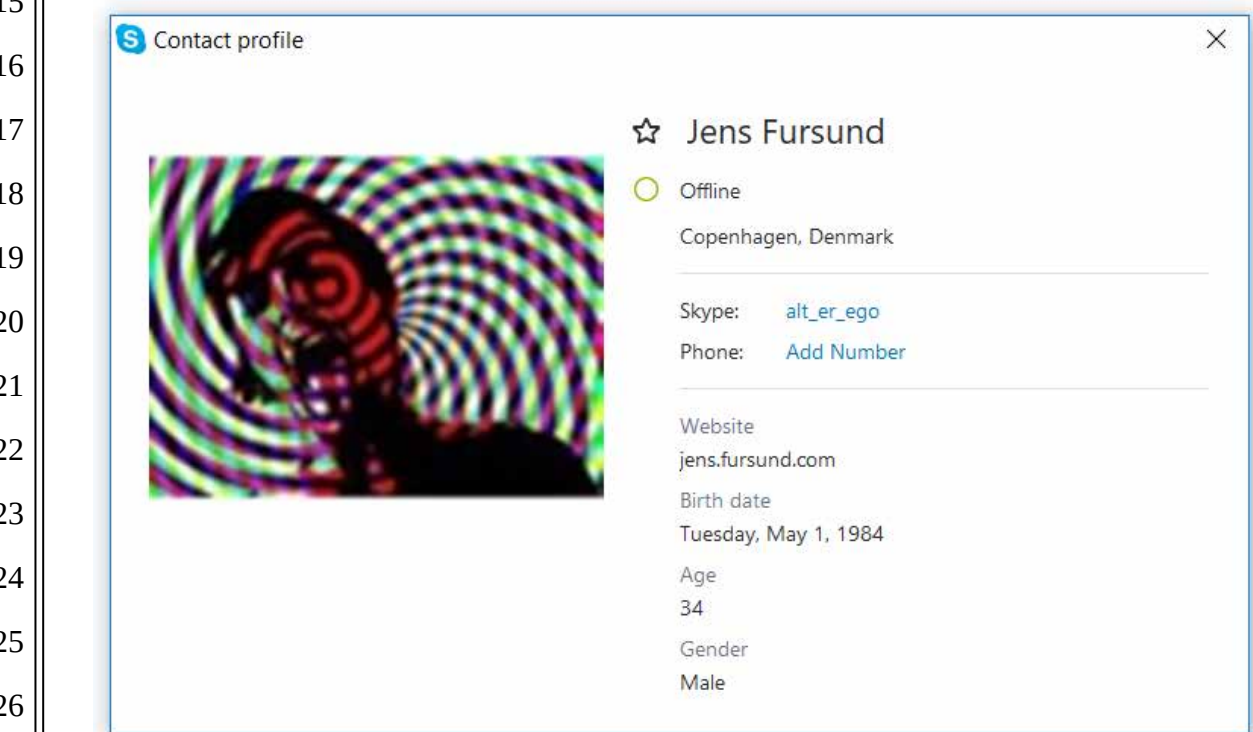
- 2 • [April 17, 2017] Li: "check on status with jens"
- 3 • [April 17, 2017] Li: "if we do not check with him, he is just doing nothing"
- 4 • [April 17, 2017] Li: "if i see no progress on his side in the next month, i will fire him"



8 Contact request sent - [Resend contact request](#)



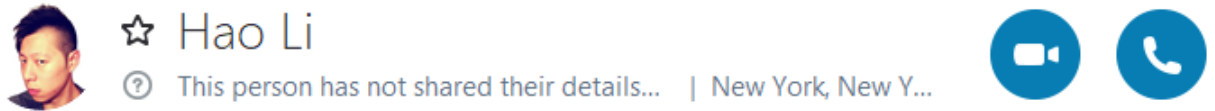
14 Fursunds's Skype profile with Skype ID "alt\_er\_ego":



28

1 Li's private messages to Sadeghi on Skype, dated April 17, 2017:

- 2 • [April 17, 2017] Li: "i understand he is having a baby, but I have never seen someone who  
3 because of a baby cannot do any work for several months"



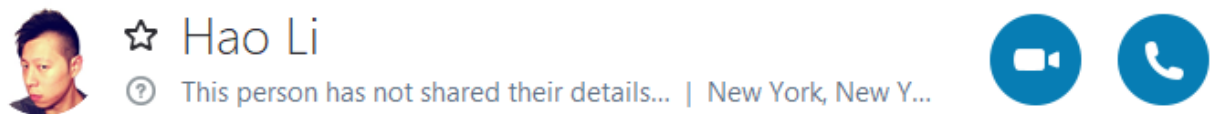
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7 Contact request sent - [Resend contact request](#)

8  
9 temporary is okay, but after 3-4 months, it is really starting  
to not be fair to anyone else  
Monday, April 17, 2017

10 i understand he is having a baby, but i have never seen  
11 someone who because of a baby cannot do any work for  
12 several months

13  
14 11. Sadeghi's private message to Li on Skype, dated March 7, 2017:

- 15 • [March 7, 2017] Sadeghi: "Maybe ask him to share what he does overall on the weeklog  
16 AND in detail in a Google doc with you and me only. Add that is because he works  
17 remotely etc etc. Make sure he doesn't feel micromanaged or disrespected 😊"



20  
21 Contact request sent - [Resend contact request](#)

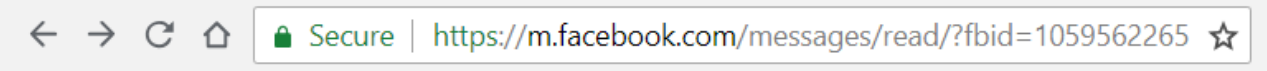
22  
23 think otherwise.  
Tuesday, March 7, 2017

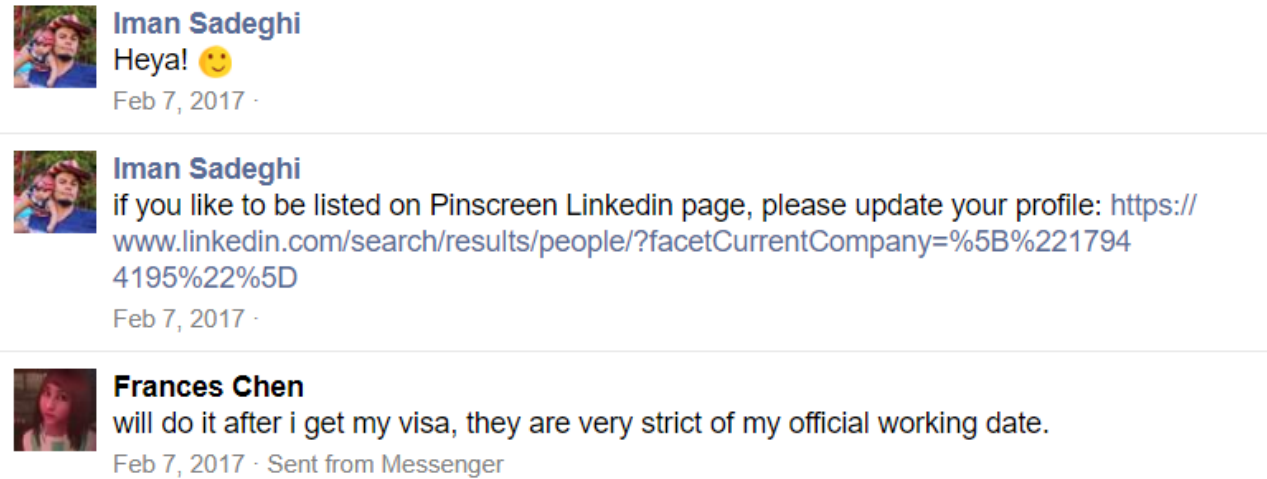
24 Maybe ask him to share what he does overall on the weeklog  
25 AND in detail in a Google doc with you and me only. Add that  
26 is because he works remotely etc etc. Make sure he doesn't  
27 feel micromanaged or disrespected 😊

1 12. Sadeghi’s private conversation with Yen-Chun Chen on Facebook, dated February 7, 2017:

- 2 • [February 7, 2017] Sadeghi: “Heya! 😊”
- 3 • [February 7, 2017] Sadeghi: “if you like to be listed on Pinscreen Linkedin page, please  
4 update your profile:  
5 “[https://www.linkedin.com/search/results/people/?facetCurrentCompany=%5B%22179441  
6 95%22%5D](https://www.linkedin.com/search/results/people/?facetCurrentCompany=%5B%2217944195%22%5D)”
- 7 • [February 7, 2017] Yen-Chun Chen: “will do it after i get my visa, they are very strict of  
8 my official working date.”

9

10 

11 

12 **Iman Sadeghi**  
Heya! 😊  
Feb 7, 2017 ·

13

14 **Iman Sadeghi**  
if you like to be listed on Pinscreen Linkedin page, please update your profile: [https://  
15 www.linkedin.com/search/results/people/?facetCurrentCompany=%5B%221794  
16 4195%22%5D](https://www.linkedin.com/search/results/people/?facetCurrentCompany=%5B%2217944195%22%5D)  
Feb 7, 2017 ·

17 **Frances Chen**  
will do it after i get my visa, they are very strict of my official working date.  
18 Feb 7, 2017 · Sent from Messenger

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13. Yen-Chun Chen's e-mail to Sadeghi and Li, dated February 3, 2017:

- [February 3, 2017] Yen-Chun Chen: "Hi Iman,"
- [February 3, 2017] Yen-Chun Chen: "I got your green card Pdf, We haven't received your confidential information signed one."
- [February 3, 2017] Yen-Chun Chen: "Can you send to us?"
- [February 3, 2017] Yen-Chun Chen: "Thanks"
- [February 3, 2017] Yen-Chun Chen: "Cheers,"
- [February 3, 2017] Yen-Chun Chen: "Frances"

 **Frances Chen** <frances@pinscreen.com> 2/3/17 ☆ Reply to all

to me, Hao

Hi Iman,

I got your green card Pdf, We haven't received your confidential information signed one.  
Can you send to us?  
Thanks

Cheers,  
Frances

\*\*\*

1 **EXHIBIT G**

2 **Sadeghi's Employment Contract with Pinscreen**

3 **PINSCREEN, INC.**

4 January 23, 2017

5 ***VIA E-MAIL ONLY***

6 Iman Sadeghi

7 Re: **EMPLOYMENT AGREEMENT**

8 Dear Iman:

9 On behalf of PINSCREEN, Inc., a Delaware corporation (the "Company"), I am pleased to  
10 offer you the position of Vice President of Engineering. Your employment by the Company shall  
be governed by the following terms and conditions (this "Agreement"):

11 1. **Duties and Scope of Employment.**

12 (a) **Position.** For the term of your employment under this Agreement (your  
13 "Employment"), the Company agrees to employ you in the position of Vice President of  
14 Engineering or any other position the Company subsequently may assign to you. You will report  
15 to the Company's Chief Executive Officer (currently Hao Li) or to such other person as the  
Company subsequently may determine (such persons, the "Supervisors"). You will perform the  
16 duties and have the responsibilities and authority customarily performed and held by an employee  
17 in your position or as otherwise may be assigned or delegated to you by the Supervisors.

18 (b) **Obligations to the Company.** During your Employment, you shall devote  
19 your full business efforts and time to the Company. During your Employment, without the prior  
20 written approval of at least one of the Supervisors, you shall not render services in any capacity to  
21 any other person or entity and shall not act as a sole proprietor or partner of any other person or  
entity. Notwithstanding the foregoing, you may serve on corporate, civic or charitable boards or  
22 committees, deliver lectures, fulfill speaking engagements, teach at educational institutions, or  
23 manage personal investments without such advance written consent, provided that such activities  
24 do not individually or in the aggregate interfere with the performance of your duties under this  
25 Agreement. You shall comply with the Company's policies and rules, as they may be in effect  
26 from time to time during your Employment.

27 (c) **No Conflicting Obligations.** You represent and warrant to the Company  
28 that you are under no obligations or commitments, whether contractual or otherwise, that are  
inconsistent with your obligations under this Agreement. In connection with your Employment,  
29 you shall not use or disclose any trade secrets or other proprietary information or intellectual  
property in which you or any other person has any right, title or interest and your Employment will  
30 not infringe or violate the rights of any other person. You represent and warrant to the Company  
that you have returned all property and confidential information belonging to any prior employer.

31 (d) **Commencement Date.** Unless otherwise arranged between you and the  
32 Company, you and the Company agree and acknowledge that your Employment shall commence  
33 on February 2, 2017.





1 (a) **Employment at Will.** Your Employment shall be “at will,” meaning that  
2 either you or the Company shall be entitled to terminate your Employment at any time and for any  
3 reason, with or without Cause. Any contrary representations that may have been made to you shall  
4 be superseded by this Agreement. This Agreement shall constitute the full and complete agreement  
5 between you and the Company on the “at-will” nature of your Employment, which may only be  
6 changed in an express written agreement signed by you and a duly authorized officer of the  
7 Company.

8 (b) **Rights Upon Termination.** Upon the termination of your Employment,  
9 you shall only be entitled to the compensation and benefits earned and the reimbursements  
10 described in this Agreement for the period preceding the effective date of the termination.

11 6. **Pre-Employment Conditions.**

12 (a) **Confidentiality Agreement.** Your acceptance of this offer and  
13 commencement of employment with the Company is contingent upon the execution, and delivery  
14 to an officer of the Company, of the Company’s Confidential Information and Invention  
15 Assignment Agreement, a copy of which is enclosed for your review and execution as Attachment  
16 A (the “Confidentiality Agreement”).

17 (b) **Right to Work.** For purposes of federal immigration law, you will be  
18 required to provide to the Company documentary evidence of your identity and eligibility for  
19 employment in the United States. Such documentation must be provided to us on or before  
20 February 15, 2017, or our employment relationship with you may be terminated.

21 (c) **Verification of Information.** This offer of employment is also contingent  
22 upon the successful verification of the information you provided to the Company during your  
23 application process, as well as a general background check performed by the Company to confirm  
24 your suitability for employment. By accepting this offer of employment, you warrant that all  
25 information provided by you is true and correct to the best of your knowledge, you agree to execute  
26 any and all documentation necessary for the Company to conduct a background check and you  
27 expressly release the Company from any claim or cause of action arising out of the Company’s  
28 verification of such information.

7. **Miscellaneous Provisions.**

8 (a) **Notice.** Notices and all other communications contemplated by this  
9 Agreement shall be in writing and shall be deemed to have been duly given when personally  
10 delivered or when mailed by U.S. registered or certified mail, return receipt requested and postage  
11 prepaid. In your case, mailed notices shall be addressed to you at the home address that you most  
12 recently communicated to the Company in writing. In the case of the Company, mailed notices  
13 shall be addressed to its corporate headquarters, and all notices shall be directed to the attention of  
14 its Chief Executive Officer.

15 (b) **Modifications and Waivers.** No provision of this Agreement shall be  
16 modified, waived or discharged unless the modification, waiver or discharge is agreed to in writing  
17 and signed by you and by an authorized officer of the Company (other than you). No waiver by  
18 either party of any breach of, or of compliance with, any condition or provision of this Agreement  
19 by the other party shall be considered a waiver of any other condition or provision or of the same  
20 condition or provision at another time.



1 (c) **Whole Agreement.** No other agreements, representations or  
2 understandings (whether oral or written and whether express or implied) which are not expressly  
3 set forth in this Agreement have been made or entered into by either party with respect to the  
4 subject matter hereof. This Agreement and the Confidentiality Agreement contain the entire  
5 understanding of the parties with respect to the subject matter hereof.

6 (d) **Withholding Taxes.** All payments made under this Agreement shall be  
7 subject to reduction to reflect taxes or other charges required to be withheld by law.

8 (e) **Choice of Law and Severability.** This Agreement shall be interpreted in  
9 accordance with the laws of the State of California without giving effect to provisions governing  
10 the choice of law. If any provision of this Agreement becomes or is deemed invalid, illegal or  
11 unenforceable in any applicable jurisdiction by reason of the scope, extent or duration of its  
12 coverage, then such provision shall be deemed amended to the minimum extent necessary to  
13 conform to applicable law so as to be valid and enforceable or, if such provision cannot be so  
14 amended without materially altering the intention of the parties, then such provision shall be  
15 stricken and the remainder of this Agreement shall continue in full force and effect. If any  
16 provision of this Agreement is rendered illegal by any present or future statute, law, ordinance or  
17 regulation (collectively, the "Law") then that provision shall be curtailed or limited only to the  
18 minimum extent necessary to bring the provision into compliance with the Law. All the other  
19 terms and provisions of this Agreement shall continue in full force and effect without impairment  
20 or limitation.

21 (f) **No Assignment.** This Agreement and all of your rights and obligations  
22 hereunder are personal to you and may not be transferred or assigned by you at any time. The  
23 Company may assign its rights under this Agreement to any entity that assumes the Company's  
24 obligations hereunder in connection with any sale or transfer of all or a substantial portion of the  
25 Company's assets to such entity.

26 (g) **Counterparts.** This Agreement may be executed in two or more  
27 counterparts, each of which shall be deemed an original, but all of which together shall constitute  
28 one and the same instrument.

We are all delighted to be able to extend you this offer and look forward to working with  
you. To indicate your acceptance of the Company's offer, please sign and date this letter in the  
space provided below and return it to me, along with a signed and dated original copy of the  
Confidentiality Agreement.

Very truly yours,

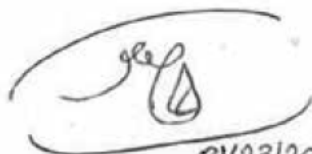
PINSCREEN, INC.



By: \_\_\_\_\_  
Name: Hao Li  
Title: CEO

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**ACCEPTED AND AGREED:**



By: \_\_\_\_\_ 01/23/2017  
Name: Iman Sadeghi

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**ATTACHMENT A**

**CONFIDENTIAL INFORMATION AGREEMENT**

*(See Attached)*

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**PINSCREEN, INC.**

**CONFIDENTIAL INFORMATION AND  
INVENTION ASSIGNMENT AGREEMENT**

*Employee Name: Iman Sadeghi*

*Effective Date: February 2, 2017*

As a condition of my becoming employed (or my employment being continued) by Pinscreen, Inc., a Delaware corporation, or any of its current or future subsidiaries, affiliates, successors or assigns (collectively, the “Company”), and in consideration of my employment with the Company and my receipt of the compensation now and hereafter paid to me by the Company, I agree to the following:

1. **Relationship.** This Confidential Information and Invention Assignment Agreement (this “Agreement”) will apply to my employment relationship with the Company. If that relationship ends and the Company, within a year thereafter, either reemploys me or engages me as a consultant, I agree that this Agreement will also apply to such later employment or consulting relationship, unless the Company and I otherwise agree in writing. Any such employment or consulting relationship between the parties hereto, whether commenced prior to, upon or after the date of this Agreement, is referred to herein as the “Relationship.”

2. **Duties.** I will perform for the Company such duties as may be designated by the Company from time to time or that are otherwise within the scope of the Relationship and not contrary to instructions from the Company. During the Relationship, I will devote my entire best business efforts to the interests of the Company and will not engage in other employment or in any activities detrimental to the best interests of the Company without the prior written consent of the Company.

3. **Confidential Information.**

(a) **Protection of Information.** I understand that during the Relationship, the Company intends to provide me with information, including Confidential Information (as defined below), without which I would not be able to perform my duties to the Company. I agree, at all times during the term of the Relationship and thereafter, to hold in strictest confidence, and not to use, except for the benefit of the Company to the extent necessary to perform my obligations to the Company under the Relationship, and not to disclose to any person, firm, corporation or other entity, without written authorization from the Company in each instance, any Confidential Information that I obtain, access or create during the term of the Relationship, whether or not during working hours, until such Confidential Information becomes publicly and widely known and made generally available through no wrongful act of mine or of others who were under confidentiality obligations as to the item or items involved. I further agree not to make copies of such Confidential Information except as authorized by the Company.



1 (b) **Confidential Information.** I understand that “Confidential Information”  
2 means information and physical material not generally known or available outside the Company  
3 and information and physical material entrusted to the Company in confidence by third parties.  
4 Confidential Information includes, without limitation: (i) Company Inventions (as defined  
5 below); and (ii) technical data, trade secrets, know-how, research, product or service ideas or  
6 plans, software codes and designs, algorithms, developments, inventions, patent applications,  
7 laboratory notebooks, processes, formulas, techniques, biological materials, mask works,  
8 engineering designs and drawings, hardware configuration information, agreements with third  
9 parties, lists of, or information relating to, employees and consultants of the Company  
10 (including, but not limited to, the names, contact information, jobs, compensation, and expertise  
11 of such employees and consultants), lists of, or information relating to, suppliers and customers  
12 (including, but not limited to, customers of the Company on whom I called or with whom I  
13 became acquainted during the Relationship), price lists, pricing methodologies, cost data, market  
14 share data, marketing plans, licenses, contract information, business plans, financial forecasts,  
15 historical financial data, budgets or other business information disclosed to me by the Company  
16 either directly or indirectly, whether in writing, electronically, orally, or by observation.

17 (c) **Third Party Information.** My agreements in this Section 3 are intended  
18 to be for the benefit of the Company and any third party that has entrusted information or  
19 physical material to the Company in confidence. I further agree that, during the term of the  
20 Relationship and thereafter, I will not improperly use or disclose to the Company any  
21 confidential, proprietary or secret information of my former employer(s) or any other person, and  
22 I agree not to bring any such information onto the Company’s property or place of business.

23 (d) **Other Rights.** This Agreement is intended to supplement, and not to  
24 supersede, any rights the Company may have in law or equity with respect to the protection of  
25 trade secrets or confidential or proprietary information.

26 4. **Ownership of Inventions.**

27 (a) **Inventions Retained and Licensed.** I have attached hereto, as Exhibit A,  
28 a complete list describing with particularity all Inventions (as defined below) that, as of the  
Effective Date: (i) I made, and/or (ii) belong solely to me or belong to me jointly with others or  
in which I have an interest, and that relate in any way to any of the Company’s actual or  
proposed businesses, products, services, or research and development, and which are not  
assigned to the Company hereunder; or, if no such list is attached, I represent that there are no  
such Inventions at the time of signing this Agreement, and to the extent such Inventions do exist  
and are not listed on Exhibit A, I hereby forever waive any and all rights or claims of ownership  
to such Inventions. I understand that my listing of any Inventions on Exhibit A does not  
constitute an acknowledgement by the Company of the existence or extent of such Inventions,  
nor of my ownership of such Inventions. I further understand that I must receive the formal  
approval of the Company before commencing my Relationship with the Company.

(b) **Use or Incorporation of Inventions.** If in the course of the Relationship,  
I use or incorporate into a product, service, process or machine any Invention not covered by  
Section 4(d) of this Agreement in which I have an interest, I will promptly so inform the  
Company in writing. Whether or not I give such notice, I hereby irrevocably grant to the

1 Company a nonexclusive, fully paid-up, royalty-free, assumable, perpetual, worldwide license,  
2 with right to transfer and to sublicense, to practice and exploit such Invention and to make, have  
3 made, copy, modify, make derivative works of, use, sell, import, and otherwise distribute such  
4 Invention under all applicable intellectual property laws without restriction of any kind.

4 (c) **Inventions.** I understand that “Inventions” means discoveries,  
5 developments, concepts, designs, ideas, know how, improvements, inventions, trade secrets  
6 and/or original works of authorship, whether or not patentable, copyrightable or otherwise  
7 legally protectable. I understand this includes, but is not limited to, any new product, machine,  
8 article of manufacture, biological material, method, procedure, process, technique, use,  
9 equipment, device, apparatus, system, compound, formulation, composition of matter, design or  
10 configuration of any kind, or any improvement thereon. I understand that “Company  
11 Inventions” means any and all Inventions that I may solely or jointly author, discover, develop,  
12 conceive, or reduce to practice during the period of the Relationship, except as otherwise  
13 provided in Section 5 below.

10 (d) **Assignment of Company Inventions.** I agree that I will promptly make  
11 full written disclosure to the Company, will hold in trust for the sole right and benefit of the  
12 Company, and hereby assign to the Company, or its designee, all my right, title and interest  
13 throughout the world in and to any and all Company Inventions and all patent, copyright,  
14 trademark, trade secret and other intellectual property rights therein. I hereby waive and  
15 irrevocably quitclaim to the Company or its designee any and all claims, of any nature  
16 whatsoever, that I now have or may hereafter have for infringement of any and all Company  
17 Inventions. I further acknowledge that all Company Inventions that are made by me (solely or  
18 jointly with others) within the scope of and during the period of the Relationship are “works  
19 made for hire” (to the greatest extent permitted by applicable law) and are compensated by my  
20 salary. Any assignment of Company Inventions includes all rights of attribution, paternity,  
21 integrity, modification, disclosure and withdrawal, and any other rights throughout the world that  
22 may be known as or referred to as “moral rights,” “artist’s rights,” “droit moral,” or the like  
23 (collectively, “Moral Rights”). To the extent that Moral Rights cannot be assigned under  
24 applicable law, I hereby waive and agree not to enforce any and all Moral Rights, including,  
25 without limitation, any limitation on subsequent modification, to the extent permitted under  
26 applicable law.

19 (e) **Maintenance of Records.** I agree to keep and maintain adequate and  
20 current written records of all Company Inventions made or conceived by me (solely or jointly  
21 with others) during the term of the Relationship. The records may be in the form of notes,  
22 sketches, drawings, flow charts, electronic data or recordings, laboratory notebooks, or any other  
23 format. The records will be available to and remain the sole property of the Company at all  
24 times. I agree not to remove such records from the Company’s place of business except as  
25 expressly permitted by Company policy which may, from time to time, be revised at the sole  
26 election of the Company for the purpose of furthering the Company’s business. I agree to  
27 deliver all such records (including any copies thereof) to the Company at the time of termination  
28 of the Relationship as provided for in Section 5 and Section 6.

25 (f) **Patent and Copyright Rights.** I agree to assist the Company, or its  
26 designee, at its expense, in every proper way to secure the Company’s, or its designee’s, rights in



1 the Company Inventions and any copyrights, patents, trademarks, mask work rights, Moral  
2 Rights, or other intellectual property rights relating thereto in any and all countries, including the  
3 disclosure to the Company or its designee of all pertinent information and data with respect  
4 thereto, the execution of all applications, specifications, oaths, assignments, recordations, and all  
5 other instruments which the Company or its designee shall deem necessary in order to apply for,  
6 obtain, maintain and transfer such rights, or if not transferable, waive and agree never to assert  
7 such rights, and in order to assign and convey to the Company or its designee, and any  
8 successors, assigns and nominees the sole and exclusive right, title and interest in and to such  
9 Company Inventions, and any copyrights, patents, mask work rights or other intellectual property  
10 rights relating thereto. I further agree that my obligation to execute or cause to be executed,  
11 when it is in my power to do so, any such instrument or papers shall continue during and at all  
12 times after the end of the Relationship and until the expiration of the last such intellectual  
13 property right to expire in any country of the world. I hereby irrevocably designate and appoint  
14 the Company and its duly authorized officers and agents as my agent and attorney-in-fact, to act  
15 for and in my behalf and stead to execute and file any such instruments and papers and to do all  
16 other lawfully permitted acts to further the application for, prosecution, issuance, maintenance or  
17 transfer of letters patent, copyright, mask work and other registrations related to such Company  
18 Inventions. This power of attorney is coupled with an interest and shall not be affected by my  
19 subsequent incapacity.

12       5.       **Company Property; Returning Company Documents.** I acknowledge and  
13 agree that I have no expectation of privacy with respect to the Company's telecommunications,  
14 networking or information processing systems (including, without limitation, files, e-mail  
15 messages, and voice messages) and that my activity and any files or messages on or using any of  
16 those systems may be monitored or reviewed at any time without notice. I further agree that any  
17 property situated on the Company's premises and owned by the Company, including disks and  
18 other storage media, filing cabinets or other work areas, is subject to inspection by Company  
19 personnel at any time with or without notice. I agree that, at the time of termination of the  
20 Relationship, I will deliver to the Company (and will not keep in my possession, recreate or  
21 deliver to anyone else) any and all devices, records, data, notes, reports, proposals, lists,  
22 correspondence, specifications, drawings, blueprints, sketches, laboratory notebooks, materials,  
23 flow charts, equipment, other documents or property, or reproductions of any of the  
24 aforementioned items developed by me pursuant to the Relationship or otherwise belonging to  
25 the Company, its successors or assigns.

20       6.       **Termination Certification.** In the event of the termination of the Relationship, I  
21 agree to sign and deliver the "Termination Certification" attached hereto as Exhibit B; however,  
22 my failure to sign and deliver the Termination Certification shall in no way diminish my  
23 continuing obligations under this Agreement.

23       7.       **Notice to Third Parties.** I agree that during the periods of time during which I  
24 am restricted in taking certain actions by the terms of this Agreement (the "Restriction Period"),  
25 I shall inform any entity or person with whom I may seek to enter into a business relationship  
26 (whether as an owner, employee, independent contractor or otherwise) of my contractual  
27 obligations under this Agreement. I also understand and agree that the Company may, with or  
28 without prior notice to me and during or after the term of the Relationship, notify third parties of  
my agreements and obligations under this Agreement. I further agree that, upon written request



1 by the Company, I will respond to the Company in writing regarding the status of my  
2 employment or proposed employment with any party during the Restriction Period.

3 8. **Solicitation of Employees, Consultants and Other Parties.** As described  
4 above, I acknowledge and agree that the Company's Confidential Information includes  
5 information relating to the Company's employees, consultants, customers and others, and that I  
6 will not use or disclose such Confidential Information except as authorized by the Company. I  
7 further agree as follows:

8 (a) **Employees, Consultants.** I agree that during the term of the Relationship,  
9 and for a period of twelve (12) months immediately following the termination of the  
10 Relationship for any reason, whether with or without cause, I shall not, directly or indirectly,  
11 solicit, induce, recruit or encourage any of the Company's employees or consultants to terminate  
12 their relationship with the Company, or attempt to solicit, induce, recruit, encourage or take away  
13 employees or consultants of the Company, either for myself or for any other person or entity.

14 (b) **Other Parties.** I agree that during the term of the Relationship, I will not  
15 negatively influence any of the Company's clients, licensors, licensees or customers from  
16 purchasing Company products or services or solicit or influence or attempt to influence any  
17 client, licensor, licensee, customer or other person either directly or indirectly, to direct any  
18 purchase of products and/or services to any person, firm, corporation, institution or other entity  
19 in competition with the business of the Company. In addition, I acknowledge that the Company  
20 has valuable Trade Secrets (as defined by applicable law from time to time) to which I will have  
21 access during the term of the Relationship. I understand that the Company intends to vigorously  
22 pursue its rights under applicable Trade Secrets law if, during a period of twelve (12) months  
23 immediately following the termination of the Relationship for any reason, whether with or  
24 without cause, I solicit or influence or attempt to influence any client, licensor, licensee,  
25 customer or other person either directly or indirectly, to direct any purchase of products and/or  
26 services to any person, firm, corporation, institution or other entity in competition with the  
27 business of the Company. Thereafter, the Company intends to vigorously pursue its rights under  
28 applicable Trade Secrets law as the circumstances warrant.

9. **At-Will Relationship.** I understand and acknowledge that, except as may be  
otherwise explicitly provided in a separate written agreement between the Company and me, my  
Relationship with the Company is and shall continue to be at-will, as defined under applicable  
law, meaning that either I or the Company may terminate the Relationship at any time for any  
reason or no reason, without further obligation or liability, other than those provisions of this  
Agreement that explicitly continue in effect after the termination of the Relationship.

10. **Representations and Covenants.**

(a) **Facilitation of Agreement.** I agree to execute promptly, both during and  
after the end of the Relationship, any proper oath, and to verify any proper document, required to  
carry out the terms of this Agreement, upon the Company's written request to do so.

(b) **No Conflicts.** I represent that my performance of all the terms of this  
Agreement does not and will not breach any agreement I have entered into, or will enter into,

1 with any third party, including without limitation any agreement to keep in confidence  
2 proprietary information or materials acquired by me in confidence or in trust prior to or during  
3 the Relationship. I will not disclose to the Company or use any inventions, confidential or non-  
4 public proprietary information or material belonging to any previous client, employer or any  
5 other party. I will not induce the Company to use any inventions, confidential or non-public  
6 proprietary information, or material belonging to any previous client, employer or any other  
7 party. I acknowledge and agree that I have listed on Exhibit A all agreements (e.g., non-  
8 competition agreements, non-solicitation of customers agreements, non-solicitation of employees  
9 agreements, confidentiality agreements, inventions agreements, etc.), if any, with a current or  
10 former client, employer, or any other person or entity, that may restrict my ability to accept  
11 employment with the Company or my ability to recruit or engage customers or service providers  
12 on behalf of the Company, or otherwise relate to or restrict my ability to perform my duties for  
13 the Company or any obligation I may have to the Company. I agree not to enter into any written  
14 or oral agreement that conflicts with the provisions of this Agreement.

15 (c) **Voluntary Execution.** I certify and acknowledge that I have carefully  
16 read all of the provisions of this Agreement, that I understand and have voluntarily accepted such  
17 provisions, and that I will fully and faithfully comply with such provisions.

18 11. **Electronic Delivery.** Nothing herein is intended to imply a right to participate in  
19 any of the Company's equity incentive plans, however, if I do participate in such plan(s), the  
20 Company may, in its sole discretion, decide to deliver any documents related to my participation  
21 in the Company's equity incentive plan(s) by electronic means or to request my consent to  
22 participate in such plan(s) by electronic means. I hereby consent to receive such documents by  
23 electronic delivery and agree, if applicable, to participate in such plan(s) through an on-line or  
24 electronic system established and maintained by the Company or a third party designated by the  
25 Company.

26 12. **Miscellaneous.**

27 (a) **Governing Law.** The validity, interpretation, construction and  
28 performance of this Agreement, and all acts and transactions pursuant hereto and the rights and  
obligations of the parties hereto shall be governed, construed and interpreted in accordance with  
the laws of the state of California, without giving effect to the principles of conflict of laws.

(b) **Entire Agreement.** This Agreement sets forth the entire agreement and  
understanding between the Company and me relating to its subject matter and merges all prior  
discussions between us. No amendment to this Agreement will be effective unless in writing  
signed by both parties to this Agreement. The Company shall not be deemed hereby to have  
waived any rights or remedies it may have in law or equity, nor to have given any authorizations  
or waived any of its rights under this Agreement, unless, and only to the extent, it does so by a  
specific writing signed by a duly authorized officer of the Company, it being understood that,  
even if I am an officer of the Company, I will not have authority to give any such authorizations  
or waivers for the Company under this Agreement without specific approval by the Board of  
Directors. Any subsequent change or changes in my duties, obligations, rights or compensation  
will not affect the validity or scope of this Agreement.



1 (c) **Successors and Assigns.** This Agreement will be binding upon my heirs,  
2 executors, administrators and other legal representatives, and my successors and assigns, and  
3 will be for the benefit of the Company, its successors, and its assigns.

4 (d) **Notices.** Any notice, demand or request required or permitted to be given  
5 under this Agreement shall be in writing and shall be deemed sufficient when delivered  
6 personally or by overnight courier or sent by email, or 48 hours after being deposited in the U.S.  
7 mail as certified or registered mail with postage prepaid, addressed to the party to be notified at  
8 such party's address as set forth on the signature page, as subsequently modified by written  
9 notice, or if no address is specified on the signature page, at the most recent address set forth in  
10 the Company's books and records.

11 (e) **Severability.** If one or more of the provisions in this Agreement are  
12 deemed void or unenforceable to any extent in any context, such provisions shall nevertheless be  
13 enforced to the fullest extent allowed by law in that and other contexts, and the validity and force  
14 of the remainder of this Agreement shall not be affected. The Company and I have attempted to  
15 limit my right to use, maintain and disclose the Company's Confidential Information, and to  
16 limit my right to solicit employees and customers only to the extent necessary to protect the  
17 Company from unfair competition. Should a court of competent jurisdiction determine that the  
18 scope of the covenants contained in Section 8 exceeds the maximum restrictiveness such court  
19 deems reasonable and enforceable, the parties intend that the court should reform, modify and  
20 enforce the provision to such narrower scope as it determines to be reasonable and enforceable  
21 under the circumstances existing at that time.

22 (f) **Remedies.** I acknowledge and agree that violation of this Agreement by  
23 me may cause the Company irreparable harm, and therefore I agree that the Company will be  
24 entitled to seek extraordinary relief in court, including, but not limited to, temporary restraining  
25 orders, preliminary injunctions and permanent injunctions without the necessity of posting a  
26 bond or other security (or, where such a bond or security is required, I agree that a \$1,000 bond  
27 will be adequate), in addition to and without prejudice to any other rights or remedies that the  
28 Company may have for a breach of this Agreement.

(g) **Advice of Counsel.** I ACKNOWLEDGE THAT, IN EXECUTING THIS  
AGREEMENT, I HAVE HAD THE OPPORTUNITY TO SEEK THE ADVICE OF  
INDEPENDENT LEGAL COUNSEL, AND I HAVE READ AND UNDERSTOOD ALL OF  
THE TERMS AND PROVISIONS OF THIS AGREEMENT. THIS AGREEMENT SHALL  
NOT BE CONSTRUED AGAINST ANY PARTY BY REASON OF THE DRAFTING OR  
PREPARATION HEREOF.

(h) **Counterparts.** This Agreement may be executed in any number of  
counterparts, each of which when so executed and delivered shall be deemed an original, and all  
of which together shall constitute one and the same agreement.

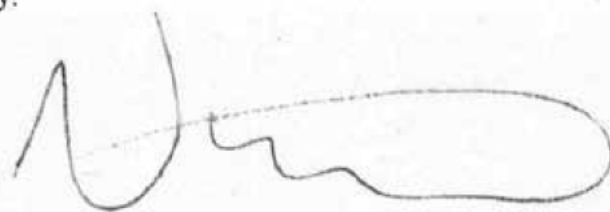
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The parties have executed this Agreement on the respective dates set forth below, to be effective as of the Effective Date first above written.

**PINSCREEN, INC.:**

By:

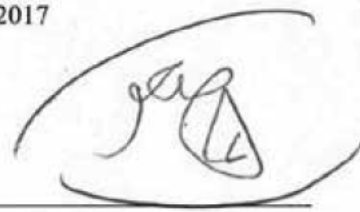


\_\_\_\_\_  
(Signature)

Name: Hao Li  
Title: CEO

Date: January 23, 2017

**EMPLOYEE:**



\_\_\_\_\_  
IMAN SADEGHI

\_\_\_\_\_  
(Signature)

Address:

\_\_\_\_\_  
340 Main St  
\_\_\_\_\_  
Venice, CA 90291  
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Email: sadeghi@gmail.com

Date: 01/23/2017

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EXHIBIT A

**LIST OF PRIOR INVENTIONS  
AND ORIGINAL WORKS OF AUTHORSHIP  
EXCLUDED UNDER SECTION 4(a) AND CONFLICTING AGREEMENTS  
DISCLOSED UNDER SECTION 10(b)**

The following is a list of (i) all Inventions that, as of the Effective Date: (A) I made, and/or (B) belong solely to me or belong to me jointly with others or in which I have an interest, and that relate in any way to any of the Company's actual or proposed businesses, products, services, or research and development, and which are not assigned to the Company and (ii) all agreements, if any, with a current or former client, employer, or any other person or entity, that may restrict my ability to accept employment with the Company or my ability to recruit or engage customers or service providers on behalf of the Company, or otherwise relate to or restrict my ability to perform my duties for the Company or any obligation I may have to the Company:

<u>Title</u>	<u>Date</u>	<u>Identifying Number or Brief Description</u>
<i>Will be submitted within the first week of employment.</i>		

Except as indicated above on this exhibit, I have no inventions, improvements or original works to disclose pursuant to Section 4(a) of this Agreement and no agreements to disclose pursuant to Section 10(b) of this Agreement.

\_\_\_ Additional sheets attached



Signature of Employee: \_\_\_\_\_

Print Name of Employee: IMAN SADEGHI

Date: 01/23/2017

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**EXHIBIT B**

**TERMINATION CERTIFICATION**

This is to certify that I do not have in my possession, nor have I failed to return, any devices, records, data, notes, reports, proposals, lists, correspondence, specifications, drawings, blueprints, sketches, laboratory notebooks, flow charts, materials, equipment, other documents or property, or copies or reproductions of any aforementioned items belonging to Pinscreen, Inc., a Delaware corporation, its subsidiaries, affiliates, successors or assigns (collectively, the "Company").

I further certify that I have complied with all the terms of the Company's Confidential Information and Invention Assignment Agreement signed by me, including the reporting of any Inventions (as defined therein), conceived or made by me (solely or jointly with others) covered by that agreement, and I acknowledge my continuing obligations under that agreement.

I further agree that, in compliance with the Confidential Information and Invention Assignment Agreement, I will preserve as confidential all trade secrets, confidential knowledge, data or other proprietary information relating to products, processes, know-how, designs, formulas, developmental or experimental work, computer programs, data bases, other original works of authorship, customer lists, business plans, financial information or other subject matter pertaining to any business of the Company or any of its employees, clients, consultants or licensees.

I further agree that for twelve (12) months from the date of this Certification, I shall not either directly or indirectly solicit, induce, recruit or encourage any of the Company's employees or consultants to terminate their relationship with the Company, or attempt to solicit, induce, recruit, encourage or take away employees or consultants of the Company, either for myself or for any other person or entity.

Further, I agree that I shall not use any Confidential Information of the Company to negatively influence any of the Company's clients or customers from purchasing Company products or services or to solicit or influence or attempt to influence any client, customer or other person either directly or indirectly, to direct any purchase of products and/or services to any person, firm, corporation, institution or other entity in competition with the business of the Company.



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Further, I acknowledge that the Company has valuable Trade Secrets (as defined by applicable law from time to time) to which I have had access. I understand that the Company intends to vigorously pursue its rights under applicable Trade Secrets law if, during a period of twelve (12) months from the date of this Certification, I solicit or influence or attempt to influence any client, licensor, licensee, customer or other person either directly or indirectly, to direct any purchase of products and/or services to any person, firm, corporation, institution or other entity in competition with the business of the Company. Thereafter, the Company intends to vigorously pursue its rights under applicable Trade Secrets law as the circumstances warrant.

Date: \_\_\_\_\_

**EMPLOYEE:**

\_\_\_\_\_  
IMAN SADEGHI

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(Signature)



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**EXHIBIT A**

**LIST OF PRIOR INVENTIONS  
AND ORIGINAL WORKS OF AUTHORSHIP  
EXCLUDED UNDER SECTION 4(a) AND CONFLICTING AGREEMENTS  
DISCLOSED UNDER SECTION 10(b)**

The following is a list of (i) all Inventions that, as of the Effective Date: (A) I made, and/or (B) belong solely to me or belong to me jointly with others or in which I have an interest, and that relate in any way to any of the Company's actual or proposed businesses, products, services, or research and development, and which are not assigned to the Company and (ii) all agreements, if any, with a current or former client, employer, or any other person or entity, that may restrict my ability to accept employment with the Company or my ability to recruit or engage customers or service providers on behalf of the Company, or otherwise relate to or restrict my ability to perform my duties for the Company or any obligation I may have to the Company:

<u>Title</u>	<u>Date</u>	<u>Identifying Number or Brief Description</u>
<i>I have multiple projects which have all started on or before 2016 and are not related to the Pinscreen Inc market. The related markets are:</i>		
<i>- IC design &amp; embedded systems</i>		
<i>- Business development coach</i>		
<i>- Life coaching &amp; therapies</i>		
<i>- Finance &amp; stock market</i>		
<i>- Charity &amp; non-profits</i>		
<i>- Genetics &amp; biology</i>		
<i>- Health &amp; nutrition</i>		
<i>- Medicine &amp; drugs</i>		
<i>- Online retails</i>		
<i>- Real estate</i>		
<i>- Fitness</i>		
<i>- Yoga</i>		
<i>- Zen</i>		

Except as indicated above on this exhibit, I have no inventions, improvements or original works to disclose pursuant to Section 4(a) of this Agreement and no agreements to disclose pursuant to Section 10(b) of this Agreement.

\_\_\_ Additional sheets attached



Signature of Employee: \_\_\_\_\_

Print Name of Employee: IMAN SADEGHI

Date: 2/7/2017

1 **EXHIBIT H**

2 **Sadeghi's Termination Letter from Pinscreen**

3 Pinscreen Inc.  
4 12400 Wilshire Blvd Suite 1480,  
5 Los Angeles, CA 90025

6 August 7, 2017

7 Mr. Iman Sadeghi

8 **Re: Termination Information and Severance Agreement and General Release**

9 Dear Iman,

10 Your last day of employment with Pinscreen, Inc., is August 7, 2017. The Company appreciates your service and is  
11 prepared to offer you severance in exchange for a release. A copy of the proposed Severance Agreement and  
12 General Release is attached for your consideration.

13 On the day of your termination, you will be paid all compensation currently due and owing to you through  
14 August 7, 2017. In addition, you will be paid all earned and unused PTO time ( 128 hours). These amounts will  
15 be direct deposited into your cash account used for payroll checks.

16 You may be eligible for COBRA election after that. Related information will be sent to you under separate  
17 cover. Please notify Yen Chun Chen of any changes in your permanent address to avoid a delay in receiving any  
18 paperwork.

19 Please return all company property (including laptops, cell phones, code, software, computer parts, storage devices,  
20 electronics, documents, etc.) upon termination. Please also return (or destroy if such information is in electronic  
21 format) all confidential/proprietary information pertaining to Pinscreen and its technology, contracts, customers,  
22 vendors, affiliates, and related peoples and entities, in your possession. If you don't have any company property at  
23 the time of termination, please return that property immediately to the Company at the address above

24 Finally, we remind you of your continuing obligation to uphold the provisions of the Confidential Information  
25 and Inventions Assignment Agreement you executed on February 2, 2017. Pursuant to that agreement, you are  
26 also required to sign and return to us Exhibit B, by which you will also be bound.

27 We wish you the best of luck in your future endeavors.

28 Sincerely,

Hao LI  
Yen Chun Chen  
Pinscreen, Inc.



Private and Confidential



1 **EXHIBIT I**

2 **Pinscreen’s Severance Offer to Sadeghi in Exchange for a Release**

3 **SEVERANCE AGREEMENT AND GENERAL RELEASE OF CLAIMS**

4 This Severance Agreement and General Release of Claims (the “Agreement”) is  
5 entered into by and between Iman Sadeghi (“Employee” or “you”) and Pinscreen,  
6 Inc. (“Employer”) (singly, a “Party” and jointly, the “Parties”) in complete, final and  
7 binding settlement of all claims and potential claims, if any, with respect to their  
8 employment relationship.

9 This Agreement confirms the terms of your separation from Employer effective  
10 August 7, 2017 (the “Separation Date”). In consideration for your signing this  
11 Agreement, and providing the general release, you will receive the severance  
12 benefits identified in paragraph 1 below, which you acknowledge you would not  
13 otherwise be entitled to receive.

14 NOW, THEREFORE, in consideration of the promises and releases given herein,  
15 the Parties hereby agree as follows:

- 16 1. **Severance Payment and Tax Liability.** Provided Employee signs this  
17 Agreement, Employer agrees to pay to Employee the gross amount of  
18 Thirteen Thousand Seven Hundred Fifty Dollars and No Cents  
19 (\$13,750.00), less deductions authorized or required by law, which is one  
20 month’s compensation at Employee’s current wage rate. The net severance  
21 amount (Eight Thousand Eight Hundred Sixteen Dollars and Five Cents  
22 (\$8,816.05)) will be paid within ten business days after Employer’s receipt of  
23 this signed Agreement from Employer. Unless Employee directs otherwise  
24 in writing, the severance check shall be mailed to Employee at his current  
25 home mailing address. This payment represents amounts that are over and  
26 above the compensation which Employee is otherwise entitled to receive  
27 from the Employer (which has been paid separately) and represent  
28 consideration for the release of claims set forth in paragraphs 4 and 5  
below. Employee expressly agrees to be solely responsible for any  
additional tax liability that may result from payment of the all amounts under  
this Agreement, including penalties, interest and forfeitures arising from  
such payments, if any, and expressly acknowledges that Employer is not  
liable for the tax consequences of this settlement.
2. All other compensation and benefits enjoyed by Employee as part of  
Employee’s employment with Employer shall cease as of the Separation  
Date. Employee may elect continued health insurance coverage under  
COBRA, details of which will be mailed in a separate notice in accordance  
with COBRA requirements.
3. Employee represents and agrees that as of the Separation Date, Employer  
has paid Employee all money currently owed to Employee, including but not  
limited to all salary, commissions, wages, overtime payments, and accrued  
but unused vacation or other pay, due and owing to Employee from



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2 Employer through the Separation Date, less any deductions required or permitted by law.

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4 **4. General Release of the Employer Released Parties.** In return for the  
5 Employer's payment of the additional amounts set forth above in paragraph  
6 1 above, less deductions authorized or required by law, and except as  
7 otherwise provided in paragraph 6, the Employee forever releases and  
8 discharges the Employer and its successors, affiliates, subsidiaries,  
9 assigns, professional corporations, partners, shareholders, owners, officers,  
10 directors, employees, attorneys, and representatives and all persons acting  
11 by, through, under or in concert with them, or any of them (collectively, the  
12 "Employer Released Parties"), of and from any and all manner of action or  
13 actions, cause or causes of action, in law or in equity, suits, debts, liens,  
14 contracts, agreements, promises, liability, claims, demands, damages, loss,  
15 cost or expense, of any nature whatsoever, known or unknown, fixed or  
16 contingent (hereafter called "Claims"), which you now have or may hereafter  
17 have against the Employer Released Parties, or any of them, by reason of  
18 any matter, cause, or thing whatsoever from the beginning of time to the  
19 date hereof, including, without limiting the generality of the foregoing, any  
20 Claims arising out of, based upon, or relating to your hire, employment,  
21 remuneration or termination by the Employer Released Parties, or any of  
22 them, including any Claims arising under Title VII of the Civil Rights Act of  
23 1964, as amended; the Age Discrimination in Employment Act, as  
24 amended; the Americans with Disabilities Act, as amended; the Equal Pay  
25 Act, as amended; the Fair Labor Standards Act, as amended; the Employee  
26 Retirement Income Security Act, as amended; the California Fair  
27 Employment and Housing Act, as amended; the California Labor Code;  
28 and/or any other local, state or federal law governing employment,  
discrimination in employment, and/or the payment of wages and benefits.  
This release does not apply to any claims that may not be released as a  
matter of state or federal law, such as claims for unemployment benefits.

**5. Release of Unknown Claims Pursuant to Civil Code Section 1542.**  
Section 1542 of the California Civil Code provides generally that a release  
does not extend to unknown claims, and specifically states as follows:

**A GENERAL RELEASE DOES NOT EXTEND TO CLAIMS  
WHICH THE CREDITOR DOES NOT KNOW OR SUSPECT  
TO EXIST IN HIS FAVOR AT THE TIME OF EXECUTING  
THE RELEASE, WHICH IF KNOWN BY HIM MUST HAVE  
MATERIALLY AFFECTED HIS SETTLEMENT WITH THE  
DEBTOR.**

To implement a full and complete release, Employee expressly waives and  
relinquishes all rights and benefits afforded by Section 1542 of the California  
Civil Code, or any other similar statute or rule of the state in which



1 Employee executes this Agreement, as this General Release is intended to  
2 include and discharge all claims which Employee does not know or suspect  
3 to exist in Employee's favor based on any matter, cause, act or omission  
4 whatsoever.

- 5 6. Nothing in this Agreement, including the release, confidentiality, non-  
6 disparagement, and cooperation provisions, is intended to limit in any way  
7 Employee's right or ability to file a charge or claim of discrimination with the  
8 EEOC or comparable state or local agencies. While Employee retains the  
9 right to participate in any such action, by signing this Agreement Employee  
10 waives his right to any individual monetary recovery in any action or lawsuit  
11 initiated by such federal, state or local agency. Employee retains the right  
12 to communicate with the EEOC and comparable state or local agencies and  
13 such communications can be initiated by the employee or be in response to  
14 the government and are not limited by any non-disparagement obligation  
15 under this Agreement.
- 16 7. Employee understands and agrees that neither this Agreement nor the  
17 consideration referenced above is to be construed as an admission on the  
18 part of the Employer Released Parties, or any of them, of any wrongdoing or  
19 liability whatsoever.
- 20 8. Employee represents and warrants that he has not filed any lawsuits, claims  
21 or charges against Employer, and that he has not transferred or assigned  
22 any claims released by this Agreement.
- 23 9. Except as otherwise provided in paragraph 6, Employee shall cooperate  
24 fully with the Employer Released Parties in their defense of or other  
25 participation in any administrative, judicial or other proceeding arising from  
26 any charge, complaint, or other action that has been or may be filed.  
27 Employee shall also keep confidential and not disclose any confidential  
28 information he acquired while an employee of Employer and shall not use  
any such information in any manner that is detrimental to the Employer.  
Employee shall also return all property of the Employer immediately.
10. This Agreement constitutes the entire agreement between Employer and  
Employee with respect to any matters referred to in this Agreement. This  
Agreement supersedes any oral or written communications between the  
Parties relating to the subjects covered by this Agreement. The Parties  
represent and acknowledge that in executing this Agreement, they do not  
rely and have not relied upon any representation or statement made by any  
of the Parties or by any of the Parties' agents, attorneys or representatives  
with regard to the subject matter, basis or effect of this Agreement or  
otherwise, other than those specifically stated in this written Agreement.  
This is an integrated document and its provisions are severable.



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11. California law shall govern this Agreement, and any controversy between the Parties involving the construction or application of this Agreement or compliance by any of the Parties with their obligations hereunder, shall, on the written request of any Party served on the other, be submitted to binding arbitration, pursuant to the Employment Arbitration Rules and Procedures of JAMS then in effect. Any arbitration proceeding initiated hereunder shall be conducted before a single arbitrator selected by agreement of the Parties, or lacking such agreement, by appointment from a panel obtained from JAMS. Any such arbitration proceeding shall be held before JAMS in Los Angeles County, California.

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12. Employee represents and agrees that Employee has carefully read and fully understands all of the provisions of this Agreement, has had the opportunity to consult with counsel of his own choosing about the Agreement, and is voluntarily entering into this Agreement.

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13. Employee understands and agrees that he will not discuss with any person other than his attorney, spouse or tax advisor and will keep strictly confidential the existence of this Agreement, its terms, the Party's negotiations, and the circumstances surrounding this Agreement. This confidentiality obligation does not extend to any communications referenced in paragraph 6, above.

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14. Employee agrees that his employment with the Employer is terminated. Employee understands that no right to re-employment is contemplated by or within this Agreement. Employee agrees that should he apply for employment with the Employer and/or affiliated entities, that they have the right to decline such application without challenge.

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15. If asked for a reference for Employee, Employer shall provide only Employee's dates of employment and position held. With Employee's written consent, Employer shall also provide Employee's last salary.

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16. Except as specifically provided in paragraph 6, Employee agrees not to make any negative or disparaging remarks about Employer or the Employer Released Parties. Employee further agrees not to sue Employer or the Employer Released Parties based on any of the claims released by this Agreement.

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17. This Agreement may be signed in counterparts, and the signed agreement may be delivered to the other Party via facsimile or electronically via PDF. The signature on any agreement delivered pursuant to this provision shall be deemed an original, and shall be fully binding on that signatory as if an original signature had been personally delivered.

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IN WITNESS WHEREOF, the Parties have knowingly and voluntarily executed this Agreement as of the first date and year written below, with full knowledge and understanding of its contents.

Dated \_\_\_\_\_

\_\_\_\_\_  
Iman Sadeghi

Pinscreen, Inc.,  
a Delaware corporation

Dated 8/7/2017

\_\_\_\_\_  
By: Hao Li  
Its: President



1 **EXHIBIT J**

2 **Defendants' Post Termination Violations**

3 1. Sadeghi's handmade sculpture damaged by Pinscreen:



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12 2. Pinscreen's undated letter with no signature, mailed on August 16, 2017:

- 13 • [August 16, 2017] Pinscreen: "While the error was inadvertent, we have also included a  
14 check in amount of \$5,711.76 (or nine days' pay) to compensate for any inconvenience and  
15 in good faith effort to resolve any wage issues."

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18 Dear Iman,

19 It has come to our attention that our payroll company did not include your full pay and PTO when  
20 calculating your final check. They included 40 hours of PTO, but failed to include one week's pay (August  
21 1, 2017 to August 7, 2017), plus an additional 88 hours of PTO. This mistake was inadvertent.

22 Enclosed please find a check in the amount of \$ 6,902.25, with a related pay stub, representing  
23 compensation at your hourly rate for 40 hours / one week's pay, and 88 PTO hours. Standard withholdings  
24 have been applied to the gross amount.


25 While the error was inadvertent, we have also included a check in the amount of \$5,711.76 (or nine days'  
26 pay) to compensate you for any inconvenience and in a good faith effort to resolve any wage issues.

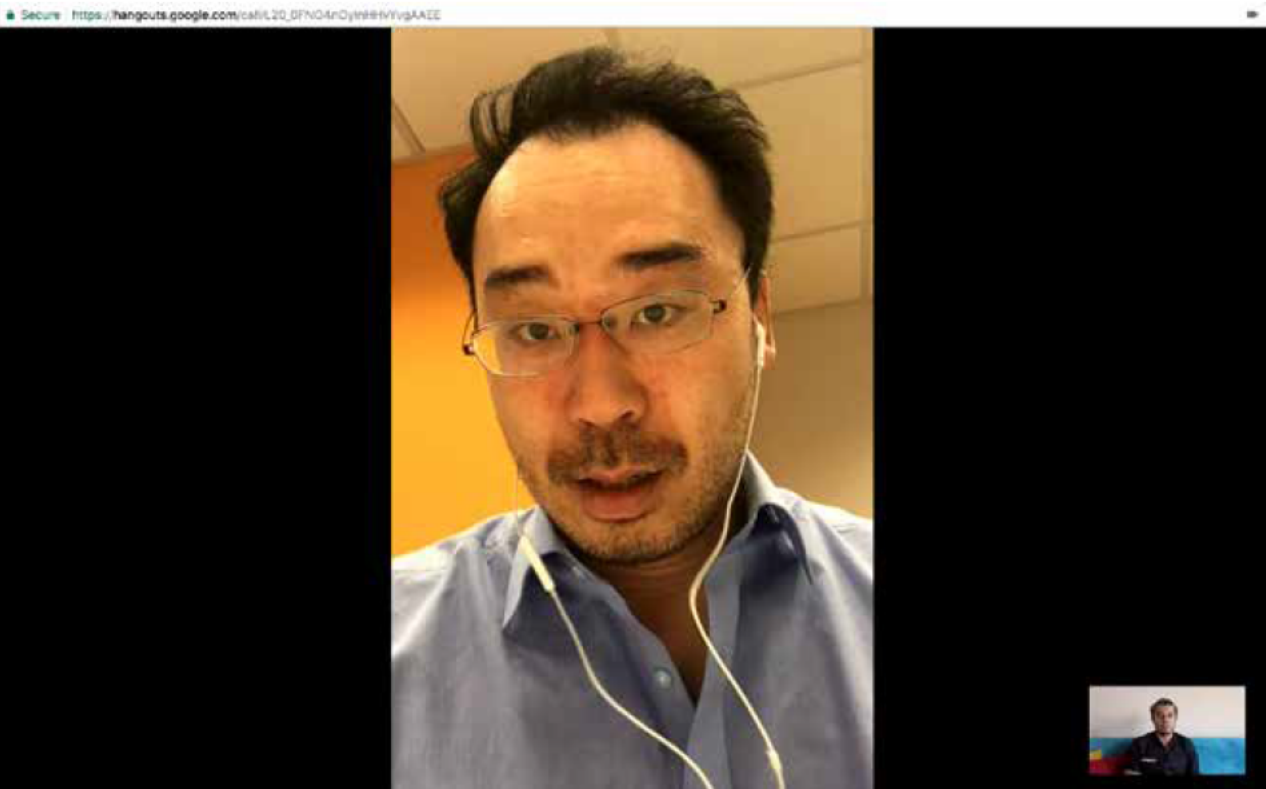
27 Our counsel will be separately responding to the letter your counsel sent. I understand you have received  
28 back your belongings.

- 1 3. Sadeghi’s private conversation with Yen-Chun Chen on Facebook, dated February 17, 2017:
- 2 • [February 17, 2017] Yen-Chun Chen: “lets discuss this when I am back, but yes u guys can
- 3 use ur Cobra first.”
- 4 • [February 17, 2017] Sadeghi: “Yes. I will look at the options more thoroughly but my
- 5 medical coverage ends by the end of this month and it might be easier to do the cobra at
- 6 first until we decide with more time 😊”
- 7 • [February 17, 2017] Yen-Chun Chen: “yes! Lets do this.”
- 8 • [February 17, 2017] Sadeghi: “Perfect. I will submit the receipts later for reimbursement.
- 9 Thanks 😊”
- 10 • [February 17, 2017] Yen-Chun Chen: “okay”

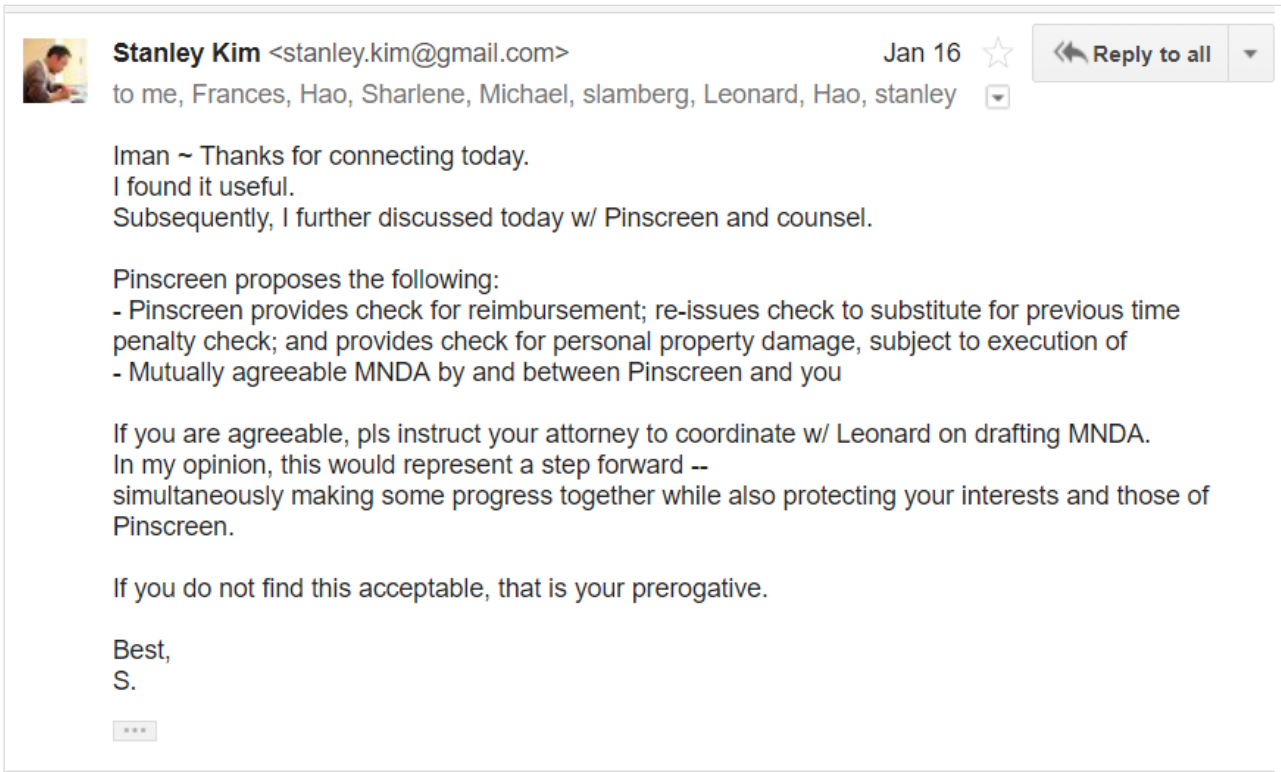


1 4. Kim's Google Hangout video conference call with Sadeghi, dated January 16, 2018:

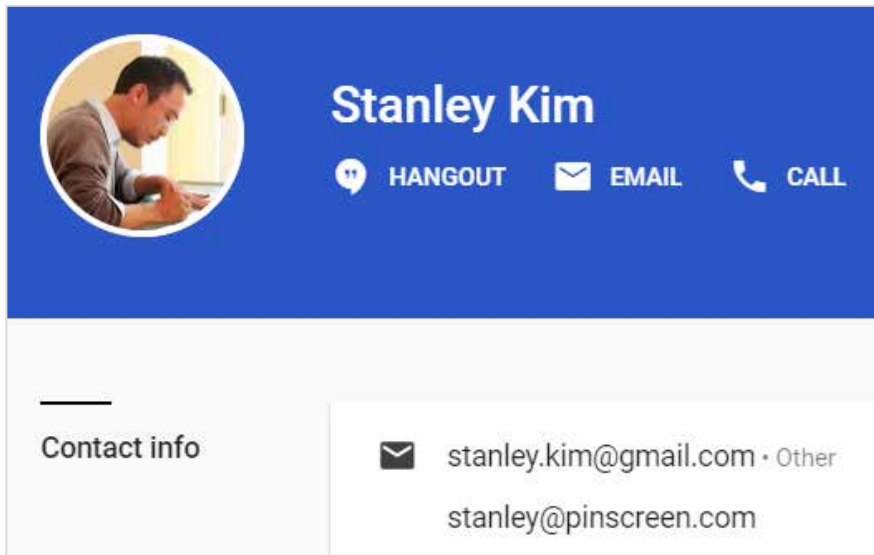
2  **Secure** | [https://hangouts.google.com/call/L20\\_0FNO4nOyInHHvYvgAAEE](https://hangouts.google.com/call/L20_0FNO4nOyInHHvYvgAAEE)



1 5. Kim's e-mail to Sadeghi, with subject line "Re: Iman Sadeghi - Notice of Claim and  
2 Litigation Hold," received on January 16, 2018:



17 Kim's Google profile with Google ID "Stanley.kim":

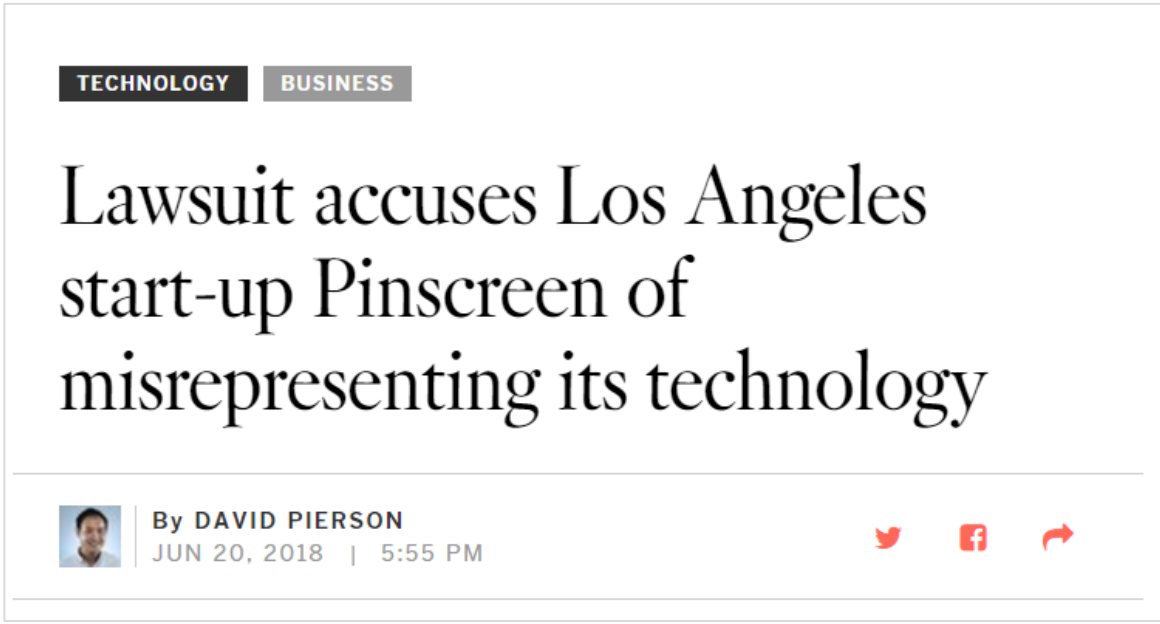


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**EXHIBIT K**

**Post Filing Events**

1. **Los Angeles Times** article published on June 20, 2018, by David Pierson, titled “Lawsuit Accuses Los Angeles Start-up Pinscreen of Misrepresenting its Technology”:
  - <http://www.latimes.com/business/technology/la-fi-pinscreen-lawsuit-20180620-story.html>
  - “Li [...] pointed to the company’s app as proof that Pinscreen’s technology works”








1 2. Pinscreen's actual automatically generated avatars generated by a third party using  
2 Pinscreen's app and posted on Zhihu website, on July 18, 2018 (updated on July 21, 2018):




- 3 • <https://www.zhihu.com/question/285705808/answer/446014560>

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5 **Input Image** **Manually Prepared Fabricated Avatar** **Actual Automatically Generated Avatar**

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13 Submitted by Pinscreen to SIGGRAPH RTL on April 4, 2017 Generated by a third party using Pinscreen's app around July 21, 2018

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16 **Input Image** **Manually Prepared Fabricated Avatar** **Actual Automatically Generated Avatar**

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25 Submitted by Pinscreen to SIGGRAPH Asia on May 23, 2017 Generated by a third party using Pinscreen's app around July 21, 2018

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1 3. Pinscreen's only real-time avatar generation during SIGGRAPH 2018 Real-Time Live, on  
2 August 14, 2018:

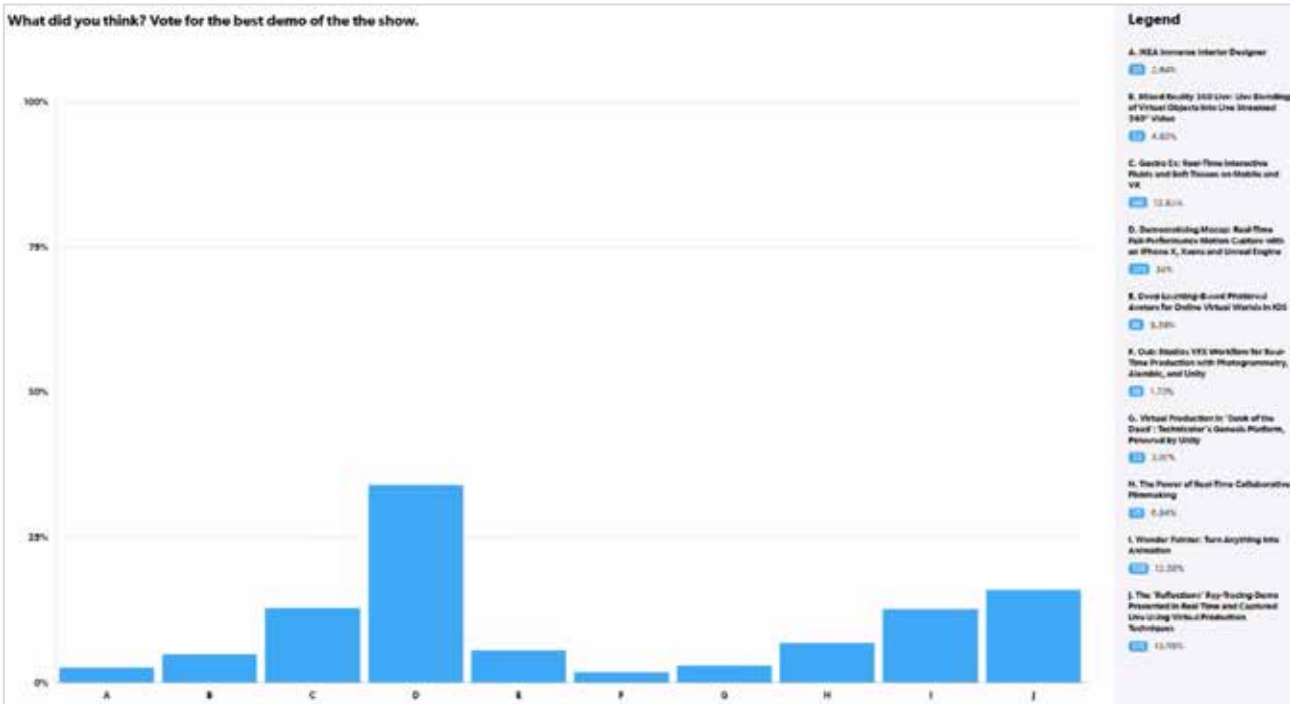
3 Pinscreen's Only Attempt to  
4 Generate an Avatar in Real-Time  
5 During SIGGRAPH 2018 Real-Time Live



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13 Input Image

Output Avatar

- 14 • <https://youtu.be/rPam5CHFQMQ?t=1h15m51s>
- 15 • SIGGRAPH 2018 RTL's popular vote dashboard:



- 27 • First place's votes: around 34%
- 28 • Pinscreen's votes: around 5.5%

**THE END**

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MEMORANDUM

To: Randy Hall  
Yannis Yortsos

From: Scientific Misconduct Inquiry Committee

Date: January 8, 2019 DKS

Subject: Preliminary Inquiry Report – Dr. Hao Li

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This will constitute the report of the Scientific Misconduct Preliminary Inquiry committee convened to assess allegations of fabrication and/or falsification brought against Dr. Hao Li, Assistant Professor in the Viterbi School of Engineering. This report is made pursuant to USC's Policy on Scientific Misconduct (<http://policy.usc.edu/scientific-misconduct/>).

**OVERVIEW**

The allegations of fabrication and/or falsification against Dr. Li arise out of two papers, an abstract submission, and a live technology demonstration, as follows:

1. **SIGGRAPH 2017 Technical Papers Submission:** Dr. Li is alleged to have fabricated and/or falsified data by representing manually prepared hair shapes as automatically generated. This submission was not accepted for publication.
2. **SIGGRAPH Asia 2017 Technical Papers Submission:** Dr. Li allegedly revised his previously rejected submission to SIGGRAPH 2017 Technical Papers Submission for purposes of submitting to SIGGRAPH Asia 2017 Technical Papers. In connection with this submission, Dr. Li allegedly submitted manually-created hair models when asked by the journal to submit 100 avatars (including hair) automatically generated by his technology. Close in time to the submission deadline (May 23, 2017), Dr. Li allegedly ordered Pinscreen employees to “manually fix all the eye colors for the avatars”, while the paper represented that eye color recognition was accomplished through his technology “due to recent advances in deep learning”. In addition, Dr. Li allegedly fabricated the process of estimating hair color, and allegedly assigned a Pinscreen employee the task of “manually” picking up the hair color. The eventual submission claims that hair color classification is computed using a “similar convolutional neural network” as the one allegedly used for eye color. There were allegedly additional



3. misrepresentations of manually prepared data as automatically generated, which will be addressed in the Findings section of this report.
4. **SIGGRAPH Real-Time Live (“RTL”) submission, dated April 4, 2017:** Dr. Li is alleged to have submitted an abstract in advance of a public demonstration of his technology at SIGGRAPH Real-Time Live (“RTL”) where he falsely represented that he had developed a “fully automatic framework for creating a complete 3D avatar...to build a high-quality head model within seconds”, when in fact the technology then in existence took approximately 90 seconds to generate an avatar. In addition, the abstract includes two example output images of actors Ryan Gosling and Haley Dunphy. Allegedly, the hair shapes for these examples were created manually by a hair artist based in Germany.
5. **SIGGRAPH Real-Time Live (“RTL”) demo, August 1, 2017:** Dr. Li is alleged to have instructed Pinscreen personnel to “cache” or pre-load the avatar whose purported real-time creation was demonstrated at RTL in order to falsely give the impression that his technology was creating the avatar in real time in a matter of seconds. Dr. Li allegedly was also aware of and/or instructed his team to manually modify the outputs actually being generated to improve the avatars’ quality such that the output demonstrated at RTL was not an accurate representation of the output his technology generated, regardless of whether it was cached or not.

## **PRELIMINARY INQUIRY COMMITTEE REPORT**

### **Federal Grant Support**

Office of Naval Research (ONR), Award No. N00014-15-1-2639  
U.S. Army Research Laboratory (ARL) under contract W911NF-14-D-0005

### **Committee Members**

Dr. Satyandra Gupta  
Dr. Detlof Von Winterfeldt  
Dr. Richard Leahy

### **Administrative Support**

Daniel K. Shapiro (administrative support)  
Dr. Mahta Moghaddam (representative for Dean’s Office)

### **Information Obtained**

In order to assist the Committee in conducting its Investigation, the Committee conducted the following interviews:

- **Dr. Hao Li:** September 25, 2018
- **Dr. Iman Sadeghi:** November 9, 2018

Dr. Li also participated in a follow-up interview with Mahta Moghaddam and the Office of Compliance on October 26, 2018.

The Committee reviewed the following documents/videos:

- Dr. Iman Sadeghi vs. Pinscreen, Inc. and Dr. Hao Li; Verified Complaint filed on June 11, 2018.
- Dr. Iman Sadeghi vs. Pinscreen, Inc.; Dr. Hao Li; Yen-Chun Chen; Liwen Hu; and Han-Wei Kung; Verified Amended Complaint filed on October 5, 2018.
  - (Note: Dr. Li did not claim that any of the screenshots of texts and conversations in these complaints are not genuine; rather, he claims that this material was taken out of context).
- Curriculum vitae for Dr. Hao Li, available at <http://www.hao-li.com/documents/resume.pdf>
- Abstract submission titled “Pinscreen: Creating Performance-Driven Avatars in Seconds”; submitted April 4, 2017
- “Real-Time Live” presentation by Dr. Li and team (August 1, 2017); available at [https://www.youtube.com/watch?v=hpuEdXn\\_M0Q](https://www.youtube.com/watch?v=hpuEdXn_M0Q) (See from 31:06-40:18 of video). ;
- Paper accepted for publication to SIGGRAPH Asia 2017, titled “*Avatar Generation From a Single Image for Real-Time Rendering*”, ACM Transactions on Graphics, Vol. 36, No. 6, Article 1 (Publication date: November, 2017)(Submission date: May 23, 2017)
- ACM/SIGGRAPH Reviews of “*Avatar Generation From a Single Image for Real-Time Rendering*”; accepted for publication to SIGGRAPH Asia 2017
- ACM/SIGGRAPH Reviews of “*Avatar Generation From a Single Image*”; rejected for publication to SIGGRAPH 2017 (North America)
- ACM/SIGGRAPH Reviews of Real-Time Live submission that was accepted to SIGGRAPH 2017
- E-mail from ACM SIGGRAPH addressing internet connectivity considerations at Real-Time Live.
- Time-line of events, provided by Dr. Li on 10.28.18.
- Comparison of SIGGRAPH/SIGGRAPH Asia Technical Paper vs. SIGGRAPH Real-Time Live, provided by Dr. Li on 10.28.18.

Dr. Li also provided a demonstration of software uploaded to GitHub in his follow-up interview with Mahta Moghaddam and the Office of Compliance on October 26, 2018.

## **Findings**

### **1. SIGGRAPH 2017 Technical Papers Submission**

Dr. Sadeghi alleges that Dr. Li included fabricated and falsified results in his submission to SIGGRAPH Technical Papers, 2017. Among other things, Dr. Sadeghi alleges that Pinscreen misrepresented manually prepared hair shapes as automatically generated. Dr. Sadeghi alleges



that the submission was rejected and later re-submitted to SIGGRAPH Asia 2017 Technical Papers.<sup>1</sup>

Dr. Sadeghi alleges that he discussed these fabrications and falsifications with Dr. Li, who responded that the misrepresentations were not material because they were not public, and that he had been practicing a “fake it ‘til you make it” strategy that had been working well up that point. Dr. Li also allegedly told Dr. Sadeghi that he and the Pinscreen team would have sufficient time to actually develop the claims prior to the eventual publication of the article.<sup>2</sup>

Dr. Sadeghi claimed that the conversation took place at a dinner meeting on March 9, 2017, and he showed the committee pictures of him and Dr. Li that he alleged were taken at the dinner. When asked why he suspected there were fabricated/falsified research results in the submission to begin with (i.e. what caused him to raise these issues), Dr. Sadeghi stated that hair rendering is an incredibly complex task, and that when he reviewed and tested the then-current hair algorithm, the geometry of the hair shapes generated was always “way off”.

However, unlike his other claims, Dr. Sadeghi did not produce any evidence beyond his recollection of a conversation with Dr. Li, along with his characterization of how the algorithm performed at the time. Dr. Li denied that a conversation like this took place.

That said, the Office of Compliance obtained the peer reviews performed by ACM SIGGRAPH in connection with the rejected submission to assist in the determination of what claims were made, as well as the comments provided by the reviewers. According to the Summary Abstract of the rejected submission, Dr. Li and his team stated that the paper would show the following:

We present a fully automatic framework for creating a complete 3D avatar from a single unconstrained image. We digitize the entire model using a textured mesh representation for the head and volumetric strips with transparency for the hair. Our digitized models also provide animation-friendly blendshapes and joint-based rigs. We present a fully automatic framework for creating a complete 3D avatar from a single unconstrained image.

We digitize the entire model using a textured mesh representation for the head and volumetric strips with transparency for the hair. Our digitized models can be easily integrated into existing game engines and readily provide animation-friendly blendshapes and joint-based rigs. The proposed system integrates state-of-the-art advances in facial shape modeling, appearance inference, and a new pipeline for single-view hair generation based on hairstyle retrieval from a massive database, followed by a strand-to-hair strip conversion method.

We also introduce a novel algorithm for realistic hair texture synthesis for the strips based on feature correlation analysis using a deep neural network. Our generated models are visually comparable to state-of-the-art game characters, as well as avatar generation techniques based on multiple input images.

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<sup>1</sup> See Verified Amended Complaint (“VAC”, paragraph 112; p.19)

<sup>2</sup> See VAC, paragraph 113; p.19



We demonstrate the effectiveness of our approach on a variety of images taken in the wild, and show that compelling avatars can be generated by anyone without effort.

(See reviews of SIGGRAPH 2017 paper submission attached hereto as Exhibit "A", p.1).

In its rejection of Dr. Li's submission, ACM SIGGRAPH informed Dr. Li that "[t]here was a very long discussion of the paper... The committee also agreed that it would be a great system paper for resubmission given the following additions: \* Evaluate/compare for choice of hair system, e.g., compare to AutoHair \* Explain how the eye balls, mouth was chosen \* Present all the results for 100 photos that were tested (as the rebuttal states) \* Explain how the chosen blend shapes method affects the animation across diverse people \* present full models, front and back views. \*show comparison to loom.ai" (See Exhibit "A", p. 11).

In preparation for the re-submission of the article in connection with SIGGRAPH Asia 2017 (due May 23, 2017), Dr. Li sent a Skype group message to Dr. Sadeghi and Shunsuke Saito on April 18, 2017 informing them that "for siggraph asia", "we need 100 fitted faces", which appears to indicate that Pinscreen did not have 100 fitted faces at that time.<sup>3</sup> Dr. Li asked Mr. Saito if he was able to prepare a database for benchmarking, and Mr. Saito replied "sure". In response, Dr. Li stated that it "... would be good to select 100 faces and we have similar hairstyles to our selection thing", and "then I have an artist create all 100 hairs [...] ahahaha".<sup>4</sup>

Dr. Li also forwarded the reviewers' comments to his team on May 15, 2017, who at the time was working to complete the manuscript for re-submission.<sup>5</sup> Two days later, Dr. Li stated that "so basically I need to create 3D hair models for 100 people... [o]r get 3D modelers to do it".<sup>6</sup>

In the eventually accepted manuscript that was published in SIGGRAPH Asia 2017, the summary of the paper stated that it would show the following:

We present a fully automatic framework that digitizes a complete 3D head with hair from a single unconstrained image. Our system offers a practical and consumer-friendly end-to-end solution for avatar personalization in gaming and social VR applications. The reconstructed models include secondary components (eyes, teeth, tongue, and gums) and provide animation friendly blendshapes and joint-based rigs. While the generated face is a high-quality textured mesh, we propose a versatile and efficient polygonal strips (polystrips) representation for the hair. Polystrips are suitable for an extremely wide range of hairstyles and textures and are compatible with existing game engines for real-time rendering. In addition to integrating state-of-the-art advances in facial shape modeling and appearance inference, we propose a novel single-view hair generation pipeline, based on 3D-model and texture retrieval, shape refinement, and polystrip patching optimization. The performance of our hairstyle retrieval is enhanced using a deep convolutional neural network for semantic hair attribute classification.

<sup>3</sup> See VAC, Exhibit "E", paragraph E.14, pp. 165, 166.

<sup>4</sup> Id.

<sup>5</sup> See VAC, Exhibit "E", paragraph E.13, pp. 163, 164.

<sup>6</sup> See VAC, paragraph 132, 133; pp. 23



Our generated models are visually comparable to state-of-the-art game characters designed by professional artists. For real-time settings, we demonstrate the flexibility of polystrips in handling hairstyle variations, as opposed to conventional strand-based representations. We further show the effectiveness of our approach on a large number of images taken in the wild, and how compelling avatars can be easily created by anyone.

(See <http://www.hao-li.com/publications/papers/siggraphAsia2017ADFSIFRTR.pdf>).

While the abstract from the rejected submission and the one from the accepted submission are similar, Dr. Li claimed in an e-mail dated 10.28.18 that "...SIGGRAPH 2017 vs SIGGRAPH RTL 2017 vs SIGGRAPH Asia 2017 are entirely different submissions and the methods/technical details are significantly different (as can be seen in the Submitted Papers). While SIGGRAPH Asia 2017 is a re-submission of the SIGGRAPH 2017 paper, it does not mean that the methods are the same, only that the reviewers can be the same, because we are allowed to opt for reviewer continuity." (See Exhibit "B" to this report).

The committee acknowledges that there are some differences in the claims (and potentially the methods) asserted in the rejected submission compared to the accepted one. That said, many of the claims appear to be very similar, including:

- Both submissions claim they will present a fully automatic framework for a complete 3D avatar with hair.
- Both submissions claim the digitized models will provide animation-friendly blendshapes and joint-based rigs.
- Both submissions claim to be able to generate hair shapes. The rejected submission claims to accomplish this through "...a new pipeline for single-view hair generation...followed by a strand-to-hair strip conversion method", while the later accepted submission states that "...we propose a versatile and efficient polygonal strips (polystrips representation for the hair)".
- Both submissions claim to introduce novel algorithms that enhance hairstyle synthesis/retrieval via "a deep neural network" (rejected submission) and "...a deep convolutional neural network for semantic hair attribute classification" (accepted submission).
- Both submissions claim that the respective papers show that compelling avatars can be created by anyone with little or no effort.

As will be shown in more detail below related to the committee's review of the eventually accepted SIGGRAPH Asia 2017 paper, Dr. Sadeghi presented evidence that, close in time to the submission deadline, there is evidence that Dr. Li informed his team that he would have an artist manually create hair shapes for 100 people (as noted above, ACM SIGGRAPH asked for the results of 100 tested photos), and also evidence that he instructed the team to manually fix all eye colors for the avatars, manually pick up the hair color for the avatars, and manually refine the automatic hair segmentation results, among other things.<sup>7</sup>

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<sup>7</sup> See VAC, paragraphs 129-167; pp.23-26



Therefore, while there is insufficient evidence that Dr. Sadeghi's claimed conversation occurred on March 9, 2017 in the manner he describes in his complaint and subsequent interview in connection with this Preliminary Inquiry, the committee nevertheless concludes this claim must be fully investigated because of the following:

- In the rebuttal submitted by Dr. Li in connection with the rejected SIGGRAPH 2017 paper, he claims that he "...tested over 100 images including public data sets, celebrity photos, and some collected selfies, where most of them lead to plausible reconstructions." The reviewers picked up on this claim and asked Dr. Li to "...[p]resent all the results for 100 photos that were tested (as the rebuttal states)". However, as outlined above, subsequent to this time, Dr. Li forwarded the comments to his team in a manner suggesting that he did not in fact have 100 tested faces, necessitating that this testing occur, and also suggesting that he have an artist manually create all hairs for the 100 photos to be tested.
- The claims between the rejected article and the later re-submission are similar enough that, to the extent that in connection with the SIGGRAPH Asia re-submission, Dr. Li was unable to achieve the results claimed without manual alteration months later, then it is possible that the earlier manuscript required manual modification as well. As will be discussed below, Dr. Li has allowed the Office of Compliance and Dr. Moghaddam to view code uploaded to GitHub that is time-stamped very close in time to the submission deadline for the accepted manuscript that Dr. Li claims to be unmodifiable from what was uploaded at that time without creating a new version and new time-stamp. Dr. Li claims that, when run, the code demonstrates that he achieved each outcome claimed in the manuscript. As noted below, the committee recommends that in connection with a full investigation, Dr. Li be required to provide the code reflecting the claimed outputs from the earlier, rejected submission as well so that it can be independently tested.

## 2. SIGGRAPH Asia 2017 Technical Papers Submission

Dr. Sadeghi alleges that, in connection with the submission to SIGGRAPH Asia Technical Papers (deadline May 23, 2018), Dr. Li was asked to present 100 avatars generated by Pinscreen's software for 100 input images.<sup>8</sup> However, the complaint alleges that approximately one month earlier (April 18, 2017), Dr. Li informed Shunsuke Saito and Dr. Sadeghi that for SIGGRAPH Asia, Pinscreen needed to submit "100 fitted faces" and informed them both that he will "...have an artist create all 100 hairs...ahahaha".<sup>9</sup>

One month later (May 17, 2017), Dr. Sadeghi alleges that Dr. Li again discussed using 3D hair modelers to create the hair shapes for the 100 avatars to be submitted.<sup>10</sup> Initially, Dr. Li asked Jens Fursund (Pinscreen's Chief Technology Officer at the time) if he was able to assist in this task, but was told by Mr. Fursund that he did not know how to do so. Dr. Li responded by stating that he would need to retain 3D artists to create the hair models for the 100 avatars.<sup>11</sup>

<sup>8</sup> See VAC, paragraph 129, p.22; Exhibit "E", paragraph E.13, p.163.

<sup>9</sup> See VAC, paragraph 129, p.22; Exhibit "E", paragraph E.14, pp. 165, 166.

<sup>10</sup> See VAC, paragraphs 132, 133, p.23; Exhibit "E"; paragraphs E.14 and E.15, pp. 165-174

<sup>11</sup> Id.



Dr. Sadeghi alleges that, in addition to manual creation of the hair models, Pinscreen also fabricated the process of estimating eye color. Dr. Sadeghi submitted text messages where Dr. Li stated that the eye color estimation in his software “was total shit”, “completely random” and therefore instructed the team to “manually fix all the eye colors” for the avatars to be submitted with the manuscript.<sup>12</sup> As part of these conversations, Dr. Li had a Skype conversation with Jens Fursund on May 18, 2018 regarding the problems with the eye color generation capability of the software, where he said “we really need a better algorithm”. When Fursund asked whether there was time to improve the algorithm given the proximity to the paper deadline, Dr. Li replied that “I guess a deep neural net would be the way to go”. Fursund replied “so no [we don’t have time]”. Dr. Li responded by saying “...[let’s] do them manually for now”.<sup>13</sup>

Dr. Sadeghi also alleges that Pinscreen fabricated the process of estimating the hair color for the submission. On May 18, 2017, five days before the submission deadline for the manuscript, Dr. Li stated that “we also have nothing that can guess hair color”.<sup>14</sup> The next day, Dr. Li instructed Jens Fursund to “manually pick up hair color and store it in .txt in Hex”.<sup>15</sup>

Dr. Sadeghi next alleges that Pinscreen misrepresented other manually prepared data as automatically generated in its submission, including the “focal length” estimation and “hair segmentation”.<sup>16</sup>

Finally, Dr. Sadeghi alleges that on May 22, 2017, one day prior to the submission deadline for the manuscript, Dr. Li instructed his team to fabricate the “Hair Polystrip Patch Optimization” process.<sup>17</sup> In paragraph E.8 of the Verified Amended Complaint, there is a lengthy Skype conversation between Dr. Li and members of his team, including Sadeghi, discussing patch optimization and errors associated with it. The team also discussed errors with “gamma correction”. At the conclusion of this conversation, Dr. Li states that “if in an hour it’s not working let’s do it manually [...] and give up on it [...] i don’t think we can make it automatic”.

In his October 26, 2018 interview, Dr. Li claimed that notwithstanding these conversations close in time to the submission deadline, he has software source code in “GitHub” that is time stamped on or about May 21, 2017 that, when executed, performs each of the key claims in the manuscript. Subsequent to his October 26, 2018 interview, he provided a PDF to the Office of Compliance that contained, among other things, the nature of what he believes these key claims are:

- Algorithmic results
- Full dyn. head model
- Full texture maps
- Hair geometry
- Predicted hair/eye colors

<sup>12</sup> See VAC, paragraphs 134-145, p.23; Exhibit “E”; paragraphs E.6, E.16-E.20; pp. 138, 139, pp. 174-181

<sup>13</sup> See VAC, Exhibit “E”; paragraph E.18, p. 176

<sup>14</sup> Id.

<sup>15</sup> See VAC, Exhibit “E”; paragraph E.21, p. 182

<sup>16</sup> See VAC, paragraphs 147-150, p.25; Exhibit “E”, paragraphs E.19 and E.21; pp.178, 179, pp. 181-183

<sup>17</sup> See VAC, paragraphs 151-167, pp.25-26; Exhibit “E”, paragraph E.8; pp.141-147



(See Exhibit “C” to this report).

In his October 26, 2018 interview, Dr. Li also downloaded/accessed a copy of the code uploaded to GitHub on May 21, and performed what he contended was an actual demo of the code creating an avatar from a source image that he had on his computer. This generated an avatar that he claimed was consistent with the key claims listed above.

Dr. Li also claimed that the texts indicate that all of the issues outlined above had been resolved, and that the remaining issue was not caused by any failures of his software, but rather by an issue caused by the export from Unity, a real-time game engine (<https://unity3d.com/>) to figures that could be represented in the paper. In support of this, Dr. Li demonstrated in Photoshop the “RGB” (Red, Green, Blue) values purportedly generated after export of the images, much the same way Liwen Hu and Koki Nagano stated they had done on May 22, 2017 in a text conversation with Dr. Li, Dr. Sadeghi, and others.<sup>18</sup> (Hu: “...once I checked the color of the png in Photoshop...it tells RGB(3,0,0)”; Nagano: “...so we are checking the new pipeline which export positions...but if we scale the value properly it might be ok”). Dr. Li claimed that the adjustment of the red tint was the only alteration necessary at that time, and that the software otherwise operated as represented in the manuscript.

The committee recommends that this allegation also be fully investigated, for the following reasons:

- The paper claims that “[t]he eye color texture (black, brown, green, blue) is computed using a similar convolutional neural network for semantic attribute inference as the one used for hair color classification”. In his October 26, 2018 interview, Dr. Li characterized the creation of a “deep neural network” as a “simple” problem to solve because the basic framework for deep learning was in place.

However, the evidence presented by Dr. Sadeghi includes a Skype conversation five days prior to the submission deadline between Dr. Li and Jens Fursund. In this conversation, Jens asks “but do we have time for a new algo?” in response to Dr. Li’s observation that “we really need a better algorithm” due to the problems the research team was having with “eye generation” (e.g. “the eye color is total shit”). Dr. Li answered this question by stating that “I guess...a deep neural net[work] would be the way to go”. Mr. Fursund replied by saying “so no [we don’t have enough time]”. This calls into question Dr. Li’s characterization regarding the ease with which the neural network described in the paper could be achieved, as well as whether in fact it was.

In addition, if as Dr. Li stated this was a “simple” problem to solve, it would be illogical for the research team to have spent as much time as the text messages indicate they did in manually modifying the output of the software to accomplish these same ends. This includes Dr. Li assigning “High Priority” to manually generating 100 hair models for purposes of the paper submission.

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<sup>18</sup> See VAC, Exhibit “E”, paragraph E.8; pp.141, 142



- The committee recommends that the software source code Dr. Li claims performs each of the key findings reported in the manuscript be tested by an independent third party with the requisite expertise to evaluate whether Dr. Li's claims are credible.
- The investigation committee should more fully evaluate Dr. Li's contention that the only issue remaining to be resolved was the slight alteration of color values necessitated by export issues from Unity to a format that would enable submitting the avatars with the manuscript. After the time Mr. Hu and Mr. Nagano identified the issue related to the color values, Dr. Li texted Mr. Hu, Mr. Nagano, and the remainder of the research team, informing them that "if in an hour it's not working let's do it manually...and give up on it...I don't think we can make it automatic". If, as Dr. Li represented in his interview, the code was operating as intended and in the manner reflected in his manuscript, there would have been no reason after the time he was informed of this issue to have suggested that "I don't think we can make it automatic", which suggests that problems with his code may have still remained.
- Even if the committee were to conclude that the source code does in fact perform each of the key claims in the manuscript, the definition of research misconduct under USC policy and applicable federal regulations includes "...fabrication, falsification, plagiarism in proposing, **performing**, or reviewing research, or in reporting research results" (Emphasis added).<sup>19</sup> Therefore, even if in the day or two prior to submission Dr. Li and his research team completed the deep neural network claimed in the manuscript, there remains evidence that there were efforts to fabricate and/or falsify data while the research was being performed.

### 3. SIGGRAPH Real-Time Live ("RTL") submission, dated April 4, 2017

Dr. Sadeghi alleges that, in preparation for the SIGGRAPH Real-Time Live ("RTL") submission titled "Pinscreen: Performance Driven Avatars in Seconds", due on April 4, 2017, Dr. Li wrote to his research team on March 27, 2017 that the "issue is that we don't have time" and that "even if we fake things there is no time". He then stated that, as to hair reconstruction, "we probably have no choice but to cheat".<sup>20</sup>

Three days later, on March 30, 2017, Dr. Li informed his research team that "i just interviewed and hired a hair modelerer [sic]" named Leszek to produce "five hair models", including Ryan Gosling and Haley Dunphy, both of whom are famous actors.<sup>21</sup> Pinscreen's April 4, 2017 submission to RTL uses avatars of both Mr. Gosling and Ms. Dunphy as examples of outputs from his "...fully automatic framework for completing a complete 3D avatar from a single unconstrained image...within seconds" that were "...visually comparable to state-of-the-art game characters". (See Exhibit "D" to this report; April 4, 2017 abstract submission to RTL).

<sup>19</sup> See USC policy on Scientific Misconduct, <https://policy.usc.edu/scientific-misconduct/>.

<sup>20</sup> See VAC, paragraph 115, p.19; Exhibit "E", paragraphs E.3 and E.7; pp. 133, 134, 140, 141.

<sup>21</sup> See VAC, paragraph 118, p.20; Exhibit "E", paragraph E.11; pp.158, 159



On April 18, 2017, Dr. Sadeghi alleges that Mr. Leszek shared with him his manually created hair shapes for Mr. Gosling and Ms. Dunphy.<sup>22</sup>

The committee recommends that this allegation also be fully investigated. Specifically, the committee recommends that the images and avatars of Mr. Gosling and Ms. Dunphy should be compared against all images and/or avatars provided to Mr. Leszek, as well as all images and/or avatars (or any other output) provided by Mr. Leszek to Dr. Li and/or his research team to determine whether they match the images and avatars contained in the abstract.

#### 4. SIGGRAPH Real-Time Live (“RTL”) demo, August 1, 2017:

Dr. Sadeghi alleges that, as the August 1, 2017 date for the RTL demo was approaching, Dr. Li realized that the claims put forth in the April 4, 2017 submission could not be met. In a June 29, 2017 Skype conversation, Dr. Li stated that “I’m really worried that nothing will work by [the] rehearsal and we have to [do] some shitty cheating again”.<sup>23</sup>

Thereafter, Dr. Sadeghi alleges that on July 20, 2017, Dr. Li proposed pre-loading the avatar creation process on a Skype conversation when he stated that “I think file load is reasonable because it [gives] the people the feeling the avatar is not pre-built”.<sup>24</sup> On July 22, 2017, Dr. Sadeghi alleges that he tested Pinscreen’s avatar generation and that he told Dr. Li and others that it took approximately 90 seconds.<sup>25</sup>

Dr. Sadeghi alleges that later that evening, he had a conversation with Dr. Li, who disclosed a plan to fake the avatar generation and its speed by pre-caching manually prepared avatars and presenting them at the conference as being computed automatically and in real time.<sup>26</sup>

Dr. Sadeghi next alleges that on July 24, 2017, Jens Fursund, Pinscreen’s CTO stated in a Skype thread that “it’s important that we know exactly who is using the webcam to generate the avatar...since we’re just using pre-cached avatars”.<sup>27</sup> During this time period, Dr. Li allegedly assigned tasks such as “[c]reating all avatars, hair models, tweak for perfect hair color” to Carrie Sun and Liwen Hu.<sup>28</sup> Thereafter, Carrie Sun allegedly confirmed with Dr. Sadeghi that he “...created a hair for koki’s avatar”, and fixed Dr. Sadeghi’s avatar in response to Dr. Sadeghi’s observation that “...around my ears the hair is missing”.<sup>29</sup> Ms. Sun also allegedly fixed her own hair as well as that of Mr. Koki Nagano and Cristobal.<sup>30</sup>

In his interview, Dr. Li admitted to pre-caching the avatars. He claimed that he did so because there were wireless internet connectivity concerns with respect to the conference facility within the Los Angeles Convention Center. According to Dr. Li, his software could perform as

<sup>22</sup> See VAC, paragraph 119, p.21; Exhibit “E”, paragraph E.11; pp. 160, 161

<sup>23</sup> See VAC, paragraph 175, p. 29 ; Exhibit “E”, paragraph E.5; p.137

<sup>24</sup> See VAC, paragraphs 179-183, pp. 29, 30; Exhibit “E”, paragraph E.26; p.191

<sup>25</sup> See VAC, paragraphs 184, 185, pp. 30, 31; Exhibit “E”, paragraph E.27, pp. 192, 193

<sup>26</sup> See VAC, paragraphs, 189-191, pp. 32, 33

<sup>27</sup> See VAC, paragraphs 195-197, p. 33; Exhibit “E”, paragraph E.30; p.196

<sup>28</sup> See VAC, paragraph 199, p.34; Exhibit “E”, paragraph E.31; pp. 197, 198

<sup>29</sup> See VAC, paragraphs 200-203, pp. 34, 35; Exhibit “E”, paragraphs E. 31 and E.39; pp. 197, 198 and p. 215

<sup>30</sup> See VAC, paragraphs 204-213, pp. 35-37; Exhibit “E”, paragraph E.31 and E.40; pp. 200-202 and 216-219



represented, but he did not want the unrelated issue of potentially spotty internet service to impact the presentation. In addition, Dr. Li stated that this presentation did not represent scientific output.

The committee does not find the wireless internet connectivity arguments persuasive for several reasons:

- According to the conference organizers for Real-Time Live, they offered all presenters a wired network option because it was the most reliable means for network access. The network option was based on network guidelines the GraphicNET program (conference network vendor) uses at the Los Angeles Convention Center. The organizers further stated that for presentations, "...a wired network all the way".
- Even if there were internet connectivity concerns, there is evidence that the Pinscreen team had sufficient computing capacity on the computers they brought on stage to perform avatar generation in real-time, rather than in cached fashion. At 34:50 of the RTL conference (viewable at [https://www.youtube.com/watch?v=hpuEdXn\\_M0Q](https://www.youtube.com/watch?v=hpuEdXn_M0Q)), Dr. Sadeghi states that "[f]or better performance, we run our neural networks and optimizations on the GPU". GPU renders graphics at a significantly faster speed than the CPU. There also appear to be several computers on stage in the video.
- Even if there were internet connectivity considerations and Pinscreen lacked sufficient computing capacity to generate the avatars in real-time, the committee believes that the research team had an ethical obligation to disclose to the audience that the avatars were not being generated in real-time. This is especially true because the essence of the conference is to present outputs in this fashion. See, e.g., <https://s2018.siggraph.org/conference/conference-overview/real-time-live/> ("Watch as the best of the best in real-time graphics and interactivity come together for a live competition and share their innovations").
- Internet connectivity concerns only address the potential length of time necessary in order to create avatars. The evidence presented by Dr. Sadeghi raises issues not only with respect to the amount of time it took to generate the avatars, but the quality of the avatars created. As noted above, there appear to be several conversations related to manually modifying the avatars due to the quality of the output, most specifically with respect to Carrie Sun's apparent manual modifications to several avatars allegedly generated in real-time at the conference.

Similarly, the committee is not persuaded by Dr. Li's argument that the RTL venue did not represent a research output, for several reasons:

- Dr. Li stated his USC and ICT affiliations on the first slide of the presentation at RTL. (See [https://www.youtube.com/watch?v=hpuEdXn\\_M0Q](https://www.youtube.com/watch?v=hpuEdXn_M0Q); 31:07).
- Dr. Li cites this presentation on his CV. (See <http://www.hao-li.com/documents/resume.pdf>, p. 16).
- In the same session at Real-Time Live at SIGGRAPH 2017, there were at least 3 other presentations from universities:

- "Direct 3D Stylization Pipelines"; Nanyang Technological University, Universite Grenoble Alpes, and Universite Bordeaux. (See [https://www.youtube.com/watch?v=hpuEdXn\\_M0Q&t=47m20s](https://www.youtube.com/watch?v=hpuEdXn_M0Q&t=47m20s); 53:36)
- "Large-Scale Interactive Water Simulation With Directional Waves"; IST Austria (<https://dl.acm.org/citation.cfm?id=3098916>).
- "PhysicsForests: Real-Time Fluid Simulation Using Machine Learning"; ETH Zurich. ([https://www.youtube.com/watch?v=hpuEdXn\\_M0Q&t=47m20s](https://www.youtube.com/watch?v=hpuEdXn_M0Q&t=47m20s); 47:23).
- Dr. Li cited his RTL presentation in his SIGGRAPH Asia 2017 Technical Papers Submission (See <https://dl.acm.org/citation.cfm?id=31310887>; ACM Transactions on Graphics, Vol 36, No. 6, Article 195, p.3).
- Outputs need not be formally peer reviewed as a manuscript would be in order for the output to be considered research (e.g., invited talks, conference presentations such as this one). That said, in this case, there was a formal submission and review process. (See Exhibit "E" attached hereto, which is a copy of the reviews for Dr. Li and Pinscreen's RTL submission). Dr. Li himself appears to have stated that "realtime live...it's the hardest thing to get in...it's much harder than paper" (See VAC, complaint p.186, paragraph 23).

### Conclusion

For the reasons stated above, the Preliminary Inquiry committee recommends that this matter proceed to a full Investigation under USC's Policy on Scientific Misconduct (<https://policy.usc.edu/scientific-misconduct/>), dated July 30, 2013.

**Date:** 1/24/2019

**To:** Yannis Yortsos, Randy Hall, Dan K. Shapiro, the Scientific Misconduct Inquiry Committee, Cyrush Shahabi, Mahta Moghaddam, Gaurav Sukhatme, and Randy Hill.

**From:** Hao Li

**Re: Preliminary Inquiry Findings**

Dear Dr. Yortsos, Members of the Scientific Misconduct Inquiry Committee, Dr. Hall, Mr. Shapiro, Dr. Shahabi, Dr. Moghaddam, Dr. Sukhatme, and Dr. Hill:

I have received and read your report regarding the Preliminary Inquiry of Mr. Sadeghi's allegations of fabrication and/or falsification against me. It goes without saying that I am deeply disappointed and that the Committee recommended a full investigation under USC's Policy on Scientific Misconduct.

Let me be very clear: there was absolutely NO fabrication and/or falsification from either our teams at USC or Pinscreen at any point in time. Nor did I or anyone associated with me mislead the public or the scientific community. It is my firm belief that Dr. Iman Sadeghi, who we have filed a motion to dismiss against, because his claims have no merit, approached USC simply to gain leverage in his shakedown lawsuit. Although I understand that USC must treat any complaint seriously, regardless of the source, it should take into account that Dr. Sadeghi's actions are driven by an ulterior motive of personal profit, rather than any legitimate concern for scientific integrity.

That being said, I will provide answers to all the concerns outlined in the January 8 Preliminary Inquiry Report (the "PIR"). In addition to my own rebuttal, I have attached receiving email exchanges, reports, and letters from top ACM SIGGRAPH leadership (SIGGRAPH Conference Chair, SIGGRAPH Real-Time Live Chair, SIGGRAPH Real-Time Live Committee) as well as recognized independent 3rd party experts (ACM SIGGRAPH Technical Papers Committee) who possess domain knowledge and are qualified to assess the authenticity of my research. Given the limited time provided to respond to the PIR, one of these responses (Prof. Dr. Etienne Vouga) may come shortly after the deadline of January 24, 2019, but I have attached the other ones to this response. I request that all submissions be considered, as this inquiry has a direct and tangible impact on my livelihood, my reputation, and my future with USC and, potentially, Pinscreen itself.

These submissions will be of great assistance in providing the technical backdrop to demonstrate that not only did nothing improper occur, but it would have been impossible for it to occur. USC's inquiry committee and its legal representative Dan K. Shapiro acknowledged during the earlier hearings that they lack domain knowledge in the field of Computer Graphics and Computer Vision, which is in my opinion critical in making a fair assessment of this inquiry. The third-party materials will assist in bridging that gap.



1. **Response re: SIGGRAPH / SIGGRAPH Asia 2017 Technical Papers Submission.**
  - a. **Proposed inquiry re: whether Pinscreen manually created 100 hairs following testing.**

With respect to the SIGGRAPH and SIGGRAPH Asia 2017 submission, the PIR first stated the following:

“In the rebuttal submitted by Dr. Li in connection with the rejected SIGGRAPH 2017 paper, he claims that he “...tested over 100 images including public data sets, celebrity photos, and some collected selfies, where most of them lead to plausible reconstructions.” The reviewers picked up on this claim and asked Dr. Li to “... [p]resent all the results for 100 photos that were tested (as the rebuttal states).” However, as outlined above, subsequent to this time, Dr. Li forwarded the comments to his team in a manner suggesting that he did not in fact have 100 tested faces, necessitating that this testing occur, and also suggesting that he have an artist manually create all hairs for the 100 photos to be tested.”

**First**, the 100 photos tested had nothing to do with the comment about having an artist create hairs for 100 photos. In testing our programming, we tested over 100 faces to determine whether the software generated outputs correctly. While they were not to our satisfaction, it simply meant that the algorithms needed to be improved and that there was more work to do.

Separately, after the submission and before the rebuttal, we reconstructed roughly 100 head+hair models, where about 10 failed. We always test the results in batches. In fact, we have reconstructed thousands of faces in the past, and hundreds of hair separately. While we did not have 100 data that was to our own satisfaction after the submission, we were confident that we could produce those automatically in a revision period. There is nothing wrong with setting the bar high, to ensure that we can achieve the best possible results and further improving those.

**Second**, the comment about manually creating hairs for 100 photos was a sarcastic comment that reflected my frustration with the errors in reconstruction. Please understand that the time it takes to create a single reasonable quality hair model manually is minimum of a full day for a good digital artist, and in fact takes on **average** multiple days, if not weeks. This would aggregate to at least half a year to a year of work for an artist to create them manually. We did not have access to a team of artists that could produce such results, nor did we engage even a single artist to produce 100 hairs for these photos. We were also on deadline so there would have been no time to create hairs from scratch. Hence, my joking remark “hahaha.” Simply put, neither I nor any of the co-authors would have risked to fabricate data and they have sufficient common sense to tell the difference if I’m joking or not.

You will receive reports (one is attached) from independent 3rd party experts (ACM SIGGRAPH Committee members) who will give evidence as a witness that my statements are correct. **[Lewis,Vouga]**

**b. Proposed inquiry re: manual alteration of hair modeling.**

The committee further wrote the following:

“The claims between the rejected article and the later re-submission are similar enough that, to the extent that in connection with the SIGGRAPH Asia re-submission, Dr. Li was unable to achieve the results claimed without manual alteration months later, then it is possible that the earlier manuscript required manual modification as well. As will be discussed below, Dr. Li has allowed the Office of Compliance and Dr. Moghaddam to view code uploaded to GitHub that is time-stamped very close in time to the submission deadline for the accepted manuscript that Dr. Li claims to be unmodifiable from what was uploaded at that time without creating a new version and new time-stamp.”

Our hair models of our database are always created manually first. The algorithm then “selects” the appropriate hair model from the database to match to the photograph of the subject. The automatic part is the **retrieval** of the hair models and automatically molding those models to the head of the avatar. The more hair models that exist in the database, the greater the variety of users who would be satisfied with the resulting avatar, and the more accurate the resulting avatar. There is nothing wrong with improving the quality of the hair models manually in our database. This is how a database-driven method works and it is described as that in our paper. This is also a well-known technique in computer graphics that is used widely (see Chai et al. 2016, AutoHair: Fully Automatic Hair Modeling from a Single Image).

Note that Dr. Moghaddam confirmed during the hearing that the code cloned from the git repository cannot be modified, especially given that there are original time-stamps with the entire revision history. I have verified with our independent 3<sup>rd</sup> party experts that, while theoretically possible, such manipulation is not possible without extensive hacking and security systems skills and experiences, which neither me nor our team possess.

You will receive reports (one is attached) from independent 3rd party experts (ACM SIGGRAPH Committee members) who will give evidence as a witness that my statements are correct. **[Lewis,Vouga]**

**c. Finding re: achieving the outcome claimed in the manuscript.**

Finally, the committee writes:

“Dr. Li claims that, when run, the code demonstrates that he achieved each outcome claimed in the manuscript. As noted below, the committee recommends that in connection with a full investigation, Dr. Li be required to provide the code reflecting the claimed outputs from the earlier, rejected submission as well so that it can be independently tested.”

You will receive reports (one is attached) from independent 3rd party experts (ACM SIGGRAPH Committee members) who will provide reports of his assessment to the committee about the source



code and the method in question, and which reflects that the code did in fact achieve the outcome claimed in the manuscript. [Lewis,Vouga]

**2. Response re: SIGGRAPH Asia 2017 Technical Papers Submission.**

**a. Proposed inquiry re: eye color generation.**

The committee writes:

“The paper claims that “[t]he eye color texture (black, brown, green, blue) is computed using a similar convolutional neural network for semantic attribute inference as the one used for hair color classification”. In his October 26, 2018 interview, Dr. Li characterized the creation of a “deep neural network” as a “simple” problem to solve because the basic framework for deep learning was in place.”

“However, the evidence presented by Dr. Sadeghi includes a Skype conversation five days prior to the submission deadline between Dr. Li and Jens Fursund. In this conversation, Jens asks “but do we have time for a new algo?” in response to Dr. Li’s observation that “we really need a better algorithm” due to the problems the research team was having with “eye generation” (e.g. “the eye color is total shit”). Dr. Li answered this question by stating that “I guess...a deep neural net[work] would be the way to go”. Mr. Fursund replied by saying “so no [we don’t have enough time]”. This calls into question Dr.Li’s characterization regarding the ease with which the neural network described in the paper could be achieved, as well as whether in fact it was.”

“In addition, if as Dr. Li stated this was a “simple” problem to solve, it would be illogical for the research team to have spent as much time as the text messages indicate they did in manually modifying the output of the software to accomplish these same ends. This includes Dr. Li assigning “High Priority” to manually generating 100 hair models for purposes of the paper submission.”

**First**, an independent 3rd party expert (ACM SIGGRAPH Committee member), who we have shown the code, will give evidence as a witness that my statements during my meetings with the committee regarding eye color are correct. More specifically, the classification of eye colors is an easy task when using off-the-shelf public domain software code (in our case Resnet from He et al. 2016), which is a deep neural network for classification that can be trained in a few hours given a pre-trained model (which is also provided in public domain).

**Second**, I would like to address the alleged contradiction between the “simple” nature of creating an improved eye-color generation algorithm, and the apparent amount of time it took. Unlike Mr. Hu and Mr. Saito, who were involved in other tasks at the time, Mr. Fursund – who I asked if he could implement that algorithm –was not familiar with deep neural networks at that time, and hence the task would seem more difficult for him. He holds a Master degree in Digital Entertainment Engineering and his expertise is in real-time rendering and not machine learning. I

asked him if he could be in charge for this code, since others were busy with other tasks and he is the CTO of the company and was overseeing the overall pipeline.

In particular, we resolved the issue by adopting the deep neural network, ResNet (He et al. 2015), which is a well-established classification network, and can be trained in a few hours given a pre-trained model. This resulted in the achievement of the eye color result that was needed. For both hair and eye color estimation, we then used supervised learning to adopt the pre-trained network. Again, this will be borne out by the expert.

Since the team was focusing on other problems, and under time pressure, it may appear based on the correspondence, cherry-picked by Dr. Sadeghi, that creating the eye-color algorithm was a difficult task. But the reality was that the team was mostly focusing on other parts of the pipeline, and therefore needed to be reminded of this issue. Sending these reminders or assigning this task a high priority does not mean it could not have been done in a short time period or was not relatively simple. Unfortunately, Pinscreen did not have a “spare” employee to tackle the issue immediately. However, any computer vision or machine learning expert would agree that this is a trivial problem, and also that it was ultimately resolved to our satisfaction.

You will receive reports (one is attached) from independent 3rd party experts (ACM SIGGRAPH Committee members) who will give evidence as a witness that my statements are correct. **[Lewis,Vouga]**

**b. Proposed inquiry re: source code compared with manuscript.**

The committee writes: “

“The committee recommends that the software source code Dr. Li claims performs each of the key findings reported in the manuscript be tested by an independent third party with the requisite expertise to evaluate whether Dr. Li’s claims are credible.”

You will receive reports (one is attached) from an independent 3rd party expert (ACM SIGGRAPH Committee member) who will provide a report of his assessment to the committee about the method in question. **[Lewis,Vouga]**

**c. Proposed inquiry re: slight alteration of color values.**

Also related to eye color, the committee writes:

“The investigation committee should more fully evaluate Dr. Li’s contention that the only issue remaining to be resolved was the slight alteration of color values necessitated by export issues from Unity to a format that would enable submitting the avatars with the manuscript. After the time Mr. Hu and Mr. Nagano identified the issue related to the color values, Dr. Li texted Mr. Hu, Mr. Nagano, and the remainder of the research team, informing them that “if in an hour it’s not working let’s do it manually...and give up on it.. I don’t think we can make it automatic”. If, as Dr. Li represented in his interview, the code

was operating as intended and in the manner reflected in his manuscript, there would have been no reason after the time he was informed of this issue to have suggested that “I don’t think we can make it automatic”, which suggests that problems with his code may have still remained.”

This is incorrect. The reconstruction output (the actual result of the paper) is correct, but our intermediate rendering failed, which would lead to some visualization inaccuracies that are unrelated to the overall performance and technical contribution of the paper. As I explained, the output of the game engine, Unity, had an issue with the Color Space Conversion, which had a different conversion value than the standard Color Space, which would lead to these minor visualization errors. The problem in rendering some figures does not mean that the results were not properly generated by the software itself, as we accurately claimed in our contributions to SIGGRAPH. The software performed as represented.

Independent 3rd party experts (ACM SIGGRAPH Committee members) will give evidence as a witness that these statements are correct. [Lewis,Vouga]

**d. Proposed inquiry re: alleged efforts to falsify data.**

Finally, the committee writes:

“Even if the committee were to conclude that the source code does in fact perform each of the key claims in the manuscript, the definition of research misconduct under USC policy and applicable federal regulations includes” ... fabrication, falsification, plagiarism in proposing, performing, or reviewing research, or in reporting research results” (Emphasis added). Therefore, even if in the day or two prior to submission Dr. Li and his research team completed the deep neural network claimed in the manuscript, there remains evidence that there were efforts to fabricate and/or falsify data while the research was being performed.”

Respectfully, the allegation that “there remains evidence that there were efforts to fabricate and/or falsify data while the research was being performed” is an unwarranted conclusion that is even more concerning because it implies that the Committee has already reached a conclusion on the issue rather than simply referring the issue to a full investigation. I categorically dispute that there is any evidence, much less any intension, at any point in the process to engage in fabrication or falsification.

- As for the chat message referencing the manual creation of 100 hair models, this was an obvious joke that everyone involved (even Dr. Sadeghi at the time) would have recognized was a sarcastic comment (hence “hahahahaha”).
- As for the Color Space Conversion issue in Unity, it had nothing to do with Pinscreen’s research output. The only adjustment came when the output needed to be rendered as an intermediate result figure rather than the actual performance or technical contribution of the paper.

- Also, although I was concerned that the eye color algorithm would not function properly by the time of the paper submission, there was never any attempt (or any implied attempt) to “solve” the issue through fabrication or falsification. And in the end, after continuing to work at the issue, eye color was resolved by adopting the deep neural network, ResNet (He et al. 2015), which is a well-established classification network.
- Neither I nor anyone on my team would ever fabricate/falsify data or even attempt to do so.

Again, independent 3rd party experts (ACM SIGGRAPH Committee members) will give evidence as a witness that these statements are correct. [Lewis, Vouga]

**3. Response re: SIGGRAPH Real-Time Live (“RTL”) Submission, dated April 4, 2017.**

The committee writes:

The committee recommends that this allegation also be fully investigated. Specifically, the committee recommends that the images and avatars of Mr. Gosling and Ms. Dunphy should be compared against all images and/or avatars provided to Mr. Leszek, as well as all images and/or avatars (or any other output) provided by Mr. Leszek to Dr. Li and/or his research team to determine whether they match the images and avatars contained in the abstract.

**First**, I have provided all data in connection with these images and avatars. And the code I showed during our hearing can reproduce these results. The independent 3<sup>rd</sup> party expert (ACM SIGGRAPH Committee member) has also seen our system working. [Lewis]

**Second**, these images are taken from our submission to RTL. Even if we could not produce those (which we can), it is acceptable for SIGGRAPH RTL submissions to only show concept results that demonstrate the intend of what the actual presentation will show. The Chair of the SIGGRAPH Asia conference will confirm in his letter that this statement is correct. [Anjyo]

**4. Response re: SIGGRAPH Real-Time Live (“RTL”) Demo, dated August 1, 2017.**

**a. Proposed inquiry re: wireless internet connectivity.**

The committee writes:


“The committee does not find the wireless internet connectivity arguments persuasive for several reasons: According to the conference organizers for Real-Time Live, they offered all presenters a wired network option because it was the most reliable means for network access. The network option was based on network guidelines the GraphicNET program (conference network vendor) uses at the Los Angeles Convention Center. The organizers further stated that for presentations, “ ... a wired network all the way.”

The “internet connectivity argument,” as you are aware, is that in order to ensure that the software performs “on demand” at Real-Time Live, the system needs to be re-built on a local machine which involves significant porting efforts since our code was designed to run on a scalable architecture

on AWS. This is because there was a very real risk that the software will not interact properly with the remote server or that this will cause delays that would render the presentation ineffective. Since the porting was too complex in that limited amount of time, we decided to cache the results, but the results were generated automatically beforehand. Also, creating a backup cached results on a local machine is a common practice that is not only accepted, but also encouraged, by the RTL organizers.

To repeat what I have previously stated, Pinscreen did request a wired connection, but we had every reason to believe that even a wired connection would cause issues based on the warnings of the conference organizers (see mail screenshot). To this end, we had to use a fallback plan, and at that time, we had to cache, since we did not have sufficient time to port the backend server algorithm to a local machine. As shown in the other evidence materials, this is a known and recurrent problem for SIGGRAPH real-time lives, because thousands of attendees are in the same room.

**From:** Justin Stimatze [jstimatze@gmail.com](mailto:jstimatze@gmail.com)  
**Subject:** Re: Reminder - 2017 Real-Time Live! Virtual Rehearsals  
**Date:** June 15, 2017 at 6:20 PM  
**To:** Cristobal Cheng [ccheng@siggraph.org](mailto:ccheng@siggraph.org)  
**Cc:** Hao Li [hao@hao-li.com](mailto:hao@hao-li.com), [maggie\\_schutz@siggraph.org](mailto:maggie_schutz@siggraph.org), [maggie\\_schutz@siggraph.org](mailto:maggie_schutz@siggraph.org), Nathan Harling [nathan.x.h@gmail.com](mailto:nathan.x.h@gmail.com)



Hello Hao,

We'd be happy to provide you with an Ethernet cable (as many as needed) and strongly prefer that presenters use Ethernet instead of wireless.

However, we would like to know more about your listed bandwidth requirements. Can you give me some more information on minimum, average, and maximum bandwidth needs? Is the traffic rate consistent or are there spikes of sudden demand? Do you have an offline fall-back option if you encounter network issues during rehearsal?

To add some context: Conference networking is surprisingly different from other venues. We can provide fairly reliable service inside the building, 100Mbit or 1000Mbit wired connections depending on the exact rooms and requests etc. However, actual internet access is a different story. In years past, we have paid many tens of thousands of dollars for 18Mbit/s shared across the whole conference. We have been unable to guarantee even 1 Mbit/s to contributors without significant preplanning and associated cost to the conference, which has caused some challenges with presentations and frustration for all involved. Fortunately, things are looking more flexible this year but I hope that explains the concern! We want you to have a fantastic and successful presentation with as little stress as possible about networking risks.

- Justin

However, since the Committee appears to be unpersuaded by my own testimony, I will provide email exchanges between our Pinscreen team and SIGGRAPH Real-Time Live conference organizers who have raised this potential issue to us. [Hasegawa et al., Stigmatze et al. Cardenas et al.]

I have also provided responses from the SIGGRAPH Asia Conference Chair, SIGGRAPH Real-Time Live Chair and Committee that it is acceptable to cache, that there are known bandwidth issues, and that we are even encouraged to cache our data, and that there is no need to disclose such information during the show. [Anjyo, Hasegawa et al., Seymour]

I have provided letters from the SIGGRAPH Conference chair and Real-Time Live Chair that these practices are not only legitimate and acceptable, but even encouraged. [Anjyo, Hasegawa et al., Seymour]

**b. Proposed inquiry re: computer capacity.**

In connection with the same issue, the committee writes:

“Even if there were internet connectivity concerns, there is evidence that the Pinscreen team had sufficient computing capacity on the computers they brought on stage to perform avatar generation in real-time, rather than in cached fashion. At 34:50 of the RTL conference (viewable at <https://www.youtube.com/watch?v=hpuEdXnMOO>), Dr. Sadeghi states that “[f]or better performance, we run our neural networks and optimizations on the GPU”. GPU renders graphics at a significantly faster speed than the CPU. There also appear to be several computers on stage in the video.”

Dr. Sadeghi’s statement is a reference to computing capacity. However, the internet connectivity problem was not a problem of computing capacity. It was a problem of network transfer bandwidth, which is dependent on the organizers’ network, not the performance capabilities of our local machine. Of course our reconstruction solution could have run on the local machine, but there was no time finishing the full porting of our backend code to the local system. Hence we used a combined local machine with server support (which is actually how it works now), but cached the results that were genuinely reconstructed. We have also demonstrated the non-cached pipeline on stage before the show for various people. I have provided these evidences, including time stamped reconstructions on the day of the event. In particular, the time stamps cannot be modified/manipulated since they are stored on Amazon S3. Even in later SIGGRAPH RTL presentations, we have explicitly asked Real-Time Live chairs if this hybrid approach was acceptable, and they strongly recommended to cache the results to ensure a smooth show.

I have provided additional material from the SIGGRAPH Conference Chair, SIGGRAPH Real-Time Live Conference Chair, SIGGRAPH RTL Committee Members, as well as independent 3rd party experts (ACM SIGGRAPH Committee members) who will give evidence as a witness that these statements are correct. [Anjyo, Hasegawa et al., Seymour, Lewis]

**b. Proposed inquiry re: quality of avatars.**

The committee further writes:

“Internet connectivity concerns only address the potential length of time necessary in order to create avatars. The evidence presented by Dr. Sadeghi raises issues not only with respect to the amount of time it took to generate the avatars, but the quality of the avatars created. As noted above, there appear to be several conversations related to manually modifying the avatars due to the quality of the output, most specifically with respect to Carrie Sun’s apparent manual modifications to several avatars allegedly generated in real-time at the conference.”



Before the show, we have every right to fine tune the performance of our algorithm, and knowing beforehand which person would be digitized motivated us to improve the quality of relevant hair models in our database. Notice that hair models can be modeled manually and added to the database in order to ensure that the query would result in a higher quality model. As we have mentioned above, the query itself is the contribution part, not the fact that we model a hair manually or not. It does not matter, where that hair comes from and this is how the algorithm works and published as such.

I am also providing the following corroborating evidence:

- At the time of the RTL, we tested the technology backstage with several people who can confirm it really worked. The data has been also stored on Amazon S3, which timestamps are impossible to alter.
- Another example is, Dr. Ari Shapiro (USC/ICT) who also cached the results for rapid avatar capture at SIGGRAPH 2014 RTL.
- I have also attached an email exchange with SIGGRAPH Real-Time Live Chair/Committee who says that it is even acceptable to have video playbacks at the show.
- An independent 3rd party expert (ACM SIGGRAPH Committee member), SIGGRAPH Conference Chair, SIGGRAPH Real-Time Live Conference Chair, and SIGGRAPH RTL Committee members, will give evidence as a witness that these statements are correct.

**b. Proposed inquiry re: RTL venue as a research output.**

Finally, the committee writes:

“Similarly, the committee is not persuaded by Dr. Li’s argument that the RTL venue did not represent a research output, for several reasons:

- Dr. Li stated his USC and ICT affiliations on the first slide of the presentation at RTL. (See <https://www.youtube.com/watch?v=hpuEdXn> MOO;31:07).
- Dr. Li cites this presentation on his CV. (See <http://www.hao-li.com/documents/resume.pdf>, p. 16).
- “In the same session at Real-Time Live at SIGGRAPH 2017, there were at least 3 other presentations from universities:
  - “Direct 3D Stylization Pipelines”; Nanyang Technological University, Universite Grenoble Alpes, and Universite Bordeaux. (See <https://www.youtube.com/watch?v=hpuEdXn> MOO&t=47m20s; 53:36);
  - “Large-Scale Interactive Water Simulation With Directional Waves”; IST Austria (<https://dl.acm.org/citation.cfm?id=3098916>);

- “PhysicsForests: Real-Time Fluid Simulation Using Machine Learning”; ETH Zurich. (<https://www.youtube.com/watch?v=hpuEdXnMOQ&t=47m20s;47:23>).”
- Dr. Li cited his RTL presentation in his SIGGRAPH Asia 2017 Technical Papers Submission (See <https://dl.acm.org/citation.cfm?id=31310887>; ACM Transactions on Graphics, Vol 36, No. 6, Article 195, p.3).
- “Outputs need not be formally peer reviewed as a manuscript would be in order for the output to be considered research (e.g., invited talks, conference presentations such as this one). That said, in this case, there was a formal submission and review process. (See Exhibit “E” attached hereto, which is a copy of the reviews for Dr. Li and Pinscreen’s RTL submission). Dr.Li himself appears to have stated that “realtime live...it’s the hardest thing to get in...it’s much harder than paper” (See VAC, complaint p.186, paragraph 23).”

I respond as follows:

- **USC and ICT affiliations:** I stated my affiliations properly. I am a USC professor. Having a presenter with University affiliation does not mean that the RTL presentations are understood to be research outputs. There is a research component deriving from the paper submissions, but the presentations themselves are general interactive demonstrations that are meant to provide entertainment to the audience. Indeed, most of the contributors come from industry, and are not research-related output. Regardless, the presentation accurately reflected the Pinscreen’s technological functionality in a manner that was true to the actual user experience.
- **My CV:** Including this presentation in my CV does not mean that the venue represents research outputs. In particular, I have put it in the section “Course Notes, Tech Talks & Exhibitions”, which is a different section than “Peer-Reviewed Journal & Conference Papers”(see screenshot).

COURSE NOTES, TECH TALKS & EXHIBITIONS

[20] PINSCREEN AVATARS IN YOUR POCKET: MOBILE PAPAN ENGINE AND PERSONALIZED GAMING  
Koki Nagano, Shunsuke Saito, Mclean Goldwhite, Kyle San, Aaron Hong, Liwen Hu, Lingyu Wei, Jun Xing, Qingguo Xu, Hanwei Kung, Jiale Kuang, Aviral Agarwal, Erik Castellanos, Jaewoo Seo, Jens Fursund, Hao Li  
*ACM SIGGRAPH Asia 2018 Real-Time Live!, 12/2018*

Hao Li

16

[19] DEEP LEARNING-BASED PHOTOREAL AVATARS FOR ONLINE VIRTUAL WORLDS ON IOS  
Koki Nagano, Jaewoo Seo, Jun Xing, Kyle San, Aaron Hong, Mclean Goldwhite, Jiale Kuang, Aviral Agarwal, Caleb Arthur, Hanwei Kung, Stuti Rastogi, Carrie Sun, Stephen Chen, Jens Fursund, Hao Li  
*ACM SIGGRAPH 2018 Real-Time Live!, 08/2018*

[18] TRUTH IN IMAGES, VIDEOS, AND GRAPHICS  
Chris Bregler, Alyosha Efros, Irfan Essa, Hany Farid, Ira Kemelmacher-Shlizerman, Matthias Nießner, Luisa Verdoliva, Hao Li  
*ACM SIGGRAPH 2018 Sunday Workshop, 08/2018*

[17] PINSCREEN: CREATING PERFORMANCE-DRIVEN AVATARS IN SECONDS  
Hao Li, Liwen Hu, Koki Nagano, Jaewoo Seo, Shunsuke Saito, Lingyu Wei, Iman Sadeghi, Jens Fursund, Yen-Chun Chen, Stephen Chen, Carrie Sun  
*ACM SIGGRAPH 2017 Real-Time Live!, 08/2017*

- **Other University presentations:** While there are other University-affiliated presentations, it does not convert the RTL from an exhibition to a research output. Again, the RTL is a general interactive demonstration that is expected to be entertaining. Most of the contributors come from industry, and are not research related output.
- **Peer review:** While there was a review process (see screenshot of an example), the output may not need a scientific or research contribution. For instance, the RTL submission Unity: Editor VR, demonstrated a new open-source feature that allows anyone to edit Unity scenes directly in VR. All the contributors are engineers at Unity, and the demo does not mark any research or scientific advancement. The definition of research is “systematic investigation into and study of materials and sources in order to establish facts and reach new conclusions”. The presented work demonstrates a new product, but not a scientific investigation.

Having said that Real-time Live is extremely difficult to get in, equating the exhibition itself with a scientific work would be a false equivalency. SIGGRAPH RTL requires a huge amount of production work and storytelling, in which the presentation is paramount. The participants and audience understand that the purpose of RTL is to demonstrate what the technology looks like and how it works, but it is neither necessary nor expected that the technology employed on the stage will rely entirely on what is presented in a technical paper that is related to the presentation of RTL.

<b>Reviewer #62:</b>	
6) Public Comments	Nice demonstration for picture to 3D model. Although the model is a bit crude, and the facial animation can be better, this submission should be encouraged considering the complexity of putting the system together. I hope by the time of presentation, the work can be more polished.
8) Overall Score	4
<b>Submission Information:</b>	

I have provided letters/reports/emails from SIGGRAPH Conference chair and Real-Time Live Chair that these practices are not only legitimate and acceptable, but even encouraged. **[Anjyo, Hasegawa et al., Seymour, Lewis]**

In addition, I provide the following corroborating evidence in [additionalEvidences.zip](#):

- **[Lewis]** I have attached a detailed interview/code-review report from a highly recognized 3<sup>rd</sup> party independent expert, J.P. Lewis, who has visited Pinscreen in Los Angeles, tested our system, and reviewed the source code, as well as interviewed the engineers in person, without my presence as I was out of the country. J.P. Lewis has also served as **ACM SIGGRAPH/SIGGRAPH Asia Technical papers committee member, J.P. Lewis**, will also comment on the difference between SIGGRAPH Technical Papers and SIGGRAPH Real-Time Live Show. Also notice that the first author, Liwen Hu, who is my current PhD student, has only been at the Pinscreen location **for this specific interview** and is otherwise no longer working or present at Pinscreen, after his summer internship in 2018:  
[JP\\_Lewis\\_SIGGRAPH\\_TechnicalPaperCommittee\\_PinscreenInterview.pdf](#)

- **[Anjyo]** I have attached a letter from the last **SIGGRAPH Asia 2018 Conference Chair, Ken Anjyo**, who will comment on his familiarity of the allegations from Mr. Sadeghi, as well as details on the official guidelines for the SIGGRAPH Real-Time Live show (for any year) as well as its difference to SIGGRAPH technical papers. In particular, he will provide comments about caching practices, internet connectivity issues, and submission criterions.  
[Ken\\_Anjyo\\_SIGGRAPH\\_Asia\\_2018\\_Conference\\_Chair\\_Letter.pdf](#)
- **[Seymour]** You should have received a letter of support from the upcoming **SIGGRAPH Asia Real-time Live 2019 Chair, Mike Seymour**, who has provided additional evidences as witness about our previous work at SIGGRAPH Asia 2017, and SIGGRAPH RTL 2017. He has provided additional details about the nature of RTL events as well as the validity of our presentations. I have added this letter as part of this response in case it is missing:  
[Mike\\_Seymour\\_SIGGRAPH\\_Asia\\_2019\\_RTL\\_Chair\\_LetterOfSupport.pdf](#)
- **[Hasegawa et al.]** I have also attached an email confirmation from **SIGGRAPH Asia 2018 Real-Time Live Chair and the entire Committee, Isamu Hasegawa**, confirming that also for SIGGRAPH Asia 2018 RTL our practice of caching are valid and encouraged, that there was wireless issues, and that not everything needs to be real-time during the show, as some other teams even showed movie playbacks.  
[Isamu\\_Hasegawa\\_SIGGRAPH\\_Asia\\_2018\\_RTL\\_Chair\\_SIGGRAPHRealTimeLiveEmail.pdf](#)
- **[Stigmatze et al.]** I have also attached two email exchanges from SIGGRAPH 2017 Real-Time Live, commenting on the need for backup plans, due to potential Wireless AND Wired connections during the Real-Time Live demonstration. Notice that the former **SIGGRAPH 2017 Real-Time Live! Chair, Cristobal Cheng**, was included in the email communication.  
[Justin\\_Stigmatze\\_Cristobal\\_Cheng\\_SIGGRAPH\\_2017\\_RTL\\_Chair\\_Email1.pdf](#)  
[Justin\\_Stigmatze\\_Cristobal\\_Cheng\\_SIGGRAPH\\_2017\\_RTL\\_Chair\\_Email2.pdf](#)
- **[Cardenas et al.]** I have also attached an email exchange from SIGGRAPH 2018 Real-Time Live, commenting again that there is a need for backup plans, due to potential Internet connection issues during the Real-Time Live demonstration. Notice that the former **SIGGRAPH 2018 Real-Time Live! Chair, Jesse Barker**, was included in the email communication.  
[Carlos\\_Cardenas\\_Jesse\\_Barker\\_SIGGRAPH\\_2018\\_RTL\\_Chair\\_Email.pdf](#)
- **[Vouga]** you will also receive a letter/report from Prof. Dr. **Etienne Vouga** (UT Austin), who has in depth knowledge in geometric modeling, who is familiar with our research, and who has served at **ACM SIGGRAPH and SIGGRAPH Asia Technical Papers Committee**. He will provide additional evidences that our algorithms are not fake and also that there was no intention of fabrication and/or falsifying data. His letter/report will be sent to you shortly after today's deadline.

These letters, reports, email exchanges, from top authorities of ACM SIGGRAPH/ACM SIGGRAPH Asia, as well as both Technical Papers Committee members and Real-Time Live Show indicate that my position and statements are correct.

Thank you for taking the time to review this response and the evidence included therewith. I am hopeful that the Committee will revisit its decision and determine that a full investigation would be an unnecessary drain on resources that could be devoted elsewhere, as there simply is no evidence that myself or Pinscreen acted in any way that could be deemed scientific misconduct.

I would be happy to respond to any further questions.

Sincerely,

A handwritten signature in blue ink, appearing to read "Hao Li", with a large loop at the end.

Dr. Hao Li  
1/24/2019



# AWARD/ MODIFICATION

**3a. ISSUED BY:**  
Office of Naval Research  
875 N. Randolph Street Suite 1425  
Arlington VA 22203-1995

**1. INSTRUMENT TYPE:**  
Grant Award

**3b. CFDA:**  
12.300

**2. AUTHORITY:**  
10 USC 2358 and 31 USC 6304, as amended

**3c. DUNS NUMBER:**  
072933393

**4. AWARD NO.:**  
N00014-18-1-2349

**5. MODIFICATION NO.:**

**6. MODIFICATION TYPE:**  
NEW

**7. PR NO.:**  
1000009253

**8. ACTIVITY/AGENCY PROPOSAL NO.:**  
GRANT12483394

**9. RECIPIENT PROPOSAL NO.:**

**10. PROPOSAL DATE:**  
09152017

**11. ACTIVITY TYPE:**  
R&D

**12. PROGRAM TYPE:**  
YIP

**13. ISSUED TO**  
**13a. ADDRESS:**

**13b. CAGE:**  
1B729

**13c. ED/LEFT NUMBER:**  
N/A

**14. REMITTANCE ADDRESS (IF DIFFERENT FROM BLOCK 13):**  
Same as Block # 13

UNIVERSITY OF SOUTHERN CALIFORNIA  
U S C  
3720 S FLOWER STREET THIRD FLOOR  
LOS ANGELES CA 90089-0001  
UNITED STATES OF AMERICA

**13d. BUSINESS OFFICE CONTACT:**  
Kalief Washington

**13e. TELEPHONE NUMBER:**  
+1 213 740 2875

**13f. EMAIL ADDRESS:**  
kaliefwa@usc.edu

**15. RESEARCH TITLE AND/OR DESCRIPTION OF PROJECT AND/OR PROPOSAL TITLE:**  
Complete Human Digitization and Unconstrained Performance Capture

16. FUNDING	ACTIVITY/AGENCY SHARE	RECIPIENT SHARE	TOTAL
PREVIOUSLY OBLIGATED:			\$0.00
OBLIGATED BY THIS ACTION:			\$170,000.00
TOTAL OBLIGATED ON AWARD:			\$170,000.00
FUTURE FUNDING:			\$421,509.00
GRANT TOTAL:			\$591,509.00

**17. CURRENT FUNDING PERIOD**  
N/A THROUGH N/A

**18. PERIOD OF PERFORMANCE**  
06/01/2018 THROUGH 05/31/2021

**19. ACCOUNTING AND APPROPRIATION DATA:**  
See Attached Financial Accounting Data Sheet(s)

**20a. PRINCIPAL INVESTIGATOR/RECIPIENT TECHNICAL REPRESENTATIVE:**  
Dr. Hao Li

**21. TECHNICAL REPRESENTATIVE**  
**21a. NAME:** PETER SQUIRE

**21b. CODE:**  
301

**21c. ADDRESS:**  
ONR ASYMMETRIC WARFARE RESEARCH DIV  
875 N. Randolph Street  
Arlington VA 22203-1995

**20b. TELEPHONE NUMBER:**  
+1 213 740 4494

**20c. EMAIL ADDRESS:**  
hao@hao-li.com

**21d. TELEPHONE NUMBER:**  
703-696-0407

**21e. EMAIL ADDRESS:**  
PETER.SQUIRE@NAVY.MIL

**22. AWARDING OFFICE CONTACT**  
**22a. NAME:** ELIZABETH FORD

**22b. CODE:**  
BD255

**23a. ADMINISTRATIVE OFFICE:**  
ONR REG Office San Diego  
Telephone: (619) 221-5490  
Email: ONR\_San\_Diego@navy.mil  
140 Sylvester Road, Bldg. 140 Room 218  
SAN DIEGO CA 92106

**23b. CODE:**  
N66018

**22c. ADDRESS:**  
Office of Naval Research  
875 N. Randolph Street, Suite 1425  
Arlington, VA 22203-1995

**22d. TELEPHONE NUMBER:**  
703-696-2576

**22e. EMAIL ADDRESS:**  
ELIZABETH.FORD@NAVY.MIL

**24. SUBMIT PAYMENT REQUEST TO:**  
Same as block 23a

**25a. PAYING OFFICE**  
DFAS-CO/WEST ENTITLEMENT OPERATIONS  
HQ0339  
PO Box 182381  
COLUMBUS OH 43218

**25b. CODE:** HQ0339

**26a. PATENT OFFICE:**  
Office of Naval Research  
ATTN: ONR Office of Counsel  
Intellectual Property Section  
One Liberty Center  
875 North Randolph Street, Suite 1425  
Arlington, VA 22203-1995

**26b. CODE:** N00014



AWARD NO. N00014-18-1-2349		<b>AWARD/MODIFICATION</b>		MODIFICATION NO.	
27. SPECIAL INSTRUCTIONS: See Special Requirements on Page 5					
28. DELEGATIONS: The administration duties listed below have been delegated to the administrative office (block 23a). Upon request the awarding office contact (block 22) will make their full text available. Please direct questions to the contacts @: <a href="http://www.onr.navy.mil/Contracts-Grants/Regional-Contacts.aspx">http://www.onr.navy.mil/Contracts-Grants/Regional-Contacts.aspx</a>					
This award provides full delegation to the administrative office in Block 23 of the grant. Full delegation includes the functions described in the DoDGARS at 32 CRF 22.715 and the administrative grants officer functions related to payments described in 32 CFR 22.810.					
29. TERMS AND CONDITIONS: The following terms and conditions are incorporated herein by reference with the same force and effect as if they were given in full text. Upon request the awarding office contact named in block 22 will make their full text available, or they can be found at the specified URL.					
DOCUMENT			URL		
The following documents may be found at : <a href="http://www.onr.navy.mil/Contracts-Grants/submit-proposal/grants-proposal/grants-terms-conditions.aspx">http://www.onr.navy.mil/Contracts-Grants/submit-proposal/grants-proposal/grants-terms-conditions.aspx</a> DOD RESEARCH AND DEVELOPMENT GENERAL TERMS AND CONDITIONS (SEPT 2017)  UAWA AWARD A (SEP 2017) ONR ADDENDUM TO THE DOD RESEARCH GENERAL TERMS AND CONDITIONS AND ONR PROGRAMMATIC REQUIREMENTS (SEPT 2017)					
30. OPTIONS	OPTION NO.	AMOUNT	PERIOD		
(1)					
(2)					
(3)					
(4)					
31. REPORTS: The reporting requirements under this award are specified in the articles of part 5 (Financial, Programmatic, and Property Reporting) to the DoD R&D general Terms and Conditions and in the additional language for Part 5 in the ONR Addendum to the DoD R&D General Terms and Conditions.					
32. FOR THE RECIPIENT			33. FOR THE UNITED STATES OF AMERICA		
32a. SIGNATURE OF PERSON AUTHORIZED TO SIGN			33a. SIGNATURE OF AWARDING OFFICER Digitally signed by ELIZABETH FORD 1057503684 Dated: 2018.04.12 07:26:46 EST		
32b. NAME AND TITLE OF SIGNER		32c. DATE SIGNED	33b. NAME AND TITLE OF AWARD OFFICER ELIZABETH FORD		33c. DATE SIGNED 04/12/2018

ONR AWARD FORM (10/99) - version 1.1

## FINANCIAL ACCOUNTING DATA SHEET - NAVY

1. CONTRACT NUMBER (CRITICAL) N00014-18-1-2349		2. SPIIN (CRITICAL)		3. MOD (CRITICAL)		4. PR NUMBER 1000009253									
CLIN/SLIN	6. LINE OF ACCOUNTING													7. AMOUNT (CRITICAL)	NAVY INTERNAL USE ONLY REF DOC/ACRN
	A. ACRN (CRITICAL)	B. APPROPRIATION (CRITICAL)	C. SUBHEAD (CRITICAL)	D. OBJ CLA	E. PARM	F. RFM	G. SA	H. AAA (CRITICAL)	I. IT	J. PAA	K. COST CODE				
											PROJ UNIT	MCC	PDLI & SUF		
AA	1781319	W1AE	410	00	014	0	050120	2D	000000	000024	204	862	\$33,124.00		
AB	1781319	W1AE	410	00	014	0	050120	2D	000000	000024	204	853	\$136,876.00		
PAGE TOTAL												\$170,000.00			
GRAND TOTAL												\$170,000.00			
PREPARED/AUTHORIZED BY:						COMPTROLLER APPROVAL:									
DATE:						FOR FISCAL DATA AND SIGNATURE									
						BY _____						for COMPTROLLER, ONR CONTRACT REVIEWED			
DATE:						DATE:									

ONR AWARD FORM (10/99) - version 1.1

## FINANCIAL ACCOUNTING DATA SHEET – NON-NAVY DoD ACTIVITIES

1. CONTRACT NUMBER (CRITICAL) N00014-18-1-2349		2. SPIIN (CRITICAL)		3. MOD (CRITICAL)		4. PR NUMBER 1000009253				
5. CLIN/SLIN	6. ACRN (CRITICAL)	7. ACCOUNTING CITATION					8. AMOUNT (CRITICAL)		NAVY INTERNAL USE ONLY REF DOC/ACRN	
						PAGE TOTAL				
						GRAND TOTAL				
PREPARED/AUTHORIZED BY:				COMPTROLLER APPROVAL:						
DATE:				FOR FISCAL DATA AND SIGNATURE						
				BY _____ for COMPTROLLER, ONR CONTRACT REVIEWED						
				DATE: _____						

ONR AWARD FORM (10/99) - version 1.1

AWARD NO.

N00014-18-1-2349

## SPECIAL REQUIREMENTS

MODIFICATION NO.

1. The Following payment instructions are hereby provided:

..  
Payment Office:

..  
The payment office shall make payment in sequential ACRN order within the award, exhausting all funds in the previous ACRN before paying from the next ACRN using the following sequential order: alpha/alpha; alpha/numeric; numeric/alpha; and numeric/numeric ACRN sequence.


..  
Grantee:

..  
Payment guides are available on the ONR website at the following link: <http://www.onr.navy.mil/Contracts-Grants/manage-grant/grants-payment/electronic-payment.aspx>

..  
2. Reports

..  
Block 31 of this award form, including any information in the header and underlying rows of that block, is hereby deleted in its entirety and replaced by the following language: "The reporting requirements under this award are specified in the articles of Part 5 (Financial, Programmatic, and Property Reporting) to the DoD R&D General Terms and Conditions and in the additional language for Part 5 in the ONR Addendum to the DoD R&D General Terms and Conditions".



		<b>AWARD/ MODIFICATION</b>			3a. AWARDING OFFICE: Office of Naval Research 875 N. Randolph Street, Suite 1425 Arlington, VA 22203-1995	
		1. INSTRUMENT TYPE: Grant Award		3b. CFDA: 12.300		
4. AWARD NO.: N00014-18-1-2349		2. AUTHORITY: 10 USC 2358 and 31 USC 6304, as amended		3c. DUNS NUMBER: 072933393		
8. ACTIVITY/AGENCY PROPOSAL NO.: GRANT12483394		5. MODIFICATION NO.: P00001	6. MODIFICATION TYPE: IF	7. PR NO.: 4720004684		
		9. RECIPIENT PROPOSAL NO.:	10. PROPOSAL DATE: 09152017	11. ACTIVITY TYPE: R&D	12. PROGRAM TYPE: YIP	
13. ISSUED TO 13a. ADDRESS:  UNIVERSITY OF SOUTHERN CALIFORNIA U S C 3720 S FLOWER ST FL 3 LOS ANGELES CA 90007-4318 UNITED STATES OF AMERICA	13b. CAGE: 1B729	13c. EDVFT NUMBER: N/A	14. REMITTANCE ADDRESS (IF DIFFERENT FROM BLOCK 13): Same as Block # 13			
13d. BUSINESS OFFICE CONTACT: Kalief Washington						
13e. TELEPHONE NUMBER: +1 213 740 2875	13f. EMAIL ADDRESS: kaliefwa@usc.edu					
15. RESEARCH TITLE AND/OR DESCRIPTION OF PROJECT AND/OR PROPOSAL TITLE: Complete Human Digitization and Unconstrained Performance Capture						
16. FUNDING		ACTIVITY/AGENCY SHARE	RECIPIENT SHARE	TOTAL	17. CURRENT FUNDING PERIOD	
PREVIOUSLY OBLIGATED:				\$170,000.00	N/A THROUGH N/A	
OBLIGATED BY THIS ACTION:				\$421,509.00		
TOTAL OBLIGATED ON AWARD:				\$591,509.00		
FUTURE FUNDING:				\$0.00	18. PERIOD OF PERFORMANCE	
GRANT TOTAL:				\$591,509.00	06/01/2018 THROUGH 05/31/2021	
19. ACCOUNTING AND APPROPRIATION DATA: See Attached Financial Accounting Data Sheet (s)						
20a. PRINCIPAL INVESTIGATOR/RECIPIENT TECHNICAL REPRESENTATIVE: Dr. Hao Li			21. TECHNICAL REPRESENTATIVE 21a. NAME: PETER SQUIRE		21b. CODE: 301	
			21c. ADDRESS: ONR ASYMMETRIC WARFARE RESEARCH DIV 875 N. Randolph Street Arlington VA 22203-1995			
20b. TELEPHONE NUMBER: +1 213 740 4494	20c. EMAIL ADDRESS: hao@hao-li.com		21d. TELEPHONE NUMBER: 703-696-0407		21e. EMAIL ADDRESS: PETER.SQUIRE@NAVY.MIL	
22. POC FOR THIS ACTION 22a. NAME: ELIZABETH FORD		22b. CODE: BD255	23a. ADMINISTRATIVE OFFICE: ONR REG Office San Diego Telephone: (619) 221-5490 Email: ONR_San_Diego@navy.mil 140 Sylvester Road, Bldg. 140 Room 218 SAN DIEGO CA 92106		23b. CODE: N66018	
22c. ADDRESS: Office of Naval Research 875 N. Randolph Street Suite 1425 Arlington VA 22203-1995						
22d. TELEPHONE NUMBER: 703-696-2576	22e. EMAIL ADDRESS:					
24. SUBMIT PAYMENT REQUEST TO: Same as block 23a		25a. PAYING OFFICE DFAS-CO/WEST ENTITLEMENT OPERATIONS HQ0339 PO Box 182381 COLUMBUS OH 43218	25b. CODE: HQ0339	26a. PATENT OFFICE: Office of Naval Research ATTN: ONR Office of Counsel Intellectual Property Section One Liberty Center 875 North Randolph Street, Suite 1425 Arlington, VA 22203-1995	26b. CODE: N00014	

ONR AWARD FORM (10/99) - version 1.1



AWARD NO. N00014-18-1-2349		<b>AWARD/MODIFICATION</b>		MODIFICATION NO. P00001	
27. SPECIAL INSTRUCTIONS: See Special Requirements on Page 5					
28. DELEGATIONS: The administration duties listed below have been delegated to the administrative office (block 23a). Upon request the awarding office contact (block 22) will make their full text available. Please direct questions to the contacts @: <a href="http://www.onr.navy.mil/Contracts-Grants/Regional-Contacts.aspx">http://www.onr.navy.mil/Contracts-Grants/Regional-Contacts.aspx</a>					
This award provides full delegation to the administrative office in Block 23 of the grant. Full delegation includes the functions described in the DoDGARS at 32 CFR 22.715 and the administrative grants officer functions related to payments described in 32 CFR 22.810.					
29. TERMS AND CONDITIONS: The following terms and conditions are incorporated herein by reference with the same force and effect as if they were given in full text. Upon request the awarding office contact named in block 22 will make their full text available, or they can be found at the specified URL.					
DOCUMENT			URL		
The following documents may be found at : <a href="http://www.onr.navy.mil/Contracts-Grants/submit-proposal/grants-proposal/grants-terms-conditions.aspx">http://www.onr.navy.mil/Contracts-Grants/submit-proposal/grants-proposal/grants-terms-conditions.aspx</a> DOD RESEARCH AND DEVELOPMENT GENERAL TERMS AND CONDITIONS (SEPT 2017) UAWA AWARD A (SEP 2017) ADDENDUM TO THE DOD R&D GENERAL TERMS AND CONDITIONS AND ONR PROGRAMMATIC					
30. OPTIONS	OPTION NO.	AMOUNT	PERIOD		
(1)					
(2)					
(3)					
(4)					
31. REPORTS: The reporting requirements under this award are specified in the articles of part 5 (Financial, Programmatic, and Property Reporting) to the General Terms and Conditions and in any additional language for Part 5 in an ONR Addendum to the General Terms and Conditions specified in Block 29.					
32. FOR THE RECIPIENT			33. FOR THE UNITED STATES OF AMERICA		
32a. SIGNATURE OF PERSON AUTHORIZED TO SIGN			33a. SIGNATURE OF AWARING OFFICER Digitally signed by VANESSA SEYMOUR 1061137463 Dated: 2019.01.28 17:11:10 EST		
32b. NAME AND TITLE OF SIGNER		32c. DATE SIGNED	33b. NAME AND TITLE OF AWARING OFFICER VANESSA SEYMOUR		33c. DATE SIGNED 01/28/2019

ONR AWARD FORM (1099) - version 1.1

## FINANCIAL ACCOUNTING DATA SHEET - NAVY

1. CONTRACT NUMBER (CRITICAL) N00014-18-1-2349		2. SPIIN (CRITICAL)			3. MOD (CRITICAL) P00001			4. PR NUMBER 4720004684								
CLIN/SLIN	6. LINE OF ACCOUNTING													7. AMOUNT (CRITICAL)	NAVY INTERNAL USE ONLY REF DOC/ACRN	
	A. ACRN (CRITICAL)	B. APPROPRIATION (CRITICAL)	C. SUBHEAD (CRITICAL)	D. OBJ CLA	E. PARM	F. RFM	G. SA	H. AAA (CRITICAL)	I. IT	J. PAA	K. COST CODE					
											PROJ UNIT	MCC	PDLI & SUF			
AC	1791319	W1AE	410	00	014	0	050120	2D	000000	000027	645	200	\$421,509.00			
PAGE TOTAL												\$421,509.00				
GRAND TOTAL												\$421,509.00				
PREPARED/AUTHORIZED BY:							COMPTROLLER APPROVAL: FOR FISCAL DATA AND SIGNATURE									
DATE:							BY _____ for COMPTROLLER, ONR CONTRACT REVIEWED									
DATE:							DATE:									



AWARD NO.

N00014-18-1-2349

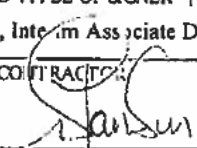

**SPECIAL REQUIREMENTS**

MODIFICATION NO.

P00001

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<b>AWARD/CONTRACT</b>		1. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 700)		RATING	PAGE OF PAGES 1   33
2. CONTRACT (Proc. Inst. Ident.) NO. W911NF-14-D-0005		3. EFFECTIVE DATE 29 September 2014		4. REQUISITION/PURCHASE REQUEST/PROJECT NO.	
5. ISSUED BY US ARMY ACC-APG-RTP W911NF 4300 S. MIAMI BLVD DURHAM NC 27703		CODE W911NF	6. ADMINISTERED BY (If other than Item 5) ONRRO SAN DIEGO 140 SYLVESTER ROAD BLDG 140 ROOM 218 SAN DIEGO CA 92105-3521		CODE N68016
7. NAME AND ADDRESS OF CONTRACTOR (No. street, city, county, state and zip code) UNIVERSITY OF SOUTHERN CALIFORNIA 3720 S FLOWER STREET THIRD FLOOR LOS ANGELES CA 90089-0001				8. DELIVERY <input type="checkbox"/> FOB ORIGIN <input checked="" type="checkbox"/> OTHER (See below)	
				9. DISCOUNT FOR PROMPT PAYMENT	
				10. SUBMIT INVOICES (If copies unless otherwise specified) TO THE ADDRESS SHOWN IN: ITEM	
CODE 1B729		FACILITY CODE			
11. SHIP TO/MARK FOR ARMY RESEARCH LABORATORY ARMY RESEARCH LABORATORY 4000 SOUTH MIAMI BLVD. DURHAM, NC MD 27703		CODE W91B7J	12. PAYMENT WILL BE MADE BY OFAS INDIANAPOLIS-GFEBS 6666 EAST 56TH STREET DEPT. 3600 INDIANAPOLIS IN 46249-3800		CODE HQ0460
13. AUTHORITY FOR USING OTHER THAN FULL AND OPEN COMPETITION: <input checked="" type="checkbox"/> 10 U.S.C. 2304(c)(3) <input type="checkbox"/> 41 U.S.C. 253(c)			14. ACCOUNTING AND APPROPRIATION DATA		
15A. ITEM NO.	15B. SUPPLIES/SERVICES	15C. QUANTITY	15D. UNIT	15E. UNIT PRICE	15F. AMOUNT
<b>SEE SCHEDULE</b>					
15G. TOTAL AMOUNT OF CONTRACT					\$141,000,000.00
16. TABLE OF CONTENTS					
(X) SEC.	DESCRIPTION	PAGE(S)	(X) SEC.	DESCRIPTION	PAGE(S)
PART I - THE SCHEDULE			PART II - CONTRACT CLAUSES		
X A	SOLICITATION/ CONTRACT FORM	1	X I	CONTRACT CLAUSES	24 - 29
X B	SUPPLIES OR SERVICES AND PRICES/ COSTS	2 - 3	PART III - LIST OF DOCUMENTS, EXHIBITS AND OTHER ATTACH.		
X C	DESCRIPTION/ SPECS./ WORK STATEMENT	4 - 8	X J	LIST OF ATTACHMENTS	30 - 33
X D	PACKAGING AND MARKING	9	PART IV - REPRESENTATIONS AND INSTRUCTIONS		
X E	INSPECTION AND ACCEPTANCE	10	K	REPRESENTATIONS, CERTIFICATIONS AND OTHER STATEMENTS OF OFFERORS	
X F	DELIVERIES OR PERFORMANCE	11 - 13	L	INSTRS., CONDS., AND NOTICES TO OFFERORS	
X G	CONTRACT ADMINISTRATION DATA	14 - 17	M	EVALUATION FACTORS FOR AWARD	
X H	SPECIAL CONTRACT REQUIREMENTS	18 - 23	CONTRACTING OFFICER WILL COMPLETE ITEM 17 (SEALED-BID OR NEGOTIATED PROCUREMENT) OR 18 (SEALED-BID PROCUREMENT) AS APPLICABLE		
17. <input checked="" type="checkbox"/> CONTRACTOR'S NEGOTIATED AGREEMENT (Contractor is required to sign this document and return it to issuing office.) Contractor agrees to furnish and deliver all items or perform all the services set forth or otherwise identified above and on any continuation sheets for the consideration stated herein. The rights and obligations of the parties to this contract shall be subject to and governed by the following documents: (a) this award/contract, (b) the solicitation, if any, and (c) such provisions, representations, certifications, and specifications, as are attached or incorporated by reference herein. (Attachments are listed herein.)			18. <input type="checkbox"/> SEALED-BID AWARD (Contractor is not required to sign this document.) Your bid on Solicitation Number _____ including the additions or changes made by you which additions or changes are set forth in full above, is hereby accepted as to the terms listed above and on any continuation sheets. This award consummates the contract which consists of the following documents: (a) the Government's solicitation and your bid, and (b) this award/contract. No further contractual document is necessary. (Block 18 should be checked only when awarding a sealed-bid contract.)		
19A. NAME AND TITLE OF SIGNER (Type or print) Teri Hansen, Interim Associate Director			20A. NAME OF CONTRACTING OFFICER DONETTA Y. GOODSON Contracting Officer		
19B. NAME OF CONTRACTOR BY  (Signature of person authorized to sign)		19C. DATE SIGNED 9/26/2014	20B. UNITED STATES OF AMERICA BY  (Signature of Contracting Officer)		20C. DATE SIGNED 29 Sep 2014

AUTHORIZED FOR LOCAL REPRODUCTION  
Previous edition is NOT usable

STANDARD FORM 26 (REV. 5/2011)  
Prescribed by GSA - FAR (48 CFR) 53.214(a)



## Section B - Supplies or Services and Prices

ITEM NO	SUPPLIES/SERVICES	MAX QUANTITY	UNIT	UNIT PRICE	MAX AMOUNT
0001	Research CLINCOST	UNDEFINED	Job	UNDEFINED	\$141,000,000.00
	This contract defines basic research, applied research, advanced technology development, and technology transfer for the University of Southern California (USC) Institute for Creative Technologies (ICT) in accordance with the Performance Work Statement contained in Section C of the contract.				
	FOB: Destination				
				MAX COST	\$141,000,000.00

ITEM NO	SUPPLIES/SERVICES	MAX QUANTITY	UNIT	UNIT PRICE	MAX AMOUNT
0002 OPTION	Option 1 Research CLINCOST	UNDEFINED	Job	UNDEFINED	\$94,000,000.00
	FOB: Destination				
				MAX COST	\$94,000,000.00

ITEM NO	SUPPLIES/SERVICES	MAX QUANTITY	UNIT	UNIT PRICE	MAX AMOUNT
0003	Accounting for Contract Services	UNDEFINED	Job	UNDEFINED	\$0.00
	Contractors shall report all contractor and subcontractor labor hours required for performance of services under covered contracts to the Enterprise-wide Contractor Manpower Reporting Application <a href="http://www.ecmra.mil/">http://www.ecmra.mil/</a> (eCMRA) no later than 31 October of each calendar year. The eCMRA Web site will be available to receive data to support the inventory of contracts for services. *****NOT SEPARATELY PRICED***** FOB: Destination				
				MAX COST	UNDEFINED

**B.1 CONTRACT TYPE**

This contract is an Indefinite Delivery, Indefinite Quantity (IDIQ) type contract. The contractor shall perform the work efforts as set forth in the Performance Work Statement and as described specifically in individual Task Orders. Orders will be issued on a Cost Reimbursement basis. Each requirement placed under the IDIQ will be negotiated on a task order basis.

**B.2 CONTRACT CEILING AMOUNT AND GOVERNMENT LIABILITY**

a. The ceiling amount of this contract is \$141,000,000.00.

b. Government Liability

The Government's "minimum quantity" liability for services and/or materials required under this contract (in its entirety including the issuance of any or all task orders for the life of the contract), per FAR 52.216-22, is limited to the initial funding of the 1st Task Order, and conditioned upon Government execution of the contract.

## Section C - Descriptions and Specifications

The Contractor will be required to perform on individual Task Orders as described in the Performance Work Statement. The Government will request a cost and technical proposal for the performance of efforts described herein. The request shall contain a description of the specific work to be accomplished, the performance schedule and any other requirements needed to complete the efforts. Upon issuance of a task order, the Contractor shall promptly commence the work and diligently prosecute the work to completion. This contract also sets forth all negotiated terms and conditions pertinent to award of this contract, including specific information required for contract performance and administration.

### 1 Scope

This Performance Work Statement (PWS) defines the non-personal support services for supporting basic research, applied research, advanced technology development, collaborative research, and technology transition for the University of Southern California (USC) Institute for Creative Technologies (ICT) University Affiliated Research Center (UARC) contract. The effort specified by this PWS establishes the basis for the USC ICT contract research projects.

#### 1.1 Background

The USC ICT is an officially designated and established UARC by the Department of Defense (DOD). The USC ICT's primary focus is in the area of advanced modeling and simulation and training (MS&T). The DOD originally established the USC ICT in 1999 as a separate institute for conducting research in advanced MS&T. The USC ICT has performed research and development across the disciplines of computer and learning sciences, capitalizing on related technologies, techniques, and methodologies used within the entertainment industry. Its research has advanced basic and applied sciences with respect to MS&T and has produced new tools, methods, and technologies which transitioned into prototypes of systems that are being used by military service members and multi-service DOD organizations. The USC ICT has conducted significant R&D and its expertise and capabilities are valued and leveraged by DOD agencies, military service members, academic and research organizations, and industry.

#### 1.2 Security Classification Level

This effort is UNCLASSIFIED. No classified or access to classified material will be involved in the performance of this contract. Projects that require a higher level of classification than UNCLASSIFIED will be handled on a case-by-case basis.

### 2 Requirements

This effort provides R&D and other activities in support of DoD needs associated with the USC ICT's approved Core Competencies.

#### 2.1 USC ICT Tasks and Activities

The USC ICT shall perform R&D and other activities within the approved core competencies in the areas of training, education, operations, health and other arenas where the research, technologies, and methodologies may be applied. The following subparagraphs identify the USC ICT's core competencies.

**2.1.1 Generation and display of realistic sensory input for immersive virtual environments**

This competency includes basic, applied and advanced development research for the creation of realistic virtual environments including, but not limited to:

- Research & development of hardware and software for 2D or 3D computer graphics that capture, manipulate, render and present images, animations, videos, databases, data visualizations and movies.
- Research & development of hardware and software to create immersive audio, 3D sound acquisition and adaptive rendering. Area includes sonification and information presentation.
- Development and systems integration of hardware and software of virtual reality-based immersion that can simulate the senses, support mobility, and position sensing.

**2.1.2 Development of engaging virtual simulation, video-based training, and medical/health related content**

This competency includes basic, applied and advanced development research of training and other content that may involve:

- Research & development of hardware, software, and artificial intelligence to be used in the development of training and medical/health related content using video, film, computer animations and other digital media, and static media such as writing, still photography, and sound/music composition.
- Synthesis of creative content with simulation technologies, including artificial intelligence research, to make immersive learning environments that are engaging and effective.
- Support of the setup and configuration of simulation environments, terrain, and entity models to include content generation and scenario authoring.

**2.1.3 Use of artificial intelligence technology to generate computer-based individual and group models and behaviors**

This competency includes basic, applied and advanced development research for artificial intelligence including natural language processing, automated reasoning, cognitive architectures, perception and spatial reasoning, knowledge representation, machine learning, simulation execution monitoring and direction, emotion modeling, interactive cognitively realistic virtual humans, and social simulations that simulate human social interaction at the individual and group level.

**2.1.4 Study and development of applications of learning theory, instructional design, and assessment to create effective instructional content**

This competency includes basic, applied and advanced development research on new paradigms for effective learning such as the use of narrative, tutoring systems, and tools for improving instructional content, effectiveness, and after action review to include but not limited to:

- The application of new learning techniques within the context of military training.
- Research and development of evaluation techniques using instrumentation, data collection, and measurement tools and methodologies.
- Research and development of models and strategies for determining the effectiveness of training and performance of individuals and groups in simulations and other computer-based environments.

**2.1.5 Knowledge integration and conduct of purpose based research**

This competency includes basic, applied and advanced development research methods to integrate knowledge from core research disciplines in support of training, education, operations, mental and physical health, and other areas where research and technologies may be applied. Develop a use-based research philosophy that addresses Department of Defense (DOD) defined Science and Technology (S&T) gaps and supports transition opportunities to DOD, academia, and industry. Provide mission and public service oriented research, engineering, evaluation, and systems analysis to respond to evolving DOD requirements through the organization's core competencies.

## 2.2 Program Management

The USC ICT shall establish and maintain a project management program during performance of the contract to include provisions for technical and administrative planning, organization, coordination, resource allocation, cost estimation, and risk management to ensure the requirements of the contract are effectively executed. The USC ICT shall conduct reasonable cost avoidance strategies to maximize efficient execution of project funds, manage and execute the USC ICT's R&D program, and provide the necessary support to keep the Army informed of activities and actions concerning projects and initiatives.

### 2.2.1 Meetings, Reviews, and Events

The USC ICT shall conduct and participate in meetings, reviews, and events. The USC ICT shall prepare, as applicable, briefings, multi-media content, and displays for presentation purposes. The USC ICT shall, for the TAB, ESB, and STTC Review (or other annual research meeting as designated by STTC), document minutes, action items, coordinate resolutions, and track action items from the applicable event. These items shall be archived for the length of the contract and be available upon request.

The USC ICT shall host and/or provide support, as requested, for the conduct of periodic meetings to include:

- Technical Advisory Board (TAB) or other annual research review as designated by the STTC at the USC ICT or at another mutually agreed location.
- Executive Steering Board (ESB) in Washington D.C. or at another mutually agreed location.
- STTC Review in Orlando, FL or at another mutually agreed location.
- Collaborative Research Workshops. USC ICT shall conduct collaborative research workshops for a minimum of two of USC ICT's research projects focus areas. These workshops may include participation from across other University Affiliated Research Centers (UARCs), Centers of Excellence (COEs), Collaborative Technology Alliances (CTAs), industry, appropriate DoD and National laboratories, and experts at other universities or research labs, as appropriate.

The meetings identified above will provide forums for Army scientists, managers, stakeholders, customers, and users to explore opportunities for synergy and collaboration, assess priorities for ongoing research activities, and evaluate the USC ICT's progress.

Other face-to-face meetings, telecons, and video conferences shall be supported by the USC ICT as reasonably required.

### 2.2.2 Cost Management

The USC ICT shall establish and maintain a cost schedule system. The system shall coincide and track with the cost elements presented within each of the USC ICT tasks.

2.2.2.1 Invoice and Payment Summary Report. The USC ICT shall develop and provide as a deliverable an Invoice and Payment Summary Report which tracks and documents the following invoice and payment information for each Task Order:

- a. Task Order Number and Title
- b. Task Order Start and End Dates
- c. Invoice Number
- d. Invoice Date
- e. Invoice Amount
- f. Cumulative Total Invoiced
- g. Payment Received Date
- h. Payment Amount Received
- i. Cumulative Total of Payments Received

- j. SUBCLIN totals (obligations, invoice history, and cumulative total invoiced to date and the balance remaining for each SUBCLIN)

**2.2.2.2 Cost Projections Report.** The USC ICT shall develop and provide as a deliverable a Cost Projections Report that documents the following information for each Task Order:

- a. Task Order Number
- b. Award amount
- c. Funded amount
- d. Total expenses through the end of the reporting period
- e. Pending expenses
- f. Projected balance at the end of the period of performance by funding type (6.1, 6.2, 6.3, and customer)
- g. Status of Final Project Deliverables (addressed under PWS paragraph 2.2.5.2) , Patent Reports, and Final Invoices

The USC ICT shall also maintain funding information at the individual project level which can be provided in draft form upon request.

The above reports can be provided in the contractor's format. Specific instructions regarding reporting frequency and where reports shall be submitted are addressed in Section F of this contract.

### **2.2.3 Travel**

The USC ICT shall travel as needed to ensure effective execution of the USC ICT and the tasks within this PWS.

### **2.2.4 Materials and Support**

The USC ICT shall procure materials and provide support as needed to ensure effective execution of the USC ICT and the tasks within this PWS.

### **2.2.5 Program Status**

The USC ICT shall maintain records and document the status of work performed for each project. Documentation shall include the items identified in this section.

**2.2.5.1 Program Status Report.** The USC ICT shall develop and provide as a deliverable a program status report. The program status report shall provide, for each major project, identifying and status information to include (as applicable): a description of the project, identification of requirements organization, collaborations and leveraging successes, major milestones, progress and successes to date, issues/risks, and publications and products to date. In the Appendix of this Report please include (as applicable) a list of major accomplishments by GFY starting and update this list with each release of the Program Status Report. Please include on this achievement information such as list major advances and project successes, awards and recognitions (e.g., best paper, presentation, demonstration, achievement, and poster awards, etc), keynote and plenary presentations, invited talks for conferences/symposiums, performances as conference chairs and leading committees/workshops, demonstrations of major innovations and research, major transitions of research and technology to other organizations (government, industry, and academia), technical reports and other publications, a list of patents and status (e.g., patents planned, in progress, or obtained), and any other major accomplishments.

**2.2.5.2 Final Project Deliverables.** The USC ICT shall develop and provide as a deliverable a final consolidated set of organized project deliverables upon conclusion of a project (note: many projects are multi-year and can be comprised of multiple proposals ). This organized set of deliverables shall include, as applicable, the final software (executable will be delivered with the organized set and source code will be delivered upon request), software documentation, data deliverables, and multi-media content. In addition a final report communicating accomplishments, results and findings shall be provided. Whenever equipment is being delivered to a government facility as a leave behind capability an equipment listing of any equipment purchased and delivered shall also be compiled and provided as to include a description, the model number, the serial number, and the cost for each piece



of equipment. A summary page shall accompany the final project deliverables communicating the software, data, or multi-media items being delivered, the list of third party software required to run the software or multi-media products, and a listing and status of patents submitted or awarded.

**2.2.5.3 Tours Report.** The USC ICT shall develop and provide as a deliverable a tours report which identifies upcoming events, planned visitors, and maintains a historical log.

The above data, software, and reports can be provided in the contractor's format. Specific instructions regarding reporting frequency and where reports shall be submitted are addressed in Section F of this contract.

### **2.3 Information Assurance.**

The USC ICT shall support information assurance to the level appropriate for the R&D efforts being undertaken.

### **2.4 Safety.**

The USC ICT shall implement a safety risk management program to ensure the safety of the design, installation, transportation, maintenance, support and disposal without any unacceptable safety hazards.

### **2.5 USC ICT Website**

The USC ICT shall maintain a USC ICT website. The USC ICT shall provide information pertinent to the UARC contract on this website to include: an overview of all ongoing projects pursuant to this agreement, research products, technical publications and other project related information, points of contact information, and other pertinent information.

### **2.6 Government Furnished Property/Information (GFP/GFI)**

The use of Government Furnished Property/Information (GFP/GFI) may be required to support certain USC ICT projects. The USC ICT shall make every effort to identify these requirements as early in the process as possible, preferably during the proposal submission stage. The USC ICT shall identify this need in writing to the Government Program Manager. The request shall also address what alternatives the USC ICT will pursue to meet their requirements if the GFP/GFI requested cannot be provided.

To the extent possible, and to the extent such GFP/GFI is not designated by the government as restricted, the USC ICT shall host any GFP/GFI provided in a common library so that it can be shared by all projects. This GFP/GFI will be provided on an as required basis to support the execution of USC ICT Projects.

### **2.7 ACCOUNTING FOR CONTRACT SERVICES REQUIREMENT (ACC-APG 5152.237-4900)**

The contractor shall report ALL contractor labor hours (including subcontractor labor hours) required for performance of services provided under this contract. The contractor is required to completely fill in all required data fields using the following web address: <http://www.ecmra.mil/>, and then click on "Department of the Army CMRA" or the icon of the DoD organization that is receiving or benefitting from the contracted services.

Reporting inputs will be for the labor executed during the period of performance during each Government fiscal year (FY), which runs October 1 through September 30. While inputs may be reported any time during the FY, all data shall be reported no later than October 31 of each calendar year, beginning with 2013. Contractors may direct questions to the help desk by clicking on "Send an email" which is located under the Help Resources ribbon on the right side of the login page of the applicable Service/Component's Contractor Manpower Reporting website.

Notwithstanding the foregoing, it is understood that, because the USC payroll system does not track labor hours, the hours provided in the report will be an estimate.

**Section D - Packaging and Marking**

**The contractor shall ensure that the preservation, packing, packaging and marking of the deliverable items are compliant with State and Federal Department of Transportation requirements and the Contractor's best commercial practices to prevent hazards of shipment and handling and to ensure safe delivery at destination.**

Section E - Inspection and Acceptance

**INSPECTION AND ACCEPTANCE (DESTINATION)**

Inspection and acceptance of the research and development services, technical reports, and prototypes to be furnished hereunder shall be performed at destination by the COR, Task Order Technical Point of Contact, or other Government designated representative.

**INSPECTION AND ACCEPTANCE TERMS**

Supplies/services will be inspected/accepted at:

CLIN	INSPECT AT	INSPECT BY	ACCEPT AT	ACCEPT BY
0001	Destination	Government	Destination	Government
0002	Destination	Government	Destination	Government
0003	Destination	Government	Destination	Government

**CLAUSES INCORPORATED BY REFERENCE**

52.246-9                      Inspection Of Research And Development (Short Form)                      APR 1984

## Section F - Deliveries or Performance

### PERIOD OF PERFORMANCE

The contract shall commence on date of contract award and shall continue 36 months thereafter for the base period.

This contract contains an Option Period for 24 months.

### MINIMUM AND MAXIMUM QUANTITIES

As referred to in paragraph (b) of FAR clause 52.216-22, Indefinite Quantity, the contract minimum and maximum quantities are established as follows:

- (1) The guaranteed minimum for this contract in its entirety is limited to the funding of the first task order.
- (2) The maximum quantity is the dollar ceiling amount identified in Section B for the base period of performance (\$141,000,000.00).

### REPORTING REQUIREMENTS

#### F.1

The following specific instructions are provided for reports and deliverables:

- a. Invoice and Payment Summary Report (PWS para 2.2.2.1). This report shall be provided on a monthly basis through the life of the contract. This deliverable for the month of June may be delivered No Later Than (NLT) 15 August.
- b. Cost Projections Report (PWS para 2.2.2.2). This report shall be provided semi-annually through the life of the contract on the following dates: 15 February and 15 August.
- c. Program Status Report (PWS 2.2.5.1). For all efforts awarded under the Reinvestment Task Order and all ICT 6.1/6.2 mission funded efforts this deliverable shall be provided NLT 15 May and 15 Nov through the life of the contract. For all other efforts awarded under the contract this deliverable shall be provided on a quarterly basis NLT 15 February, 15 May, 15 August, and 15 November unless the customer for specific efforts has required more frequent reporting. All program status reports shall be accessible via secure electronic file sharing services.
- d. Final Project Deliverables Summary (PWS 2.2.5.2). This deliverable shall be provided within 90 days after project completion.
- e. Tours Report (PWS 3.2.5.3). This deliverable shall be provided on a monthly basis through the life of the contract NLT the 5<sup>th</sup> of the month.

Extensions and waivers to the due dates identified above may be considered and approved on a case-by-case basis by the government.

#### F.2

Publications in appropriate professional journals relating to USC ICT project work is encouraged as an important method of recording and reporting information.

Unless prohibited by the applicable publisher, all accepted manuscripts for publications associated with USC ICT project work shall be made available, via the USC ICT website, to the Government Contracting Officer, the Government Contracting Officer's Representative (COR), and the Government Program Manager.

Please also refer to ARO Form 18 (<http://www.arl.army.mil/www/pages/218/form18.pdf>) for specific reporting requirements for these manuscripts (Note: none of the other reports identified in ARO Form 18 are required for delivery under this contract). These manuscripts shall be submitted electronically in PDF format when possible. If you are not able to submit reports electronically you should submit as indicated in the ARO Form 18.

Unless otherwise expressly stated in the applicable task order, delivery shall be as follows:

#### DELIVERY INFORMATION

CLIN	DELIVERY DATE	QUANTITY	SHIP TO ADDRESS	UIC
0001	POP 30-SEP-2014 TO 29-SEP-2017	N/A	ARMY RESEARCH LABORATORY ARMY RESEARCH LABORATORY 4300 SOUTH MIAMI BLVD. DURHAM, NC MD 27703 FOB: Destination	W71B7J
0002	POP 30-SEP-2017 TO 29-SEP-2019	N/A	(SAME AS PREVIOUS LOCATION) FOB: Destination	W71B7J
0003	POP 30-SEP-2014 TO 29-SEP-2017	N/A	(SAME AS PREVIOUS LOCATION) FOB: Destination	W71B7J

#### CLAUSES INCORPORATED BY REFERENCE

52.211-8	Time of Delivery	JUN 1997
52.242-15	Stop-Work Order	AUG 1989
52.247-34	F.O.B. Destination	NOV 1991
252.247-7023	Transportation of Supplies by Sea	APR 2014
252.247-7024	Notification Of Transportation Of Supplies By Sea	MAR 2000

#### CLAUSES INCORPORATED BY FULL TEXT

##### 52.217-9 OPTION TO EXTEND THE TERM OF THE CONTRACT (MAR 2000)

(a) The Government may extend the term of this contract by written notice to the Contractor; provided that the Government gives the Contractor a preliminary written notice of its intent to extend before the contract expires. The preliminary notice does not commit the Government to an extension.

(b) If the Government exercises this option, the extended contract shall be considered to include this option clause.

(c) The total duration of this contract, including the exercise of any options under this clause, shall not exceed 60 months.

(End of clause)



## Section G - Contract Administration Data

G.1. Delegation of Administration Functions: The following contract administration functions are hereby delegated to the Office of Naval Research specified below and in Block 6 of the SF 26 award page.

Office of Naval Research (ONR) Regional Office  
ONR San Diego Regional Office  
DODAAC: N66018  
140 Sylvester Road, Building 140  
Room 218  
San Diego, CA 92106-3501  
TELEPHONE: 619-221-5490 or 619-221-5600  
E-mail: [ONR\\_San\\_Diego@navy.mil](mailto:ONR_San_Diego@navy.mil)

The following duties are delegated to ONR San Diego as follows:

- 1) Property administration, except the approval of the contractor's requests to purchase equipment with contract funds for items not specifically listed in the current budget. Such approvals must be authorized by the Contracting Officer.
- 2) Patent requirements.
- 3) Closeout of each delivery order.
- 4) Obtain required technical reports.
- 5) Approve requests for Registration of Scientific and Technical Information Services (DD Form 1540).
- 6) Certify vouchers.

G.2. Audit Functions: Audit functions will be conducted by the Defense Contract Audit Agency (DCAA) specified below:

Defense Contract Audit Agency  
DODAAC: HAA656  
San Gabriel Valley Branch Office  
1000 E. Lakes Drive, Suite 400  
West Covina, CA 91790-2900  
TELEPHONE: 626-918-5922  
E-mail: [dcaa-fao4901@dcaa.mil](mailto:dcaa-fao4901@dcaa.mil)

G.3 Payment Office:

DFAS Indianapolis - GFEBs  
DODAAC: HQ0490  
8899 East 56th Street, Dep 3800  
Indianapolis, IN 46249-3800

G.4. Contracting Officer's Representative (COR)

a. The Contracting Officer has designated the individual listed below as the authorized Contracting Officer's Representative (COR) for this contract. The Contracting Officer's Representative for this contract is as follows:

Mr. Joseph M. Brennan  
U. S. Army Research Laboratory  
TELEPHONE: 407-384-3855  
E-mail: [joseph.m.brennan12.civ@mail.mil](mailto:joseph.m.brennan12.civ@mail.mil)

b. Neither the COR nor the TPOC has the authority to take any action, either directly or indirectly, that would change any of the contract terms and conditions (i.e., pricing, task schedule, task destination) or to otherwise direct the accomplishment of effort which goes beyond the scope of this contract. Section H of this contract sets forth the principles for changes under the contract.

#### CLAUSES INCORPORATED BY FULL TEXT

##### 252.204-0003 LINE ITEM SPECIFIC: CONTRACTING OFFICER SPECIFIED ACRN ORDER. (SEP 2009)

The payment office shall make payment within the line item in the sequence ACRN order specified below, exhausting all funds in the previous ACRN before paying from the next ACRN.

<u>Line Item</u>	<u>ACRN Order</u>
As designated by the COR	As designated by the COR
(End of clause)	

##### 252.232-7006 WIDE AREA WORKFLOW PAYMENT INSTRUCTIONS (MAY 2013)

(a) Definitions. As used in this clause--

Department of Defense Activity Address Code (DoDAAC) is a six position code that uniquely identifies a unit, activity, or organization.

Document type means the type of payment request or receiving report available for creation in Wide Area WorkFlow (WAWF).

Local processing office (LPO) is the office responsible for payment certification when payment certification is done external to the entitlement system.

(b) Electronic invoicing. The WAWF system is the method to electronically process vendor payment requests and receiving reports, as authorized by DFARS 252.232-7003, Electronic Submission of Payment Requests and Receiving Reports.

(c) WAWF access. To access WAWF, the Contractor shall--

(1) Have a designated electronic business point of contact in the System for Award Management at <https://www.acquisition.gov>; and

(2) Be registered to use WAWF at <https://wawf.eb.mil/> following the step-by-step procedures for self-registration available at this Web site.

(d) WAWF training. The Contractor should follow the training instructions of the WAWF Web-Based Training Course and use the Practice Training Site before submitting payment requests through WAWF. Both can be accessed by selecting the "Web Based Training" link on the WAWF home page at <https://wawf.eb.mil/>.

(e) WAWF methods of document submission. Document submissions may be via Web entry, Electronic Data Interchange, or File Transfer Protocol.

(f) WAWF payment instructions. The Contractor must use the following information when submitting payment requests and receiving reports in WAWF for this contract/order:

(1) Document type. The Contractor shall use the following document type(s).

**Cost Voucher**

(2) Inspection/acceptance location. The Contractor shall select the following inspection/acceptance location(s) in WAWF, as specified by the contracting officer.

**W71B7J**

(3) Document routing. The Contractor shall use the information in the Routing Data Table below only to fill in applicable fields in WAWF when creating payment requests and receiving reports in the system.

**Routing Data Table\***

Field Name in WAWF	Data to be entered in WAWF
Pay Official DoDAAC	HQ0490
Issue By DoDAAC	W911NF
Admin DoDAAC	N66018
Inspect By DoDAAC	W71B7J
Ship To Code	W71B7J
Ship From Code	N/A
Mark For Code	N/A
Service Approver (DoDAAC)	W71B7J
Service Acceptor (DoDAAC)	W71B7J
Accept at Other DoDAAC	N/A
LPO DoDAAC	N/A
DCAA Auditor DoDAAC	HAA656
Other DoDAAC(s)	N/A

(\*Contracting Officer: Insert applicable DoDAAC information or "See schedule" if multiple ship to/acceptance locations apply, or "Not applicable.")

(4) Payment request and supporting documentation. The Contractor shall ensure a payment request includes appropriate contract line item and subline item descriptions of the work performed or supplies delivered, unit price/cost per unit, fee (if applicable), and all relevant back-up documentation, as defined in DFARS Appendix F, (e.g. timesheets) in support of each payment request.

(5) WAWF email notifications. The Contractor shall enter the email address identified below in the "Send Additional Email Notifications" field of WAWF once a document is submitted in the system.

[Vonetta.g.mcneal.civ@mail.mil](mailto:Vonetta.g.mcneal.civ@mail.mil)  
[joseph.m.brennan12.civ@mail.mil](mailto:joseph.m.brennan12.civ@mail.mil)

(g) WAWF point of contact. (1) The Contractor may obtain clarification regarding invoicing in WAWF from the following contracting activity's WAWF point of contact.

N/A

(2) For technical WAWF help, contact the WAWF helpdesk at 866-618-5988.

(End of clause)

## Section H - Special Contract Requirements

H.1. Title to each item of equipment acquired with contract funds shall be as follows:

Title shall vest in the contractor provided the approval to purchase the equipment was obtained from the Contracting Officer as required by FAR 52.245-5, Alt I. The contractor agrees, as a condition to taking title, that no charge will be made to the Government for any depreciation, amortization, or use with respect to such equipment under any existing or future Government contract or subcontract there under. Equipment included in approved Task Order budgets may be purchased without further prior approval.

H.2. The Subcontracting Plan submitted by the University of Southern California was deemed compliant by the Small Business Administration (SBA) Representative, Ms. Gina Holman, and is hereby incorporated by reference. Updates to the Subcontracting Plan originally submitted by USC, shall be made on an annual basis to reflect the Government Fiscal Year funding. The amended plan must be reviewed and approved by the SBA Representative annually to reflect the cumulative goals.

H.3. In accordance with FAR subpart 4.12, Representations and Certifications, prospective contractors are required to complete electronic annual representations and certifications; this requirement has been consolidated and has migrated into the System Award Management database, located at <https://www.sam.gov/portal/public/SAM>. Specific instructions for this requirement can be found @<http://farsite.hill.af.mil/vffara.htm>.

H.4. Acknowledgment of Sponsorship

a. The contractor agrees that in the release of information relating to this contract, such release shall include a statement to the effect that the project or effort depicted was or is sponsored by the U.S. Army Research Laboratory (ARL) under contract number W911NF-14-D-0005, and that the content of the information does not necessarily reflect the position or the policy of the Government, and no official endorsement should be inferred.

b. For the purpose of this provision, "information" includes news releases, articles, manuscripts, brochures, advertisements, still and motion pictures, etc.

c. The contractor further agrees to include this provision in any subcontract awarded as a result of this contract.

d. The contractor will make reasonable efforts to include the acknowledgement of H.4.a. in any speeches, trade association proceedings or symposia materials or presentations. Inadvertent failure to provide the report may not constitute a breach of the contract.

H.5. Research Responsibility

a. The contractor shall bear responsibility for the conduct of the research specified in the contractor's proposal identified in the contract. The contractor will exercise judgment in obtaining the stated research objectives within the limits of the terms and conditions of the contract; provided, however, that the contractor will obtain the Contracting Officer's approval to change the Performance Work Statement. Consistent with the foregoing, the contractor shall conduct the work as set forth in this proposal and accepted by the contract award.

b. Whenever a proposal is submitted for a project under this contract, the ICT's Principal Investigator identified in the proposal shall be continuously responsible for the conduct of the

research, and shall be closely involved with the research efforts. If, at any time during a budgetary year, an ICT Principal Investigator's level of effort devoted to a given project for the year varies from the proposed amount by an amount equal to ten percent or more of his total time for the year, the contractor shall advise the Contracting Officer.

c. The contractor shall obtain the Contracting Officer's approval prior to changing ICT Principal Investigators identified within the project proposals. The Contracting Officer shall be notified if there is a change in the Project Leads identified in the project proposals.

#### H.6 Restriction on Printing

The Government authorizes the reproduction of reports, data or other written material, if required, provided the material produced does not exceed 5,000 production units of any page, and items consisting of multiple pages do not exceed 25,000 production units in the aggregate. The contractor shall obtain the express prior written authorization of the contracting officer to reproduce material in excess of the quantities cited above.

#### H.7 Task Order Procedures

- a. As the need exists for performance under the terms of this contract, the Contracting Officer or his/her authorized representative will notify the Contractor of an existing requirement.
- b. Upon receipt of this notification, the Contractor shall respond to the needs of the Government within five (5) working days by:
  1. Establishing contact with the Contracting Officer or his/her authorized representative to further define the scope of the requirement.
  2. Submitting a proposal to the Contracting Officer on the proposed work for this task order by a mutually agreed upon date.
- c. Time for submittal of the Contractor's proposal for individual requirements shall be as agreed upon by the Government and the Contractor based on the value of the Task Order and the urgency of the requirement, as defined or established during the initial planning. In the absence of an agreement, the proposal shall be submitted within fifteen (15) working days, after the Government and the Contractor have agreed to the technical details of the effort.
- d. Upon receipt of the Contractor's proposal, the Government will review the proposal for completeness and negotiate the items (as applicable), performance times, and method. The Contractor shall be required to resubmit the negotiated proposal within ten (10) working days, if necessary.
- e. The work to be included in an individual requirement must be proposed using the proposal format to be agreed upon by the Government and the Contractor at that time.
- f. Each task order will be issued for the scope of work negotiated.
- g. Task orders will be issued by the Contracting Officer on a DD Form 1155. Each Task Order will include the following information:
  - (1) Date of the Task Order;
  - (2) Contract Number and Task Order Number;
  - (3) Scope of work and negotiated cost;
  - (4) Performance data;
  - (5) Accounting and Appropriation data;



(6) Any other pertinent data

- h. It should be realized by the Contractor that circumstances may prohibit the Government from issuing an individual Task Order, even after the receipt of the Contractor's Task Order proposal. If such circumstances arise, the Government is not obligated to reimburse the Contractor for any costs incurred in the preparation of the Task Order proposal.
- i. The basic UARC contract provides for no restrictions on information emerging from the UARC or on personnel who may work on any UARC efforts. If and when, the Army perceives the need to undertake specific new R&D tasks that would require such restrictions, these restrictions would be defined in the specific Task Orders funding these new R&D efforts. USC ICT will have the right not to accept such task orders, if USC ICT finds the terms unacceptable. Unless specifically stated in the applicable funding task order, the work to be performed, including any developmental efforts, and deliverables required, under this contract has both civil and military applications.

H.8 Restrictions of Personnel

- a. A requirement of this contract is to maintain stability of personnel proposed in order to provide quality service. The Contractor agrees to assign only those Key Personnel whose resumes were approved and who are necessary to fulfill the requirements of the effort. For the purposes of this contract, "Key Personnel" are defined as the Executive Team consisting of the Executive Director, Technical Director, and Managing Director.
- b. The contractor agrees that no Key Personnel substitutions or additions will be made unless necessitated by compelling reasons including, but not limited to, an individual's illness, death or termination of employment, declining an offer of employment (for those individuals proposed as contingent hires), or maternity and/or paternity leave. In any of these events, the contractor shall promptly provide the information required by paragraph c. below, to the Contracting Officer for approval prior to the substitution or addition of Key Personnel. Proposed substitutions of Key Personnel must meet or exceed the qualifications of personnel for whom they are proposed to replace. Fully compliant requests for substitutions or additions must be submitted in writing, to the Contracting Officer, for approval at least fifteen (15) working days in advance of the proposed change.
- c. Each request for Key Personnel changes must include a detailed explanation of the circumstances necessitating the proposed substitutions or additions. A complete resume of the proposed change, information regarding the full financial impact of the change, and any other information requested by the Contracting Officer shall be provided with each request.

H.9 Government Furnished Property (GFP)

Upon completion of the contract, all GFP shall be returned to the Government, or otherwise disposed of, as directed by the Government. Reference FAR 52.245-5, Alternate I, Government Property.

H.10 Army and Other Government Agency (OGA) Guest Researchers

Army and Other Government Agency (OGA) Guest Researchers will participate as active research partners in the USC ICT Facility, subject to the following conditions: 1) the U.S. Army and USC ICT will collaboratively identify the project and researchers; 2) both parties will have the opportunity to accept or reject the proposed effort; 3) once accepted, both parties will collaboratively develop a PWS and initial proposal for this effort within one week; 4) this mutually agreed upon, and technically acceptable, effort will result in a Task Order to be issued in accordance with H.7. Task Order Procedures of the basic contract; 5) the researcher will not work

at the USC ICT facilities in military uniform; and 6) funding for the Guest Researcher shall not come from the funding designated for USC ICT by ASAALT or from taxes on such funding. The participation of Army and OGA Guest Researchers at the USC ICT facility is considered an important part of the USC ICT partnership. Each Army and OGA Guest Researcher to be utilized will work under specific task orders and shall be included as part of a given task order proposal. The sponsoring organization will pay the salary, benefits, lodging, and per diem for the Army and/or OGA guest researcher(s). The USC ICT proposals shall identify any other expenses which must be funded to accommodate any Army and/or OGA Guest Researchers to be utilized at the USC ICT. Once the contracting action is complete, the Army and/or OGA will be appointed as a guest member of the research staff of the USC ICT facility, and shall have all the associated privileges (parking, use of facilities, infrastructure, etc). It is considered important that the Army and/or OGA Guest Researchers be fully integrated into the research culture of the USC ICT. Research projects associated with the Army and/or OGA Guest Researchers will be subject to the same review process as any other research project under the USC ICT contract. Projects will be evaluated for technical merit, contribution to the USC ICT objectives and technical progress.

#### H.11

##### Intellectual Property

a. In each task order proposal, USC ICT shall provide the Government with an option to acquire perpetual Government Purpose Rights (GPR) in non-commercial computer software and technical data developed solely at private expense. It is understood that a price may be associated with the acquisition of GPR in material developed wholly at private expense. For any non-commercial computer software and technical data developed with a combination of private funding and funding through a task order under this contract, the Government will have Government Purpose Rights (GPR) in perpetuity.

b. Noncommercial software (including audio and visual content incorporated in a software-controlled system, including but not limited to an interactive or immersion system) and technical data developed under a given USC ICT task order pursuant to this contract will be delivered to the Government with perpetual GPR in accordance with DFARS 252.227-7014. The primary deliverable(s) for all non-commercial software under a given USC ICT project shall be executable code, however, source code shall also be provided when requested by the government. Any commercial software products anticipated to be used in the development of a given USC ICT project shall be identified, to the extent possible, in the appendix of the proposal. A final list of required commercial software shall be provided as part of the software documentation pursuant to the project deliverables. Commercial software will be provided subject to the vendor's standard commercial license in accordance with DFARS 227.7202-3.

c. For purposes of the PWS, GPR is defined in DFARS 252.227-7014, Rights in Noncommercial Computer Software and Noncommercial Computer Software Documentation, and DFARS 252.227-7013, Rights in Technical Data - Noncommercial Items. GPR permits the Government to use and release the noncommercial computer software and technical data for any purpose of the Government, which does not include commercial use. A Government purpose may be any noncommercial undertaking in which the Government is a party. Before the non-commercial computer software and technical data may be released to a third-party for Government purposes, the Government will ensure that the third-party is made subject to use and non-disclosure restrictions. Those restrictions are accomplished either by the application of DFARS 252.227-7025, or agreement under DFARS 227.7013-7. GPR does not permit the Government to use the software/data for commercial purposes, nor does it permit the Government to authorize others to use the software for commercial purposes.

d. In each task order proposal, USC ICT will comply with DFARS 252.227-7017, Identification and assertion of use, release, or disclosure restrictions.

e. Except as otherwise agreed in a task order, new sound and visual recordings produced under this agreement (other than those incorporated in a software controlled system) shall be treated as Special Works in accordance with DFARS 252.227-7020, and the government hereby grants to contractor a perpetual, royalty-free, worldwide license with right of sublicense to reproduce and display any portion of such material, and to incorporate it in other works.

f. Except as otherwise agreed in a task order, if a deliverable incorporates copyrightable content owned by a third party, that deliverable will be licensed for government use in the medium and for the purpose for which it was created, and may be subject to restrictions on other uses imposed by the copyright owner. (For example, movie film footage licensed for use in a training film could not be incorporated in a recruitment advertisement and broadcast on television without further authorization from the copyright holder.) Contractor will notify the contracting officer of any such restrictions prior to incorporating such material in a deliverable.

g. In the event that a Guest Researcher at the USC ICT is an inventor or co-inventor of a subject invention under this contract, the contractor will have the option of electing title in the invention, the government will assign its ownership interest to the contractor in accordance with 35 USC § 202(e)(1), and the government will have a nonexclusive, nontransferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the government the subject invention throughout the world. As a condition of and prior to working at the USC ICT, each Guest Researcher will be required to execute a Visitor Agreement, substantially in the form of Appendix D, modified as appropriate to the circumstances, which grants the Guest Researcher the right to a share of net royalty income from inventions that he or she invents or co-invents.

## H.12

### Adjunct Projects

Adjunct Projects are defined as projects outside of the UARC core program which are undertaken for private sector sponsors.

#### a. Acceptance Criteria:

- (1) Adjunct Projects must fall within the USC ICT approved mission and purpose, and draw upon one or more of its approved core competencies, and
- (2) Funding must be available from the sponsoring agency.

b. Conditions for Adjunct Projects : The USC ICT can accept adjunct projects from the private sector after consultation with the Government. The following procedure shall apply.

- (1) The USC ICT shall notify the Government Contracting Officer and/or the Project Director as soon as practicable of private sector adjunct projects contemplated by the USC ICT.
- (2) The notification shall include a general description of the contemplated work, identifying the sponsor and the manner in which the proposed project falls within an approved core competency.
- (3) Within five business days of USC ICT notification, the Government Contracting Officer and/or Project Director will notify USC ICT if the proposed adjunct project will impact Government national security or other relevant Government concerns, which will be discussed to both parties' satisfaction.

c. If the Government Contracting Officer and/or Project Director, after such consultations, determines that USC ICT acceptance of the adjunct project will adversely affect national security, then USC ICT shall decline to participate in the adjunct project.

d. If the Government Contracting Officer and/or Project Director, after such consultations, determines that USC ICT acceptance of the adjunct project may adversely affect other Government concerns, then USC ICT shall provide the Government Contracting Officer and

Project Director with a written explanation of what actions it will take to mitigate these concerns during performance of the adjunct project.

#### H.13 Reinvestment Task Order

The Reinvestment Task Order is established by associating with each project awarded under this contract, a mandatory reinvestment task order contribution equal to 5% of such project. Under the Reinvestment Task Order, this 5% of the total available funding will be used for activities essential to advancing the overall mission of the UARC contract, including, funding innovative in-house research; transitioning technology development programs into operational use; workforce development activities (recruiting and retaining scientific, engineering, creative and other required project personnel) and other activities requested or approved by the Government. The contractor shall provide a semi-annual status report to include how the funds are used under the task order. The contractor shall specify, to the extent it relates to spending in the applicable period, the following in the quarterly status report: 1) discuss the research performed, 2) describe development programs that support transition of technologies, 3) discuss any recruitments made, or 4) discuss contributions to the development of needed military capabilities (where applicable).

## Section I - Contract Clauses

## CLAUSES INCORPORATED BY REFERENCE

52.202-1	Definitions	NOV 2013
52.203-3	Gratuities	APR 1984
52.203-5	Covenant Against Contingent Fees	MAY 2014
52.203-7	Anti-Kickback Procedures	MAY 2014
52.203-8	Cancellation, Rescission, and Recovery of Funds for Illegal or Improper Activity	MAY 2014
52.203-10	Price Or Fee Adjustment For Illegal Or Improper Activity	MAY 2014
52.203-12	Limitation On Payments To Influence Certain Federal Transactions	OCT 2010
52.203-13	Contractor Code of Business Ethics and Conduct	APR 2010
52.203-17	Contractor Employee Whistleblower Rights and Requirement To Inform Employees of Whistleblower Rights	APR 2014
52.204-4	Printed or Copied Double-Sided on Postconsumer Fiber Content Paper	MAY 2011
52.204-10	Reporting Executive Compensation and First-Tier Subcontract Awards	JUL 2013
52.204-13	System for Award Management Maintenance	JUL 2013
52.209-6	Protecting the Government's Interest When Subcontracting With Contractors Debarred, Suspended, or Proposed for Debarment	AUG 2013
52.209-10	Prohibition on Contracting With Inverted Domestic Corporations	MAY 2012
52.210-1	Market Research	APR 2011
52.215-2 Alt II	Audit and Records--Negotiation (Oct 2010) - Alternate II	APR 1998
52.215-8	Order of Precedence--Uniform Contract Format	OCT 1997
52.215-10	Price Reduction for Defective Certified Cost or Pricing Data	AUG 2011
52.215-12	Subcontractor Certified Cost or Pricing Data	OCT 2010
52.215-13	Subcontractor Certified Cost or Pricing Data--Modifications	OCT 2010
52.215-14	Integrity of Unit Prices	OCT 2010
52.215-15	Pension Adjustments and Asset Reversions	OCT 2010
52.215-18	Reversion or Adjustment of Plans for Postretirement Benefits (PRB) Other than Pensions	JUL 2005
52.215-20 Alt II	Requirements for Cost or Pricing Data or Information Other Than Cost or Pricing Data (Oct 2010) - Alternate II	OCT 1997
52.215-21 Alt IV	Requirements for Certified Cost or Pricing Data or Information Other Than Certified Cost or Pricing Data-- Modifications (Oct 2010) - Alternate IV	OCT 2010
52.215-23	Limitations on Pass-Through Charges	OCT 2009
52.216-7 Alt II	Allowable Cost and Payment (Jun 2013) - Alternate II	AUG 2012
52.219-8	Utilization of Small Business Concerns	MAY 2014
52.219-9 Alt II	Small Business Subcontracting Plan (JULY 2013) Alternate II	OCT 2001
52.219-16	Liquidated Damages-Subcontracting Plan	JAN 1999
52.219-28	Post-Award Small Business Program Rerepresentation	JUL 2013
52.222-3	Convict Labor	JUN 2003
52.222-4	Contract Work Hours and Safety Standards Act - Overtime Compensation	MAY 2014
52.222-8	Payrolls and Basic Records	MAY 2014
52.222-9	Apprentices and Trainees	JUL 2005
52.222-21	Prohibition Of Segregated Facilities	FEB 1999
52.222-26	Equal Opportunity	MAR 2007

52.222-35	Equal Opportunity for Veterans	JUL 2014
52.222-36	Equal Opportunity for Workers with Disabilities	JUL 2014
52.222-37	Employment Reports on Veterans	JUL 2014
52.222-40	Notification of Employee Rights Under the National Labor Relations Act	DEC 2010
52.222-54	Employment Eligibility Verification	AUG 2013
52.223-6	Drug-Free Workplace	MAY 2001
52.225-13	Restrictions on Certain Foreign Purchases	JUN 2008
52.227-1 Alt I	Authorization And Consent (Dec 2007) - Alternate I	APR 1984
52.227-2	Notice And Assistance Regarding Patent And Copyright Infringement	DEC 2007
52.227-11	Patent Rights--Ownership By The Contractor	MAY 2014
52.228-7	Insurance--Liability To Third Persons	MAR 1996
52.230-2	Cost Accounting Standards	MAY 2014
52.230-6	Administration of Cost Accounting Standards	JUN 2010
52.232-9	Limitation On Withholding Of Payments	APR 1984
52.232-20	Limitation Of Cost	APR 1984
52.232-22	Limitation Of Funds	APR 1984
52.232-23	Assignment Of Claims	MAY 2014
52.232-25	Prompt Payment	JUL 2013
52.232-25 Alt I	Prompt Payment (July 2013) Alternate I	FEB 2002
52.232-33	Payment by Electronic Funds Transfer--System for Award Management	JUL 2013
52.232-39	Unenforceability of Unauthorized Obligations	JUN 2013
52.232-40	Providing Accelerated Payments to Small Business Subcontractors	DEC 2013
52.233-1	Disputes	MAY 2014
52.233-3 Alt I	Protest After Award (Aug 1996) - Alternate I	JUN 1985
52.233-4	Applicable Law for Breach of Contract Claim	OCT 2004
52.242-1	Notice of Intent to Disallow Costs	APR 1984
52.242-2	Production Progress Reports	APR 1991
52.242-3	Penalties for Unallowable Costs	MAY 2014
52.242-4	Certification of Final Indirect Costs	JAN 1997
52.242-13	Bankruptcy	JUL 1995
52.243-2 Alt V	Changes--Cost-Reimbursement (Aug 1987) - Alternate V	APR 1984
52.243-7	Notification Of Changes	APR 1984
52.244-2	Subcontracts	OCT 2010
52.244-5	Competition In Subcontracting	DEC 1996
52.244-6	Subcontracts for Commercial Items	JUL 2014
52.245-1 Alt II	Government Property (Apr 2012) Alternate II	APR 2012
52.245-9	Use And Charges	APR 2012
52.246-23	Limitation Of Liability	FEB 1997
52.246-25	Limitation Of Liability--Services	FEB 1997
52.247-1	Commercial Bill Of Lading Notations	FEB 2006
52.247-63	Preference For U.S. Flag Air Carriers	JUN 2003
52.247-67	Submission Of Transportation Documents For Audit	FEB 2006
52.249-5	Termination For Convenience Of The Government (Educational And Other Nonprofit Institutions)	SEP 1996
52.249-14	Excusable Delays	APR 1984
52.252-2	Clauses Incorporated By Reference	FEB 1998
52.253-1	Computer Generated Forms	JAN 1991
252.201-7000	Contracting Officer's Representative	DEC 1991
252.203-7001	Prohibition On Persons Convicted of Fraud or Other Defense-Contract-Related Felonies	DEC 2008
252.204-7000	Disclosure Of Information	AUG 2013



252.204-7001	Commercial And Government Entity (CAGE) Code Reporting	AUG 1999
252.204-7003	Control Of Government Personnel Work Product	APR 1992
252.204-7004 Alt A	System for Award Management Alternate A	FEB 2014
252.204-7006	Billing Instructions	OCT 2005
252.204-7012	Safeguarding of unclassified controlled technical information	NOV 2013
252.205-7000	Provision Of Information To Cooperative Agreement Holders	DEC 1991
252.209-7004	Subcontracting With Firms That Are Owned or Controlled By The Government of a Terrorist Country	MAR 2014
252.211-7003	Item Unique Identification and Valuation	DEC 2013
252.215-7000	Pricing Adjustments	DEC 2012
252.215-7002	Cost Estimating System Requirements	DEC 2012
252.219-7003	Small Business Subcontracting Plan (DOD Contracts)	AUG 2012
252.225-7012	Preference For Certain Domestic Commodities	FEB 2013
252.225-7048	Export-Controlled Items	JUN 2013
252.227-7000	Non-estoppel	OCT 1966
252.227-7013 Alt I	Rights in Technical Data--Noncommercial Items (FEB 2014) - Alternate I	JUN 1995
252.227-7014 Alt I	Rights in Noncommercial Computer Software and Noncommercial Computer Software Documentation (FEB 2014) - Alternate I	JUN 1995
252.227-7016	Rights in Bid or Proposal Information	JAN 2011
252.227-7017	Identification and Assertion of Use, Release, or Disclosure Restrictions	JAN 2011
252.227-7019	Validation of Asserted Restrictions--Computer Software	SEP 2011
252.227-7025	Limitations on the Use or Disclosure of Government-Furnished Information Marked with Restrictive Legends	MAY 2013
252.227-7027	Deferred Ordering Of Technical Data Or Computer Software	APR 1988
252.227-7028	Technical Data or Computer Software Previously Delivered to the Government	JUN 1995
252.227-7030	Technical Data--Withholding Of Payment	MAR 2000
252.227-7037	Validation of Restrictive Markings on Technical Data	JUN 2013
252.227-7039	Patents--Reporting Of Subject Inventions	APR 1990
252.231-7000	Supplemental Cost Principles	DEC 1991
252.232-7010	Levies on Contract Payments	DEC 2006
252.235-7003	Frequency Authorization	APR 2014
252.235-7010	Acknowledgment of Support and Disclaimer	MAY 1995
252.235-7011	Final Scientific or Technical Report	NOV 2004
252.242-7004	Material Management And Accounting System	MAY 2011
252.242-7006	Accounting System Administration	FEB 2012
252.243-7002	Requests for Equitable Adjustment	DEC 2012
252.244-7001	Contractor Purchasing System Administration	MAY 2014
252.245-7001	Tagging, Labeling, and Marking of Government-Furnished Property	APR 2012
252.245-7002	Reporting Loss of Government Property	APR 2012
252.245-7003	Contractor Property Management System Administration	APR 2012
252.245-7004	Reporting, Reutilization, and Disposal	MAY 2013
252.251-7000	Ordering From Government Supply Sources	AUG 2012

## CLAUSES INCORPORATED BY FULL TEXT

52.216-18 ORDERING. (OCT 1995)

(a) Any supplies and services to be furnished under this contract shall be ordered by issuance of delivery orders or task orders by the individuals or activities designated in the Schedule. Such orders may be issued from contract award through 36 months hereafter.

(b) All delivery orders or task orders are subject to the terms and conditions of this contract. In the event of conflict between a delivery order or task order and this contract, the contract shall control.

(c) If mailed, a delivery order or task order is considered "issued" when the Government deposits the order in the mail. Orders may be issued orally, by facsimile, or by electronic commerce methods only if authorized in the Schedule.

(End of clause)

#### 52.216-19 ORDER LIMITATIONS. (OCT 1995)

(a) Minimum order. When the Government requires supplies or services covered by this contract in an amount of less than zero, the Government is not obligated to purchase, nor is the Contractor obligated to furnish, those supplies or services under the contract.

(b) Maximum order. The Contractor is not obligated to honor:

(1) Any order for a single item in excess of N/A;

(2) Any order for a combination of items in excess of N/A; or

(3) A series of orders from the same ordering office within N/A days that together call for quantities exceeding the limitation in subparagraph (1) or (2) above.

(c) If this is a requirements contract (i.e., includes the Requirements clause at subsection 52.216-21 of the Federal Acquisition Regulation (FAR)), the Government is not required to order a part of any one requirement from the Contractor if that requirement exceeds the maximum-order limitations in paragraph (b) above.

(d) Notwithstanding paragraphs (b) and (c) above, the Contractor shall honor any order exceeding the maximum order limitations in paragraph (b), unless that order (or orders) is returned to the ordering office, with written notice stating the Contractor's intent not to ship the item (or items) called for and the reasons. Upon receiving this notice, the Government may acquire the supplies or services from another source.

(End of clause)

#### 52.216-22 INDEFINITE QUANTITY. (OCT 1995)

(a) This is an indefinite-quantity contract for the supplies or services specified, and effective for the period stated, in the Schedule. The quantities of supplies and services specified in the Schedule are estimates only and are not purchased by this contract.

(b) Delivery or performance shall be made only as authorized by orders issued in accordance with the Ordering clause. The Contractor shall furnish to the Government, when and if ordered, the supplies or services specified in the Schedule up to and including the quantity designated in the Schedule as the "maximum". The Government shall order at least the quantity of supplies or services designated in the Schedule as the "minimum".

(c) Except for any limitations on quantities in the Order Limitations clause or in the Schedule, there is no limit on

the number of orders that may be issued. The Government may issue orders requiring delivery to multiple destinations or performance at multiple locations.

(d) Any order issued during the effective period of this contract and not completed within that period shall be completed by the Contractor within the time specified in the order. The contract shall govern the Contractor's and Government's rights and obligations with respect to that order to the same extent as if the order were completed during the contract's effective period; provided, that the Contractor shall not be required to make any deliveries under this contract after the end date of the contract.

(End of clause)

#### 52.222-2 PAYMENT FOR OVERTIME PREMIUMS (JUL 1990)

(a) The use of overtime is authorized under this contract if the overtime premium cost does not exceed "zero" or the overtime premium is paid for work --

(1) Necessary to cope with emergencies such as those resulting from accidents, natural disasters, breakdowns of production equipment, or occasional production bottlenecks of a sporadic nature;

(2) By indirect-labor employees such as those performing duties in connection with administration, protection, transportation, maintenance, standby plant protection, operation of utilities, or accounting;

(3) To perform tests, industrial processes, laboratory procedures, loading or unloading of transportation conveyances, and operations in flight or afloat that are continuous in nature and cannot reasonably be interrupted or completed otherwise; or

(4) That will result in lower overall costs to the Government.

(b) Any request for estimated overtime premiums that exceeds the amount specified above shall include all estimated overtime for contract completion and shall--

(1) Identify the work unit; e.g., department or section in which the requested overtime will be used, together with present workload, staffing, and other data of the affected unit sufficient to permit the Contracting Officer to evaluate the necessity for the overtime;

(2) Demonstrate the effect that denial of the request will have on the contract delivery or performance schedule;

(3) Identify the extent to which approval of overtime would affect the performance or payments in connection with other Government contracts, together with identification of each affected contract; and

(4) Provide reasons why the required work cannot be performed by using multishift operations or by employing additional personnel.

\* Insert either "zero" or the dollar amount agreed to during negotiations. The inserted figure does not apply to the exceptions in paragraph (a)(1) through (a)(4) of the clause.

(End of clause)

252.209-7993 REPRESENTATION BY CORPORATIONS REGARDING AN UNPAID DELINQUENT TAX LIABILITY OR A FELONY CONVICTION UNDER ANY FEDERAL LAW—FISCAL YEAR 2014 APPROPRIATIONS (DEVIATION 2014-000009) (FEB 2014)

(a) In accordance with sections 8113 and 8114 of the Department of Defense Appropriations Act, 2014, and sections 414 and 415 of the Military Construction and Veterans Affairs and Related Agencies Appropriations Act, 2014 (Public Law 113-76, Divisions C and J), none of the funds made available by those divisions (including Military Construction funds) may be used to enter into a contract with any corporation that—

(1) Has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability, where the awarding agency is aware of the unpaid tax liability, unless the agency has considered suspension or debarment of the corporation and made a determination that this further action is not necessary to protect the interests of the Government; or

(2) Was convicted of a felony criminal violation under any Federal law within the preceding 24 months, where the awarding agency is aware of the conviction, unless the agency has considered suspension or debarment of the corporation and made a determination that this action is not necessary to protect the interests of the Government.

(b) The Offeror represents that—

(1) It is  is not  a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability,

(2) It is  is not  a corporation that was convicted of a felony criminal violation under a Federal law within the preceding 24 months.

(End of provision)

**Section J - List of Documents, Exhibits and Other Attachments**

- Attachment 1 - Subcontracting Plan**
- Attachment 2 - UARC Management Plan**
- Attachment 3 - Visitor Agreement**

## Attachment 3 : Visitor Agreement

**VISITOR AGREEMENT**

This Visitor Agreement, ("Agreement"), is made this \_\_\_ day of ----- by and between, \_\_\_\_\_ ("Visitor") residing at <address> , and the University of Southern California, ("USC"), a California non-profit corporation, having a place of business at Department of Contracts & Grants, 837 West Downey Way, STO 330, Los Angeles, CA 90089-1147, USA.

WHEREAS, USC and the U.S. Army have entered Contract ----- (the "ICT Contract") under which the Army funds and USC operates the Institute for Creative Technologies (ICT) at USC;

WHEREAS, the ICT Contract provides for Government employees to work at the ICT as Guest Researchers or Resident Subject Matter Experts;

WHEREAS, the ICT Contract provides that USC will have title in, and the Government will obtain a worldwide, perpetual, royalty-free government purpose license in, inventions and other intellectual property that persons working at the ICT (including Guest Researchers and Resident Subject Matter Experts) may jointly or individually conceive, create, or reduce to practice;

WHEREAS, Visitor desires to work in the ICT as a Guest Researcher or Resident Subject Matter Expert;

WHEREAS, USC desires to have said Visitor work in the ICT for a limited period of time;

NOW, THEREFORE, for valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties agree as follows:

1. The Visitor shall work in the ICT under the direction of Dr. <name> (hereinafter referred to as a "Visit"). The period of the Visit shall begin on <date> and shall end on <date>. USC hereby grants the Visitor(s) permission to enter and utilize USC Facilities in connection with the Research (as that term is defined below) during the term of this Agreement.
2. The Army shall be solely responsible for all of Visitor's costs and expenses incurred during the Visit, including salary or other compensation, bonuses, withholding federal, state and local income taxes and Social Security (FICA), payroll taxes, housing costs, meals, per diem, travel, health care benefits, personal insurance, unemployment insurance, automobile insurance, disability insurance, Workers Compensation Insurance, accident insurance, retirement or pension benefits, or any other employee benefits. In no event shall USC be responsible for any accident which may befall Visitor(s) during the Visit.
3. During the Visit, the Visitor will conduct the activities described in Attachment A hereto ("Research").
4. Visitor hereby irrevocably and in perpetuity assigns all of Visitor's worldwide right, title and interest in and to any inventions or discoveries or processes (whether or not patentable), know-how, copyrightable materials, computer software, semiconductor maskworks, trademarks, trade secrets, or any other intellectual property or proprietary rights (collectively, "IP"), discovered, conceived, invented, developed, designed, created, authored, or reduced to practice by Visitor during the Visit or which arise from or relate to the Research, solely and exclusively to USC, to the extent that such right, title, and interest does not accrue to the United States by operation of Executive Order 10096, as amended, 37 C.F.R. Part 501, and/or agency regulations applicable to Visitor.

Visitor shall assist USC, to the extent necessary in USC's opinion, in procuring and perfecting USC's rights in and to the Intellectual Property, by providing the documentation or other materials necessary to perfect those rights, including executing, at USC's expense, any copyright, patent, trademark or similar applications and assignments to USC, and any other lawful documents deemed necessary by USC to register the Intellectual Property.



5. Visitor, along with any other co-creators of Intellectual Property, will be entitled to share in USC's net royalty income from licensing of that Intellectual Property in accordance with the then-current version of the USC Intellectual Property Policy, provided that the ownership interest in the Intellectual Property resulting from Visitor's creative effort has been assigned to USC. The current version of that policy may be examined at:

[http://policies.usc.edu/policies/intel\\_property.html](http://policies.usc.edu/policies/intel_property.html)

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6. When proprietary, financial, trade secret or other confidential information ("Confidential Information") is exchanged, each party shall keep in confidence and not disclose to any other person or persons outside of their respective organizations any of the other party's Confidential Information, provided, however, that neither party shall be liable for use or disclosure of any Confidential Information which:

Was or subsequently passes into the public domain at the time it was disclosed through no fault or omission of the receiving party, or

Was known to the receiving party at the time of disclosure or thereafter becomes known, provided such knowledge was or is derived from a

source other than the disclosing party rightfully in possession of the Confidential Information, or

Is disclosed with the prior written approval of the other party, or

As evidenced by the written records of the receiving party, was independently developed by or for the receiving party without any reference to, or reliance upon, the Confidential Information, or

(i)

Is or was disclosed by the disclosing party to a third party without any confidentiality restriction.

Upon the request of the disclosing party, the receiving party shall promptly deliver to the disclosing party all Confidential Information disclosed to the receiving party including, but not limited to, all written or other materials which record, store or embody such Confidential Information and all copies thereof, or, in the alternative, certify in writing to the disclosing party that all materials which record, store or embody Confidential Information have been destroyed.

7. Visitor represents and warrants to USC that: (a) Visitor is a true employee of the Army and is not an independent contractor; (b) that Visitor shall comply with and abide by USC's rules and regulations; and (c) Visitor shall not disclose to USC or use in his/her work at USC any proprietary or confidential information of any prior employers or of any third party, including any trade secret or confidential information with respect to the business, work or investigations of such prior employer or other third party, or any ideas or writings related thereto.

8. Except as explicitly set forth herein, no party shall acquire any rights to another party's Intellectual Property under this Agreement.

9. No party shall use the name of another party in connection with any products, publicity, promotion, or advertising without the prior written permission of the other party.

10. This Agreement shall begin on the first day of the Visit and shall expire automatically on the last day of the Visit. Either party may terminate this Agreement by giving the other party thirty (30) days notice in writing. Paragraphs 2, 4, 5, 6, 7, and 13 shall survive any expiration or termination of this Agreement.

11. For the purposes of this Agreement, each instance of the word "including" shall be deemed to incorporate the phrase "without limitation."

12. This Agreement constitutes the entire agreement and understanding between the parties relating to the subject matter hereof and terminates and supersedes any prior agreement or understanding relating to the subject matter hereof between the parties. This Agreement may not be modified and none of the provisions of this Agreement, or any breach thereof, may be waived or excused, in whole or in part, except in a writing signed by the authorized representatives of the party against whom such modification or waiver is sought to be enforced. The provisions of this Agreement are severable and if any clause or provisions shall be held invalid or unenforceable in whole or in part, such invalidity or unenforceability shall affect only such clause or provision or part thereof. Nothing herein contained shall be construed to place the parties in the relationship of partners or joint ventures or agents, and neither party shall have the power to obligate or bind the other party in any manner whatsoever.

13. This Agreement shall be governed by the substantive laws of the United States and the State of California without reference to any conflicts of laws provisions. Venue and jurisdiction for any dispute arising under or involving the terms of this Agreement and jurisdiction over the parties to this Agreement shall be vested exclusively in the federal courts located in the County of Los Angeles, California. Visitor consents to personal jurisdiction in said courts and shall not seek to transfer or change the venue of any action brought in compliance with this paragraph.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the date first above written. Visitor

University of Southern California

Printed Name:

Printed Name:



# Avatar Digitization From a Single Image For Real-Time Rendering

LIWEN HU\*, Pinscreen, University of Southern California  
SHUNSUKE SAITO\*, Pinscreen, University of Southern California  
LINGYU WEI\*, Pinscreen, University of Southern California  
KOKI NAGANO, Pinscreen  
JAEWOO SEO, Pinscreen  
JENS FURSUND, Pinscreen  
IMAN SADEGHI, Pinscreen  
CARRIE SUN, Pinscreen  
YEN-CHUN CHEN, Pinscreen  
HAO LI, Pinscreen, University of Southern California, USC Institute for Creative Technologies

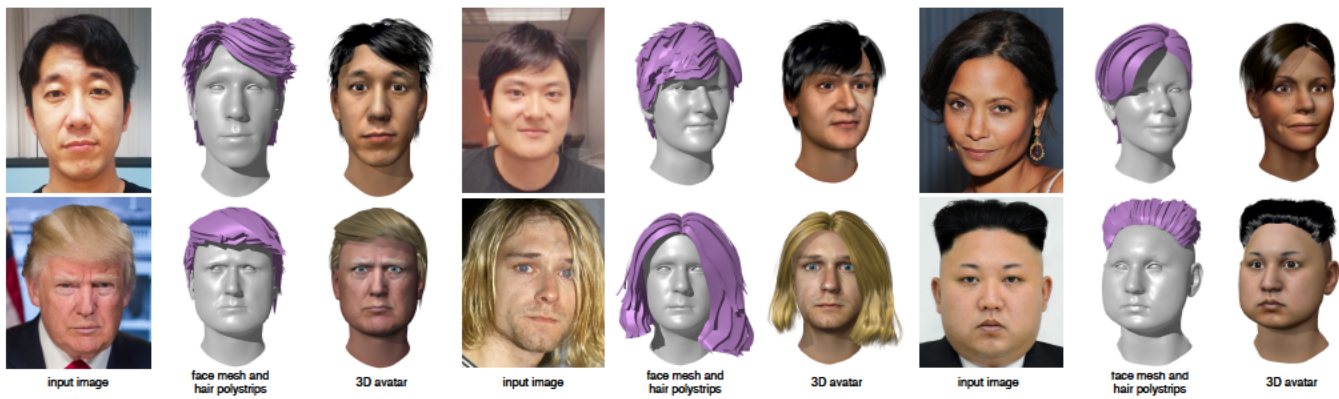


Fig. 1. We introduce an end-to-end framework for modeling a complete 3D avatar from a single input image for real-time rendering. We infer fully rigged textured faces models and polygonal strips for hair. Our flexible and efficient mesh-based hair representation is suitable for a wide range of hairstyles and can be readily integrated into existing real-time game engines. All of the illustrations are rendered in realtime in Unity. President Trump’s picture is obtained from whitehouse.gov and Kim Jong-un’s photograph was published in the Rodong Sinmun. The other celebrity pictures are used with permission from Getty Images.

We present a fully automatic framework that digitizes a complete 3D head with hair from a single unconstrained image. Our system offers a practical and consumer-friendly end-to-end solution for avatar personalization in gaming and social VR applications. The reconstructed models include secondary components (eyes, teeth, tongue, and gums) and provide animation-friendly blendshapes and joint-based rigs. While the generated face is a high-quality textured mesh, we propose a versatile and efficient polygonal strips (polystrips) representation for the hair. Polystrips are suitable for an extremely wide range of hairstyles and textures and are compatible with existing game engines for real-time rendering. In addition to integrating state-of-the-art advances in facial shape modeling and appearance inference, we propose a novel single-view hair generation pipeline, based on

\* indicates equal contribution

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3D-model and texture retrieval, shape refinement, and polystrip patching optimization. The performance of our hairstyle retrieval is enhanced using a deep convolutional neural network for semantic hair attribute classification. Our generated models are visually comparable to state-of-the-art game characters designed by professional artists. For real-time settings, we demonstrate the flexibility of polystrips in handling hairstyle variations, as opposed to conventional strand-based representations. We further show the effectiveness of our approach on a large number of images taken in the wild, and how compelling avatars can be easily created by anyone.

CCS Concepts: • Computing methodologies → Mesh geometry models; • Theory of computation → Machine learning theory;

Additional Key Words and Phrases: dynamic avatar, face, hair, digitization, modeling, rigging, polystrip, texture synthesis, data-driven, deep learning, deep convolutional neural network

## ACM Reference Format:

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<https://doi.org/10.1145/3130800.3130887>

## 1 INTRODUCTION

The onset of virtual reality (VR) and its entertainment applications have highlighted how valuable and captivating the immersion of alternate universes can be. VR and its democratization have the potential to revolutionize 3D face-to-face communication and social interactions through compelling digital embodiments of ourselves, as demonstrated lately with the help of VR head mounted displays with facial sensing capabilities [Li et al. 2015; Olszewski et al. 2016; Thies et al. 2016b] or voice-driven technology demonstrated at Oculus Connect 3. In addition to enabling personalized gaming experiences, faithfully individualized 3D avatars could facilitate natural telepresence and interactions between remote participants in virtual worlds, and potentially, one day, displace physical travels. Meanwhile, companies such as Facebook and Snap are popularizing the use of augmented reality filters to alter selfie videos and emerging tech startups such as Pinscreen [2017], FaceUnity [2017], Loom.ai [2017], and itSeez3D [2017], are exploring the automatic creation of 3D avatars for virtual chatting applications.

Recent progress in data-driven methods and deep learning research have catalyzed the development of high-quality 3D face modeling techniques from a single image [Cao et al. 2014b; Saito et al. 2017; Thies et al. 2016a]. Even the generation of realistic strand-level hair models is possible from an image fully automatically [Chai et al. 2016]. However, despite efforts in real-time simulation [Chai et al. 2014], strand-based representations are still very difficult to integrate into game environments due to their rendering and simulation complexity. Furthermore, strands are not efficient representations for short hairstyles and ones with highly stochastic structures, such as for curly hair. Cao et al. [2016] have recently introduced a system that uses a versatile image-based mesh representation, but it requires the usage of multiple photographs and manual intervention, and the volumetric structure of hair is not captured. Despite substantial advances in making avatar creation as easy as possible, the barriers to entry are still too high for commodity user adoption.

In this paper, we present the first automatic framework that generates a complete 3D avatar from a single unconstrained image, using high-quality optimized polygonal strips (polystrips or poly cards) for real-time hair rendering. By eliminating the need of multiple photographs and a controlled capture environment, we provide a practical and consumer-friendly solution for digitizing ourselves or others, such as celebrities, from any photograph. Our digitized models are fully rigged with intuitive animation controls such as blendshapes and joint-based skeletons, and can be readily integrated into existing game engines.

We first address the challenge of predicting the 3D shape and appearance of entire heads from partially visible 2D input data. We carefully integrate multiple cutting edge techniques into a comprehensive facial digitization framework. An accurate 3D face model is estimated using a modified dense analysis-through-synthesis approach [Thies et al. 2016a] with visibility constraints on a pre-segmented input image, which is obtained from a convolutional neural network for segmentation [Saito et al. 2016]. Subsequently, a complete high-quality facial texture is synthesized using a deep learning-based inference technique introduced by Saito et al. [2017].

While a straightforward incorporation of an existing single-view hair modeling technique is possible [Chai et al. 2016; Hu et al. 2015],

we focus on a method that produces highly efficient polystrips rather than strands. The use of polystrips is particularly suitable for real-time rendering and integration with existing game engines. For games, hair models rarely exceed 100K triangles, especially when a large number of characters need to be on screen at any given time. With appropriate textures and alpha masks, this representation also supports for a much larger variety of hairstyles than strands. Though widely used in cutting edge games (e.g., *Uncharted 4*), the creation of visually compelling hair polystrips is typically associated with a tedious and time-consuming modeling and texture painting process by skilled artists.

We introduce an automatic hair digitization pipeline for modeling polystrip-based hairstyles. Critical to reconstructing high-quality hair meshes are convincing shapes and structures, such as fringes, which are laid out manually by a modeler. We propose a deep learning-based framework to first extract semantical hair attributes that characterizes the input hairstyle. A tractable subset of candidate hairstyles with compatible traits is then selected from a large hair model database. A closest hairstyle is then retrieved from this hairstyle collection and refined to match the input. Our deep neural network also identifies hair appearance attributes, that describe the local structure and styling with the corresponding shading properties. Though a small set of local hairstyle textures can generalize well for different hair models, the associated alpha masks often introduce severe transparency artifacts and alter the overall look of the hair model significantly. In production, the crafting of hair polystrips typically involves a complex iterative design process of mesh adjustments, UV layout, texturing, as well as polystrip duplication and perturbation. To this end, we develop a novel iterative optimization technique for polystrip patching, placement, and shape refinement based on a scalp visibility metric. For visually pleasing animations, we also rig our hair model to the head skeleton using inverse distance skinning [Jacobson et al. 2014].

We show the effectiveness of our approach on a wide range of subjects and hairstyles, and also demonstrate compelling animations of our avatars with simulated hair dynamics. The output quality of our framework is comparable to state-of-the-art game characters, as well as cutting-edge avatar modeling systems that are based on multiple input photographs [Cao et al. 2016; Ichim et al. 2015]. The proposed pipeline also produces superior results than existing commercial single view-based solutions such as Loom.ai and itSeez3D.

### Contributions:

- We present a fully automatic framework for complete 3D avatar modeling and rigging, from a single unconstrained image that is suitable for real-time rendering in game and VR environments. Our facial digitization pipeline integrates the latest advances in facial segmentation, shape modeling, and high-fidelity appearance inference.
- We develop a new single-view hair digitization pipeline that produces highly efficient and versatile polystrip models. Our system captures both hair shape and appearance properties.
- To ensure high-quality output hair meshes, we present a hair attributes classification framework based on deep learning. Furthermore, an iterative optimization algorithm for polystrip patching is introduced to ensure a flawless scalp coverage and correct hair shape likeness to the input.

## 2 RELATED WORK

*Facial Modeling and Capture.* Over the past two decades, a great amount of research has been dedicated to the modeling and animation of digital faces. We refer to [Parke and Waters 2008] for a comprehensive introduction and overview. Though artist-friendly digital modeling tools have significantly evolved over the years, 3D scanning and performance capture technologies provide an attractive way to scale content creation and improve realism through accurate measurements from the physical world. While expensive and difficult to deploy, sophisticated 3D facial capture systems [Beeler et al. 2010, 2011; Bradley et al. 2010; Debevec et al. 2000; Ghosh et al. 2011; Li et al. 2009; Ma et al. 2007; Weise et al. 2009] are widely adopted in high-end production and have proven to be a critical component for creating photoreal digital actors. Different rigging techniques such as joint-based skeletons, blendshapes [Li et al. 2010; von der Pahlen et al. 2014], or muscle-based systems [Sifakis et al. 2005; Terzopoulos and Waters 1990] have been introduced to ensure intuitive control in facial animation and high-fidelity retargeting for performance capture. Dedicated systems for capture, rigging, and animation have also emerged for the treatment of secondary components such as eyes [Bérard et al. 2016; Miller and Pinskiy 2009], lips [Garrido et al. 2016b], and teeth [Wu et al. 2016]. Despite high-fidelity output, these capture and modeling systems are too complex for mainstream adoption.

The PCA-based linear face models of [Blanz and Vetter 1999] have laid the foundations for the modern treatment of image-based 3D face modeling, with extensions to multi-view stereo [Blake et al. 2007], large-scale internet pictures [Kemelmacher-Shlizerman 2013; Liang et al. 2016], massive 3D scan datasets [Booth et al. 2016], and the use of shading cues [Kemelmacher-Shlizerman and Basri 2011]. Blanz and Vetter have demonstrated in their original work that compelling facial shapes and appearances with consistent parameterization can be extracted reliably from a single input image. Recent progress in single-view face modeling demonstrate improved detail reconstruction [Richardson et al. 2016], component separation [Kim et al. 2017; Tewari et al. 2017], and manipulation capabilities [Shu et al. 2017] using deep convolutional neural networks. To handle facial expressions, vector spaces based on visemes and expressions have been proposed [Blanz et al. 2003], which led to the development of PCA-based multi-linear face models [Vlasic et al. 2005] and the popularization of FACS-based blendshapes [Cao et al. 2014b]. The low dimensionality and effectiveness in representing faces have made linear models particularly suitable for instant 3D face modeling and robust facial performance capture in monocular settings using depth sensors [Bouaziz et al. 2013; Hsieh et al. 2015; Li et al. 2013; Weise et al. 2011, 2009], as well as RGB video [Cao et al. 2014a; Garrido et al. 2013, 2016a; Saito et al. 2016; Shi et al. 2014; Thies et al. 2016a]. When modeling a 3D face automatically from an image, sparse 2D facial landmarks [Cootes et al. 2001; Cristinacce and Cootes 2008; Saragih et al. 2011; Xiong and De la Torre 2013] are typically used for robust initialization during fitting. State-of-the-art landmark detection methods achieve impressive efficiency by using explicit shape regressions [Cao et al. 2013; Kazemi and Sullivan 2014; Ren et al. 2014].

While linear models can estimate entire head models from a single view, the resulting textures are typically crude approximations of

the subject, especially in the presence of details such as facial hair, complex skin tones, and wrinkles. In order to ensure likeness to the captured subject, existing 3D avatar creation systems often avoid the use of a purely linear appearance model, but rely on acquisitions from multiple views to build a more accurate texture map. Ichim et al. [2015] introduced a comprehensive pipeline for video-based avatar reconstruction in uncontrolled environments. They first produce a dense point cloud using multi-view stereo and then estimate a 3D face model using non-rigid registration. An integrated albedo texture map is then extracted using a combination of Poisson blending and light factorization via spherical harmonics. Their method is limited to a controlled acquisition procedure based on a semi-circular sweep of a hand-held sensor, and hair modeling is omitted. Chai et al. [2015] presented a single-view system for high-quality 2.5D depth map reconstruction of a both faces and hair, using structural hair priors, silhouette, and shading cues. However, their technique is not suitable for avatars, as a full head cannot be produced nor animated. More recently, Cao et al. [2016] developed an end-to-end avatar creation system that can produce compelling face and hair models based on an image-based mesh representation. While their system can handle very large variations of hairstyles and also produce high-quality facial animations with fine-scale details, they require up to 32 input images and some manual guidance for segmentation and labeling. Instead of a controlled capture procedure with multiple photographs, we propose a fully automatic system that only needs a single image as input.

Notice that proprietary technologies for single-view avatar modeling have emerged recently in the commercial world, such as Pinscreen’s demonstration at *SIGGRAPH Real Time Live!* show [Li et al. 2017] and FaceUnity’s photo-to-avatar preview [FaceUnity 2017]. In Section 6, we compare our proposed solution with two other recent avatar creation solutions, Loom.ai [2017] and itSeez3D [2017].

*Hair Modeling and Capture.* Hair is an essential component of life-like avatars and CG characters. In studio settings, human hair is traditionally modeled, simulated, and rendered using sophisticated design tools [Choe and Ko 2005; Kim and Neumann 2002; Weng et al. 2013; Yuksel et al. 2009]. We refer to the survey of Ward et al. [2006] for an extensive overview. 3D hair capture techniques, analogous to those used for face capture, have been introduced to digitize hair from physical inputs. High-fidelity acquisition systems typically involve controlled recording sessions, manual assistance, and complex hardware equipments, such as multi-view stereo rigs [Beeler et al. 2012; Echevarria et al. 2014; Jakob et al. 2009; Luo et al. 2013; Paris et al. 2008] or even thermal imaging [Herrera et al. 2012].

Hu et al. [2014a] demonstrated a highly robust multi-view hair modeling approach using a data-collection of pre-simulated hair strands, which can fully eliminate the need for manual hair segmentation. Since physically simulated hair strands are used as shape priors, their method can only handle unconstrained hairstyles. The same authors later introduced a procedural method for hair patch generation [Hu et al. 2014b] to handle highly convoluted hairstyles such as braids. They also proposed a more accessible acquisition approach based on a single RGB-D camera, that is swept around the subject. Single-view hair digitization methods have been pioneered by Chai et al. [2013; 2012] but rely on high-resolution input photographs and can only produce the frontal geometry of the hair.



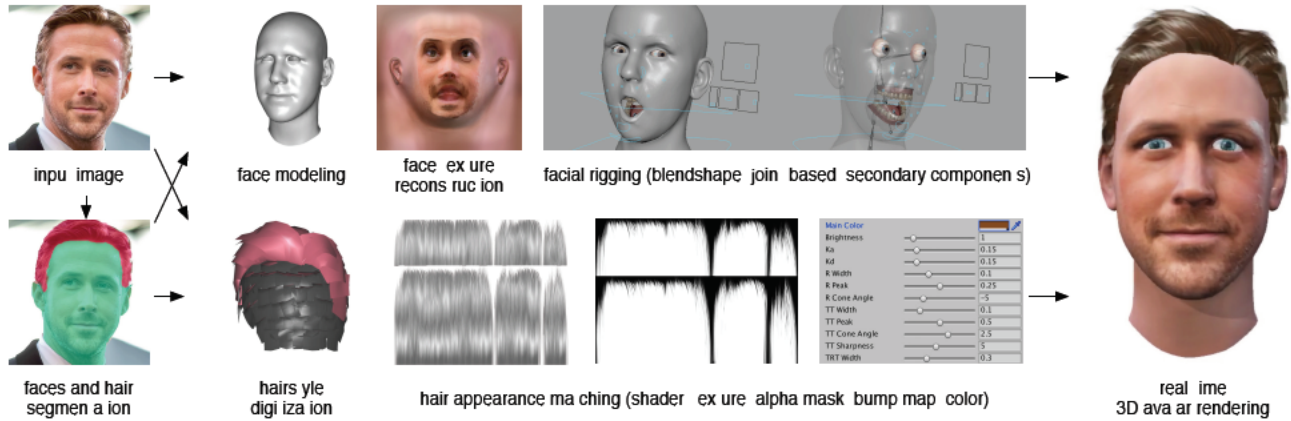


Fig. 2. Our single-view avatar creation framework is based on a pipeline that combines both complete face digitization and hair polystrip digitization—both geometry and appearance are captured. Original image courtesy of Getty Images.

A database-driven approach by Hu et al. [2015] later showed that the modeling of complete strand-level hairstyles is possible from a single image, with the help of very few user strokes as guidance. A similar, but fully automatic approach has been furthered by Chai et al. [2016] using a larger database for shape retrieval and a deep learning-technique for hair segmentation. While a wide range of high-quality hair models can be digitized, many hairstyles with multiple layers or stochastic structures—such as afros or messy hair—are difficult to capture and not suitable for strand-based representations. Furthermore, strand-based hair models are still difficult to integrate into real-time game environments, due to their complexity in real-time hair rendering and simulation. We introduce a new hair digitization framework based on highly efficient and flexible polystrips, which are widely adopted in modern games. Hair polystrips are more efficient for rendering than hair strands, and also can also achieve believable volumetric structures through textures with alpha masks and cut-off techniques as opposed to the opaque textured mesh representation used by Cao et al. [2016].

### 3 AVATAR MODELING FRAMEWORK

Our end-to-end pipeline for face and hair digitization is illustrated in Figure 2. An initial pre-processing step computes pixel-level segmentation of the face and hair regions. We then produce a fully rigged avatar based on textured meshes and hair polystrips from this image. We decouple the digitization of face and hair since they span entirely different spaces for shape, appearance, and deformation. While the full head topology of the face is anatomically consistent between subjects and expressions, the mesh of the hair model will be unique for each person.

*Image Pre-Processing.* Segmenting the face and hair regions of an input image improves the accuracy of the 3D model fitting process, as only relevant pixels are used as constraints. It also provides additional occlusion areas, that need to be completed during texture reconstruction, especially when the face is covered by hair. For the hair modeling step, the silhouette of the segmented hair region will provide important matching cues.

We adopt the real-time and automatic semantic segmentation technique of [Saito et al. 2016] which uses a two-stream deconvolution network to predict face and hair regions. This technique produces accurate and robust pixel-level segmentations for unconstrained photographs. While the original implementation is designed to process face regions, we repurpose the same convolutional neural network to segment hair. In contrast to the image pre-processing step of [Cao et al. 2016], ours is fully automatic.

To train our convolutional neural network, we collected 9269 images from the public LFW face dataset [Huang et al. 2007] and produce the corresponding binary segmentation masks for both faces and hair via Amazon Mechanical Turk (AMT) as illustrated in Figure 3. We detect the face in each image using the popular Viola-Jones face detector [2001] and normalize their positions and scales to a  $128 \times 128$  image. To avoid overfitting, we augment the training dataset with random Gaussian-distributed transformation perturbations and produce 83421 images in total. The standard deviations are  $10^\circ$  for rotations, 5 pixels for translations, and 0.1 for scale, and the means are 0, 0, and 1.0 respectively. We further use a learning rate of 0.1, a momentum of 0.9, and weight decay of 0.0005 for the training. The optimization uses 50,000 stochastic gradient descent (SGD) iterations which take roughly 10 hours on a machine with 16GB RAM and NVIDIA GTX Titan X GPU. We refer to the work of [Saito et al. 2016] for implementation details. Once trained, the network outputs a multi-class probability map (for face and hair) from an arbitrary input image. A post-hoc inference algorithm based on dense conditional random field (CRF) [Krähenbühl and Koltun 2011] is then used to extract the resulting binary mask. Successful results and failure cases are presented in Figure 3.

*Face Digitization.* We first fit a PCA-based linear face model for shape and appearance to the segmented face region. Next, a variant of the efficient pixel-level analysis-through-synthesis optimization method of [Thies et al. 2016a] is adopted to solve for the PCA coefficients of the 3D face model and an initial low-frequency albedo map. We use our own artist-created head topology (front and back head) with identity shapes transferred from [Banz and Vetter 1999]

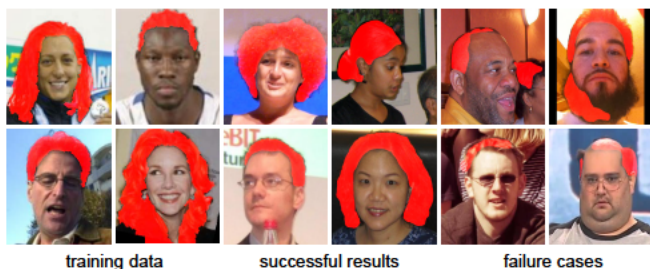


Fig. 3. Hair segmentation training data, successful results, and failure cases.

and expressions from [Cao et al. 2014b]. A visibility constraint is incorporated into the model fitting process to improve occlusion handling and non-visible regions. A PCA-based appearance model is constructed for the textures of the full head, using artist-painted skin textures in missing regions of the original data samples. We then infer high-frequency details to the frontal face regions even if they are not visible in the capture using a feature correlation analysis approach based on deep neural networks [Saito et al. 2017]. Finally, we eliminate the expression coefficients of our linear face model to neutralize the face. The resulting model is then translated and scaled to fit the eye-balls using the average pupillary distance of an adult human of 66 mm. We then translate and scale the teeth/gum to fit pre-selected vertices of the mouth region. We ensure that these secondary components do not intersect the face using a penetration test for all the FACS expressions of our custom animation rig.

**Hair Digitization.** Our hair digitization pipeline produces a hair mesh model and infers appearance properties for the hair shader. We first use a state-of-the-art deep convolutional neural network based on residual learning [He et al. 2016] to extract semantic hair attributes such as hair length, level of baldness, and the existence of hairlines and fringes. These hair attributes are compared with a large hairstyle database containing artist created hair polystrip models. We then form a reduced hairstyle dataset that only contains relevant models with compatible hair attributes. We then search for the closest hairstyle to our input image based on the silhouette of its segmentation and the orientation field of the hair strands. As the retrieved hairstyle may not match the input exactly, we further perform a mesh fitting step to deform the retrieved hairstyle to the input image using the silhouette and the input orientation field. We incorporate collision handling between the deformed hair and the personalized face model to avoid hair meshes intersecting the face mesh. The classification network for hair attribute classification also identifies hair appearance properties for proper rendering such as hair color, texture and alpha maps, various shader parameters, etc. Polystrip duplication is necessary, since the use of alpha masks for the hair texture can cause a loss of scalp coverage during rendering. Consequently, we iteratively identify the incomplete hair regions using multi-view visibility map and patch them with interpolated hair strips. The hair polystrips are alpha blended using an efficient rendering algorithm based on order-independent transparency with depth peeling [Bavoil and Myers 2008].

**Rigging and Animation.** Since our linear face model is expressed by a combination of identity and expression coefficients [Saito et al. 2017], we can easily obtain the neutral pose. Using an example-based approach, we can compute the face input’s corresponding FACS-based expressions (including high-level controls) via transfer from a generic face model [Li et al. 2010]. Our generic face is also equipped with skeleton joints based on linear blend skinning (LBS) [Parke and Waters 2008]. The face and secondary components (eyes, teeth, tongue, and gums) also possess blendshapes. Eye colors (black, brown, blue, and green) are detected using the same deep convolutional neural network used for hair attribute classification [He et al. 2016] and the appropriate texture is used. Our model consists of 71 blendshapes, and 16 joints in total. Our face rig also abstracts the low-level deformation parameters with a smaller and more intuitive set of high-level controls as well as manipulation handles. We implemented our rig in both the animation tool, Autodesk Maya, and the real-time game engine, Unity. We can rig our hair model directly with the skeleton joints of the head in order to add a minimal amount of dynamics for simple head rotations. For more complex hair dynamics, we also demonstrate a simple real-time physical simulation of our polystrip hair representation using mass-spring models with rigid body chains and hair-head collisions [Selle et al. 2008].

#### 4 FACE DIGITIZATION

We first build a fully textured head model using a multi-linear PCA face model. Given a single unconstrained image and the corresponding segmentation mask, we compute a shape  $V$ , a low-frequency facial albedo map  $I$ , a rigid head pose  $(R, t)$ , a perspective transformation  $\Pi_P(V)$  with the camera intrinsic matrix  $P$ , and illumination  $L$ , together with high-frequency textures from the visible skin region. Since the extracted high-frequency texture is incomplete from a single-view, we infer the complete texture map using a facial appearance inference method based on deep neural networks [Saito et al. 2017].



Fig. 4. Our facial modeling pipeline with visibility constraints produces plausible facial textures when there are occlusions such as hair.

**3D Head Modeling.** To obtain the unknown parameters  $\chi = \{V, I, R, t, P, L\}$ , we adopt the pipeline of [Thies et al. 2016a] which is based on morphable face models [Banz and Vetter 1999] extended with a PCA-based facial expression model and an efficient optimization based on pixel color constraints. We further incorporate pixel-level visibility constraints using our segmentation mask obtained using the method of [Saito et al. 2016].

We use a multi-linear PCA model to represent the low-frequency facial albedo  $I$  and the facial geometry  $V$  with  $n = 10,822$  vertices

and 21, 510 faces:

$$V(\alpha_{id}, \alpha_{exp}) = \bar{V} + A_{id}\alpha_{id} + A_{exp}\alpha_{exp},$$

$$I(\alpha_{al}) = \bar{I} + A_{al}\alpha_{al}.$$

Here  $A_{id} \in \mathbb{R}^{3n \times 40}$ ,  $A_{exp} \in \mathbb{R}^{3n \times 40}$ , and  $A_{al} \in \mathbb{R}^{3n \times 40}$  are the basis of a multivariate normal distribution for identity, expression, and albedo with the corresponding mean:  $\bar{V} = \bar{V}_{id} + \bar{V}_{exp} \in \mathbb{R}^{3n}$ , and  $\bar{I} \in \mathbb{R}^{3n}$ , and the corresponding standard deviation:  $\sigma_{id} \in \mathbb{R}^{40}$ ,  $\sigma_{exp} \in \mathbb{R}^{40}$ , and  $\sigma_{al} \in \mathbb{R}^{40}$ .  $A_{id}$ ,  $A_{al}$ ,  $\bar{V}$ , and  $\bar{I}$  are based on the Basel Face Model database [Paysan et al. 2009] and  $A_{exp}$  is obtained from FaceWarehouse [Cao et al. 2014b]. We assume Lambertian surface reflectance and approximate the illumination using second order Spherical Harmonics (SH).

First, we detect 2D facial landmarks  $f_i \in \mathcal{F}$  using the method of Kazemi et al. [Kazemi and Sullivan 2014] in order to initialize the face fitting by minimizing the following energy:

$$E_{lan}(\chi) = \frac{1}{|\mathcal{F}|} \sum_{f_i \in \mathcal{F}} \|f_i - \Pi_P(RV_i + t)\|_2^2.$$

We further refine the shape and optimize the low-frequency albedo, as well as the illumination, by minimizing the photometric difference between the input image and a synthetic face rendering. The objective function is defined as:

$$E(\chi) = w_c E_c(\chi) + w_{lan} E_{lan}(\chi) + w_{reg} E_{reg}(\chi), \quad (1)$$

with energy term weights  $w_c = 1$ ,  $w_{lan} = 10$ , and  $w_{reg} = 2.5 \times 10^{-5}$  for the photo-consistency term  $E_c$ , the landmark term  $E_{lan}$ , and the regularization term  $E_{reg}$ . Following [Saito et al. 2017], we also ensure that the photo-consistency term  $E_c$  is only evaluated for visible face regions:

$$E_c(\chi) = \frac{1}{|M|} \sum_{p \in M} \|C_{input}(p) - C_{synth}(p)\|_2,$$

where  $C_{input}$  is the input image,  $C_{synth}$  the rendered image, and  $p \in M$  a visibility pixel given by the facial segmentation mask. The regularization term  $E_{reg}$  is defined as:

$$E_{reg}(\chi) = \sum_{i=1}^{40} \left[ \left( \frac{\alpha_{id,i}}{\sigma_{id,i}} \right)^2 + \left( \frac{\alpha_{al,i}}{\sigma_{al,i}} \right)^2 \right] + \sum_{i=1}^{40} \left( \frac{\alpha_{exp,i}}{\sigma_{exp,i}} \right)^2.$$

This term encourages the coefficients of the multi-linear model to conform a normal distribution and reduces the chance to converge into a local minimum. We use an iteratively reweighted Gauss-Newton method to minimize the objective function (1) using three levels of image pyramids. In our experiments, 30, 10, and 3 Gauss-Newton steps were sufficient for convergence from the coarsest level to the finest one. After this optimization, a high-frequency albedo texture is obtained by factoring out the shading component consisting of the illumination  $L$  and the surface normal from the input image. The resulting texture map is stored in the uv texture map and used for the high-fidelity texture inference.

*Face Texture Reconstruction.* After obtaining the low-frequency albedo map and a partially visible fine-scale texture, we can infer a complete high-frequency texture map, as shown in Figure 5, using a deep learning-based transfer technique and a high-resolution face database [Ma et al. 2015]. The technique has been recently introduced in [Saito et al. 2017] and is based on the concept of feature

correlation analysis using convolutional neural networks [Gatys et al. 2016]. Given an input image  $I$  and a filter response  $F^l(I)$  on the layer  $l$  of a convolutional neural network, the feature correlation can be represented by a normalized Gramian matrix  $G^l(I)$ :

$$G^l(I) = \frac{1}{M_l} F^l(I) (F^l(I))^T$$

Saito et al. [2017] have found that high-quality facial details (e.g., pores, moles, etc.) can be captured and synthesized effectively using Gramian matrices. Let  $I_0$  be the low-frequency texture map and  $I_h$  be the high-frequency albedo map with the corresponding visibility mask  $M_h$ . We aim to represent the desired feature correlation  $G_h$  as a convex combination of  $G(I_i)$ , where  $I_1, \dots, I_K$  are the high-resolution images in the texture database:

$$G_h^l = \sum_k w_k G^l(I_k), \forall l \quad \text{s.t.} \quad \sum_{k=1}^K w_k = 1.$$

We compute an optimal blending weight  $\{w_k\}$  by minimizing the difference between the feature correlation of the partial high-frequency texture  $I_h$  and the convex combination of the feature correlations in the database under the same visibility. This is formulated as the following problem:

$$\begin{aligned} \min_w \quad & \sum_l \left\| \sum_k w_k G_{\mathcal{M}}^l(I_k, M_h) - G_{\mathcal{M}}^l(I_h, M_h) \right\|_F \\ \text{s.t.} \quad & \sum_{k=1}^K w_k = 1 \\ & w_k \geq 0 \quad \forall k \in \{1, \dots, K\} \end{aligned} \quad (2)$$

where  $G_{\mathcal{M}}(I, M)$  is the Gramian Matrix computed from only the masked region  $M$ . This allows us to transfer multi-scale features of partially visible skin details to the complete texture. We refer to [Saito et al. 2017] for more detail.

Once the desired  $G_h$  is computed, we update the albedo map  $I$  so that the resulting correlation  $G(I)$  is similar to  $G_h$ , while preserving the low frequency spatial information  $F^l(I_0)$  (i.e., position of eye brows, mouth, nose, and eyes):

$$\min_I \sum_{l \in L_F} \|F^l(I) - F^l(I_0)\|_F^2 + \alpha \sum_{l \in L_G} \|G^l(I) - G_h^l\|_F^2, \quad (3)$$

where  $L_G$  is a set of high-frequency preserving layers and  $L_F$  a set of low-frequency preserving layers in VGG-19 [Simonyan and Zisserman 2014]. A weight  $\alpha$  balances the influence of high frequency and low frequency and  $\alpha = 2000$  is used for all our experiments. Following Gatys et al. [2016], we solve Equation 3 using an L-BFGS solver. Since only frontal faces are available in the database, we can only enhance frontal face regions. To obtain a complete texture, we combine the results with the PCA-based low-frequency textures of the back of the head using Poisson blending [Pérez et al. 2003].

*Secondary Components.* To enhance the realism of the reconstructed avatar, we insert template models for eyes, teeth, gums, and tongue into the reconstructed head model. The reconstructed face model is rescaled and translated to fit a standardized pair of eye balls so that each avatar is aligned as to avoid scale ambiguity during the single-view reconstruction. The mouth-related template models are aligned based on pre-selected vertices on the facial template model. After the initial alignment, we test for intersections between the face and the secondary components for each activated blendshape



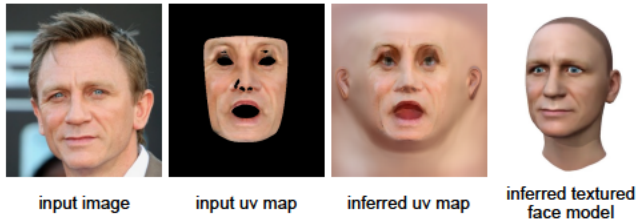


Fig. 5. We produce a complete and high-fidelity texture map from a partially visible and low resolution subject using a deep learning-based inference technique. Original image courtesy of Getty Images.

expression. The secondary models for the mouth region are then translated by the minimal offset where no intersection is present. The eye color texture (black, brown, green, blue) is computed using a similar convolutional neural network for semantic attribute inference as the one used for hair color classification. The input to this network is a cropped image of the face region based on the bounding box around the 2D landmarks from [Kazemi and Sullivan 2014], where non-face regions are set to black and the image centered between the two eyes.

## 5 HAIR DIGITIZATION

**Hairstyle Database.** Starting from the *USC-HairSalon* database for 3D hairstyles, introduced in [Hu et al. 2015], and 89 additional artist created models, we align all the hairstyle samples to the PCA mean head model  $\bar{V}$  used in Section 4. Inspired by [Chai et al. 2015], we also increase the number of samples in our database using a combinatorial process, which is necessary to span a sufficiently large variation of hairstyles. While the online model generation approach of [Hu et al. 2015] is less memory consuming, it requires some level of user interaction.

To extend the number of models, we first group each sample of the *USC-HairSalon* database into 5 clusters via  $k$ -means clustering using the root positions and the strand shapes as in [Wang et al. 2009]. Next, for every pair of hairstyles, we randomly pick a pair of strands among the cluster centroids and construct a new hairstyle using these two sampled strands as a guide using the volumetric combination method introduced in [Hu et al. 2015]. We further augment our database by flipping each hairstyle w.r.t. the  $x$ -axis plane, forming a total of 100,000 hairstyles.

For each hair model, the set of all particles forms the outer surface of the entire hair by considering each hair strand as a chain of particles. This surface can be constructed using a signed distance field obtained by volumetric points samples [Zhu and Bridson 2005]. By using the surface normal of this mesh, we compose close and nearly parallel hair strands into a hair polystrip, which is a parametric piece-wise linear patch. This thin surface structure can carry realistic looking textures that provide additional variations of hair, such as curls, crossings, or thinner tips. Additionally, the transparency of the texture allows us to see through the overlay of different polystrips and provide an efficient way to achieve volumetric hair renderings.

Luo et al. [2013] proposed a method to group short hair segments into a ribbon structure. Adopting a similar approach, we start from the longest hair strand in the hairstyle as the center strand of the

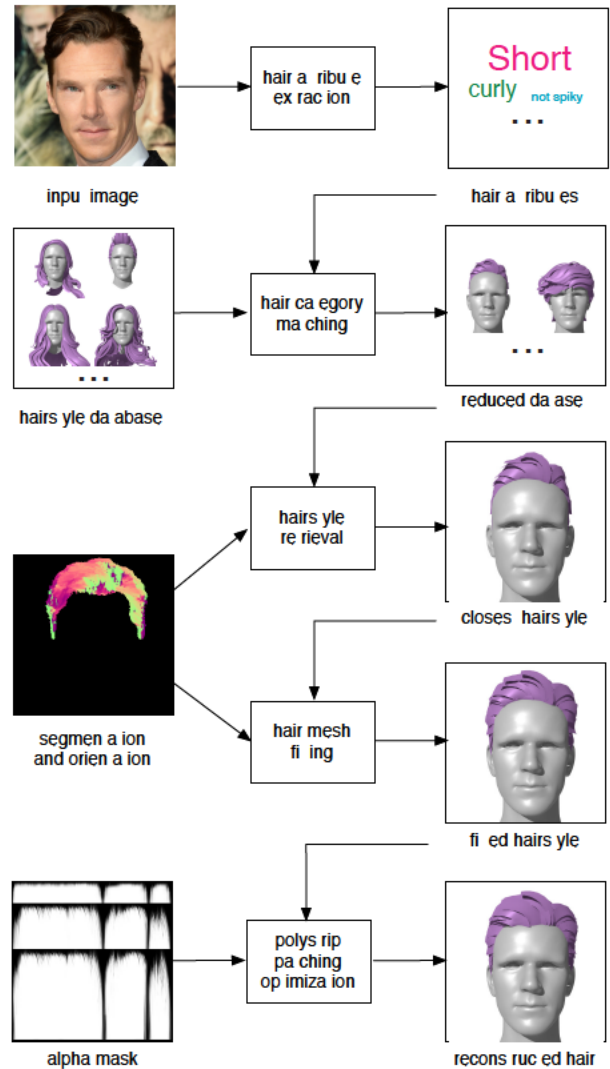


Fig. 6. Our hair mesh digitization pipeline. Original image courtesy of Getty Images.

polystrip. By associating the normal of each vertex on the strand to the closest point on the hair surface, we can expand the center strand on both sides of the binormal as well as its opposite direction. We compute the coverage of all hair strands by the current polystrip, and continue to expand the polystrip until no more strands are covered. Once a polystrip is generated, we remove all the covered strands in the hairstyle, and reinitiate process from the longest strand in the remaining hair strand subset. Finally, we obtain a complete hair polystrip model, once all the hair strands are removed from the hairstyle. We refer to [Luo et al. 2013] for more details.

**Hair Attribute Classification.** We use 40K images from the CelebA dataset [Liu et al. 2015] with various hairstyles and collect their hair attributes using AMT (see Table 1 for the list of hair attributes). Similarly, we manually label all the hair models in our database

using high level semantic attributes. We also actively ensure that we have roughly the same quantity of images for each attribute by resampling the training data.

These annotations are then fed into a state-of-the-art classification network, ResNet [He et al. 2016], to train multiple classifiers predicting each hair attribute given an input image. We use the 50-layer ResNet pre-trained with ImageNet [Deng et al. 2009], and fine-tune it using our training data under learning rate  $10^{-4}$ , weight decay  $10^{-4}$ , momentum 0.9, batch size 32, and 90 epochs using the stochastic gradient descent method. The images are augmented for the training based on perturbations suggested by He et al. [2016] (variations in cropping, brightness, contrast, and saturation).

During test time, input images are resized so that the maximum width or height is 256, center-cropped to  $224 \times 224$ , and fed into the trained classifiers. Each classifier returns a normalized  $n$ -dimensional vector, where  $n = 2$  for binary attributes and  $n = m$  for  $m$ -class attributes. The predictions of all classifiers are then concatenated into a multi-dimensional descriptor. Nearest neighbor search is then performed to find the  $k$ -closest matching hair with smallest Euclidean distance in the descriptor space. If the classifier detects a bald head, the following hairstyle matching process is skipped.

**Hairstyle Matching.** After obtaining a reduced hair model subset based on the semantic attributes, we compare the segmentation mask and hair orientations at the pixel level using pre-rendered thumbnails to retrieve the most similar hairstyle [Chai et al. 2016]. Following Chai et al. [2016], we organize our database as thumbnails and adopt the binary edge-based descriptor from [Zitnick 2010] to increase matching efficiency. For each hairstyle in the database, we pre-render the mask and the orientation map as thumbnails from 35 different views, where 7 angles are uniformly sampled in  $[-\pi/4, \pi/4]$  as yaw and 5 angles in  $[-\pi/4, \pi/4]$  as pitch. If the hair segmentation mask has multiple connected components due to occlusion or if the hair is partially cropped, then the segmentation descriptor may not be reliable; in this case, we find the most similar hairstyle using the classifiers.

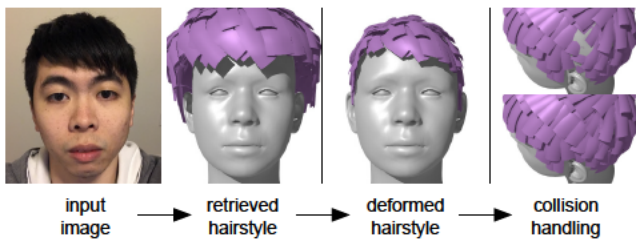


Fig. 7. Our hair mesh fitting pipeline.

**Hair Mesh Fitting.** In order to match the retrieved model with the silhouette and orientation of the input, we extend the hair fitting algorithm for strands [Chai et al. 2016; Hu et al. 2015] to the polystrip meshes. First, we perform spatial deformation in order to fit the hair model to the personalized head model, using an as-rigid-as-possible graph-based deformation model [Li et al. 2009]. We represent the displacement of each vertex on the hair mesh as a linear combination

of the displacements of  $k$ -nearest vertices on the head mesh using the following inversely weighted Gaussian approximation:

$$dp_i = \sum_{j \in N_i} (1 + \|p_i - q_j\|_2 + \|p_i - q_j\|_2^2)^{-1} dq_j,$$

where  $p$  and  $q$  are vertices on the hair and mean head mesh respectively. This allows the hair model to follow the head deformation without causing intersection. Once the scalp and the hair mesh is aligned, we compute a smooth warping function  $\mathcal{W}(\cdot)$  mapping vertices on the 3D model's silhouette to the closest points on the input's 2D silhouette from the camera angle, and deform each polystrip according to the as-rigid-as-possible warping function presented in [Li et al. 2009]. Then, we deform each polystrip to follow the input 2D orientation map as described in [Chai et al. 2016; Hu et al. 2015]. Possible intersections between the head and the hair model due to this deformation are resolved using simple collision handling via force repulsion [Luo et al. 2013].

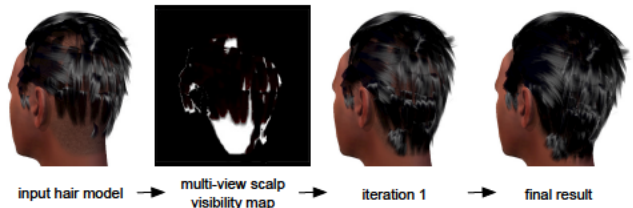


Fig. 8. Our iterative optimization algorithm for polystrip patching.

**Polystrip Patching Optimization.** With the benefit of having a low computational overhead, a polystrip-based rendering with a bump map and an alpha mask produces locally plausible hair appearance for a wide range of hairstyles. However, such rendering is prone to a lack of scalp coverage, especially for short hairstyles. We propose an iterative optimization method to ensure scalp coverage via patching with minimum increase in the number of triangles.

We measure the coverage by computing the absolute difference between the alpha map in a model view space with and without hair transparency from multiple view points (see Figure 8). Regions with high error expose the scalp surface and need to be covered by additional hair meshes. Without transparency, all polystrips are rendered with alpha value 1.0. When a hair alpha mask is assigned by the hair style classification, the polystrips are rendered via order-independent transparency (OIT), resulting in alpha values of range  $[0, 1]$ . First, we convert the error map into a binary map by thresholding if the error exceeds 0.5, and apply blob detection on the binary map. Given the blob with highest error, a new polystrip is then placed to cover the area.

We find the  $k$ -closest polystrips to the region with the highest error and resample two polystrips within this set so that their average produces a new one that covers this region. We use  $k = 6$  for all our examples. The two polystrips are re-sampled so that they have consistent vertex numbers for linear blending. By averaging the polystrips, we can guarantee that the resulting strips are inside the convex hull of the hair region. Thus, our method does not violate the overall hair silhouette after new strips are added. We iterate this



process until the highest error has reached a certain threshold or when no more scalp region is visible.

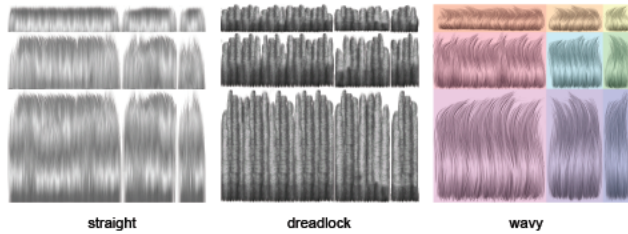


Fig. 9. Example polystrip textures for characterizing high-frequency structures of different hair types. Each texture atlas contains a 9-uv map for polystrips of different sizes.

**Hair Rendering and Texturing.** We render the resulting polystrips using a variant of [Sadeghi et al. 2010]. The hair tangents are directly obtained from the directions of the mesh’s UV parameterization. We use our classification network to determine the semantic shader parameters, such as the width and the intensity of the primary and secondary highlights. To approximate the multiple scattering components, we add the diffuse term from Kajiya and Kay [1989]. We perform alpha blending between the polystrips using an order-independent transparency (OIT) algorithm based on depth peeling.

Our classification network also specifies for each input image the most similar local hairstyle texture. As illustrated in Figure 9, we characterize a hairstyle’s local high-frequency structure into different categories. These textures are manually designed by an artist based on pre-categorized images that are also used for training. As demonstrated in many games, these type of hair textures can represent a wide range of hair appearances. As different hair types are associated with custom shaders, some styles may be associated with a bump map, which is also prepared by the artist.

For the texture lookups, we use a hierarchical UV atlas which depends on the world dimensions of individual polystrips after the deformation step. The polystrip textures are grouped into nine categories of sizes in a single map. Using multiple texture sizes for each hair patch reduces stretching and compression artifacts in both U and V directions, and also increases texture variations.

## 6 RESULTS

We created fully-rigged 3D avatars with challenging hairstyles and secondary components for a diverse set of inputs from a wide range of image sets. Even though the input resolutions are inconsistent, there is no a-priori knowledge about the scene illumination or intrinsic camera parameters, and the subjects within the inputs may have tilted or partially covered heads with different expressions, we were still able to produce automatically digitized outputs. We also processed short and long hairstyles of different local structures including straight, wavy, and dreadlock styles. As illustrated in Figure 10, our proposed framework successfully digitizes textured face models and reproduces the volumetric appearance of hair, which is shown from the front and the back. Facial details are faithfully digitized in unseen regions and fully covered hair polystrips can be

reconstructed using our iterative patching optimization algorithm. Our accompanying video shows several animations produced by a professional animator using the provided controls of our avatar. We also demonstrate an avatar animation applications using a real-time facial performance capture system, as well as the simulated hair motions of our hair polystrip models using a mass-spring system based on rigid body chains and hair-head collision (see Figure 13).

**Evaluation.** We evaluate the robustness of our system and consistency of the reconstruction using a variety of input examples of the same subject as shown in Figure 11. Our combined facial segmentation [Saito et al. 2016], texture inference [Saito et al. 2017] and PCA-based shape, appearance, and lighting estimation [Thies et al. 2016a] framework is robust to severe lighting conditions. We can observe that the visual difference between the reconstructed albedo map of a same person, captured under contrasting illuminations, is minimal. We also demonstrate how our linear face model can discern between a person’s identity and its expression up to some degree. Our visualization shows the resulting avatar in the neutral pose. While some slightly noticeable dissimilarity in the face and hair digitization remains, both outputs are plausible. For large smiles in the input image, the optimized neutral pose can still contain an amused expression.

While traditional hair database retrieval techniques [Chai et al. 2016; Hu et al. 2015] are effective for strand-based output, our hair polystrip modeling approach relies on clean mesh structures and topologies as they are mostly preserved until the end of the pipeline. As shown in Figure 12, a deep learning-based hair attribute classification step is critical in avoiding wrong hair types being used during retrieval. Table 1 lists a few annotated hair attributes, as well as their prediction accuracies from the trained network. Although the predictions are sometimes not accurate due to the lack of training data, we can still retrieve similar hairstyles which are further optimized by subsequent steps in the pipeline.

attribute	possible values	accuracy (%)
hair_length	long/short/bald	72.5
hair_curve	straight/wavy/curly/kinky	76.5
hairline	left/right/middle	87.8
fringe	full/left/right	91.8
hair_bun	1 bun/2 buns/...	91.4
ponytail	1 tail/2 tails/...	79.2
spiky_hair	spiky/not spiky	91.2
shaved_hair	fully/partially shaved	81.4
baldness	fully bald/receded hair	79.6

Table 1. We train a network to classify the above attributes of hairstyles, achieving accuracies around 70-90%.

**Comparison.** We compare our method against several state-of-the-art facial modeling techniques and avatar creation systems in Figure 14. Our deep learning-based framework [Saito et al. 2017] can infer facial textures with more details comparing to linear morphable face models [Blanz and Vetter 1999; Thies et al. 2016a]. In addition to producing high-quality hair models, our generated face meshes and textures are visually comparable to the video-based





Fig. 10. Our proposed framework successfully generates high-quality and fully rigged avatars from a single input image in the wild. We demonstrate the effectiveness on a wide range of subjects with different hairstyles. We visualize the face meshes and hair polystrips, as well as their textured renderings. Original images courtesy of Getty Images.

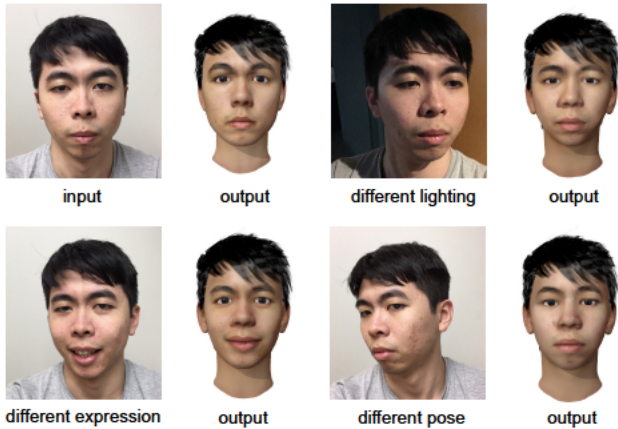


Fig. 11. We evaluate the robustness of our framework by validating the consistency of the output under different capture conditions.

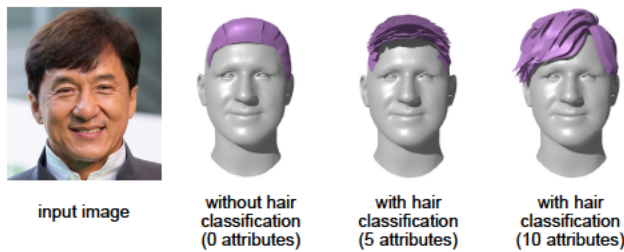


Fig. 12. We assess the importance of our deep learning-based hair attribute classification. Original image courtesy of Getty Images.



Fig. 13. Real-time hair simulation using a mass-spring system.

reconstruction system of Ichim et al. [2015]. We can also reproduce similarly compelling avatars as in [Cao et al. 2016], but using only one out of many of their input images. While their approach is still associated with some manual labor, our system is fully automatic. Additionally, we provide two comparisons with two existing commercial solutions. In particular, we notice that the system of Loom.ai [2017] fails to retrieve the correct hairstyle, while itSeez3D's Avatar SDK [2017] does not automatically produce hair models, nor allows the avatar to be animated.

We further compare our polystrip-based results with the state-of-the-art single-view hair modeling technique from Chai et al. [2016] as shown in Figure 15. Their methods are constrained to strand-based hairstyles and lose effectiveness on local features compared to our polystrips method. While strand-based renderings are typically more realistic, we argue that our representation is more versatile (especially for very short hair) and suitable for efficient character rendering in highly complex virtual scenes. In particular, a single polystrip patch can approximate a large number of strands using a

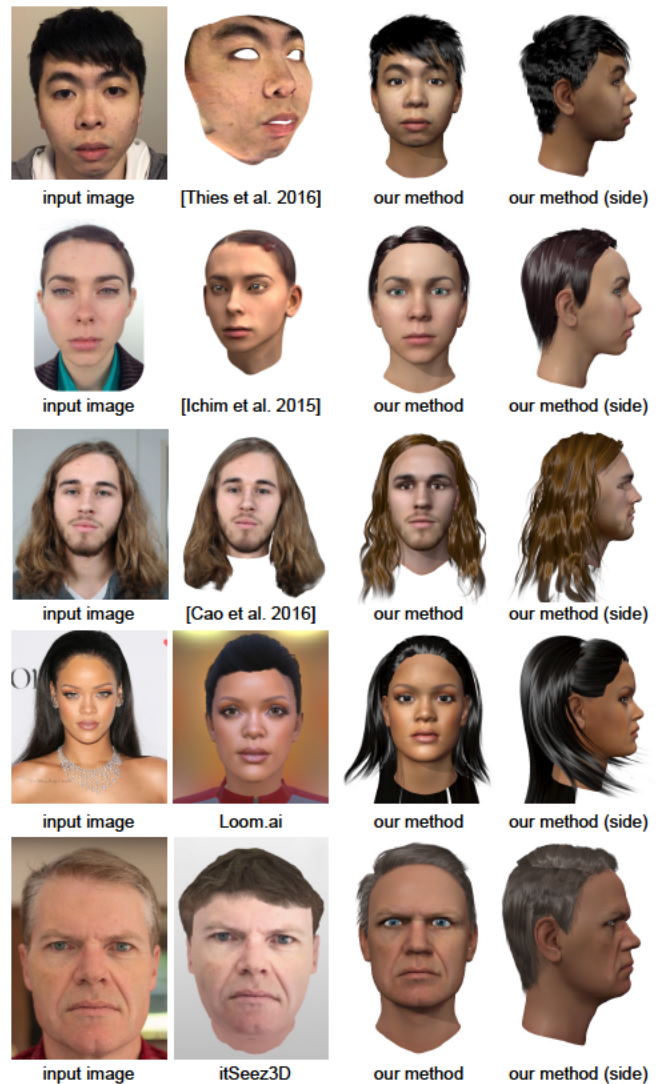


Fig. 14. We compare our method with several state-of-the-art avatar creation systems. Original image (row 4) courtesy of Getty Images.

single texture with an alpha mask, which can significantly increase rendering performance.

**Performance.** All our experiments are performed using an Intel Core i7-5930K CPU with 3.5 GHz equipped with a GeForce GTX Titan X with 12 GB memory. 3D head model reconstruction takes 5 minutes in total, consisting of 0.5 second of face model fitting, 75 s of feature correlation extraction, 14 s of computing the convex blending weight, 172 s of the final synthesis optimization. The secondary component fitting and facial rigging are done within 1 second. Hair polystrip reconstruction takes less than 1 s to classify the hair attributes from the input image, less than 1 s to retrieve the closest exemplar, and 10 s to deform a hairstyle. 5 s are needed to handle collision. Polystrip patching optimization is done within 1 minute for 2 iterations.



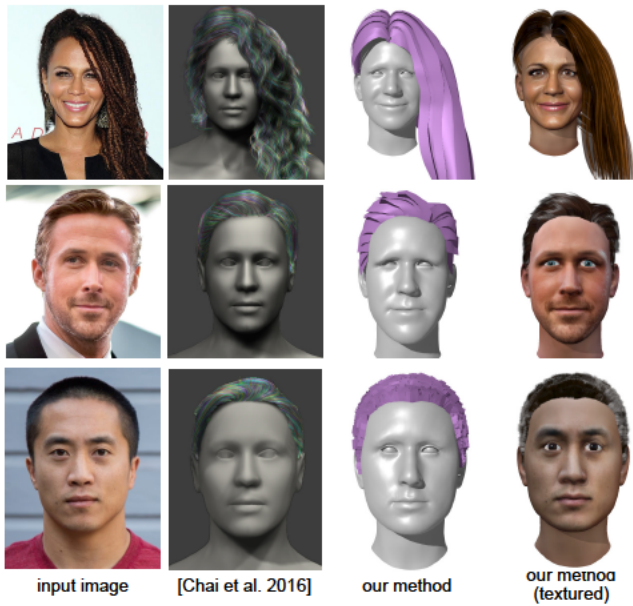


Fig. 15. We compare our method with the latest single-view hair modeling technique, AutoHair [Chai et al. 2016]. Original images (row 1, 2) courtesy of Getty Images.

## 7 DISCUSSION

The concept of single-view modeling of avatars with hair has been first demonstrated in [Cao et al. 2014b] as part of their “real-time performance-based facial image animation” application. The system is based on a hair reconstruction pipeline for portrait manipulation [Chai et al. 2012]. However, the technique is not fully automatic and requires manual key point corrections and hair strokes.

While the automatic digitization of faces [Blanz and Vetter 1999; Saito et al. 2017; Thies et al. 2016a] and hair [Chai et al. 2016] from single views have been introduced separately, we demonstrate an end-to-end framework that integrates the computation of both components. The ability to create complete models from a single unconstrained image is particularly suitable for consumer use, as well as for scalable content creation in virtual production. We can now easily produce animator-friendly models of a person with intuitive controls, as illustrated in our examples.

Previous single-view hair reconstruction techniques mostly focus on the digitization of strand geometry; however, we also infer hair appearance, taking into account the custom shading properties for the rendering engine. Even though the digitization of high-quality strands is possible, the rendering costs involved are significant for complex multi-character virtual environments. Our focus is to provide a unified solution for capturing a wide range of hairstyles and the ability to integrate them into existing real-time game engines such as Unity. We have shown that polystrips are versatile hair representations and suitable for the efficient rendering and animation of compelling avatars. We also note the importance of rendering capabilities such as order-independent transparency for producing convincing looking volumetric hair.

The effectiveness of our methodology is grounded on a careful integration of state-of-the-art modeling and synthesis techniques for faces and hair. Several key components, such as segmentation, semantic hair attributes extraction, and eye color recognition, are only possible due to recent advances in deep learning. Our experiments also indicate the robustness of our system, where consistent results of the same subject can be obtained when captured from different angles, under contrasting lighting conditions, and with different input expressions.

Even in cases where the subject is only partially visible, the image is of low resolution, and the illumination conditions unknown, we can obtain high-quality textured meshes of the face and compelling hair renderings similar to those of characters in recent games. Our approach is qualitatively comparable to existing avatar creation systems, which require multiple photographs and manual input [Cao et al. 2016; Ichim et al. 2015].

While our proposed polystrip optimization algorithm is a critical component for our automatic avatar digitization framework, we believe that it can also be a useful tool during the design process of polystrip-based hair models in general. Once a rough hair mesh is created, an artist could use this patching optimization instead of manually duplicating and perturbing with additional polystrips.

*Limitations.* Due to the ill-posed problem of highly incomplete input and the low-dimensionality of our linear face models, our shape models may not be fully accurate and our facial texture inference technique may add details in wrong places. With the dramatic progress in deep learning research, we believe that a massive collection of high-resolution 3D faces in controlled capture settings could be used to improve the fidelity of our face models, as well as the performance of shape inference algorithms.

Since only a single input image is used, our face modeling pipeline transfers a generic FACS-based linear blendshape model to every subject. In reality these blendshapes would need to be individualized for specific subjects. While it is possible that certain expressions would correlate with the shape of the face, it is most likely that multiple input images would be necessary to form accurate facial expression models using optimization techniques as introduced by Li et al. [2010]. In addition, the accuracy of our hair classification network is not 100%; for example, ponytails can be ambiguous. Similar to previous papers, our method would fail to retrieve the correct hair model when the input hairstyle differs greatly from those in the database (Figure 16).

We use a simple mass-spring system technique to produce motion simulation. While the use of hair polystrips is highly efficient and a reasonable approximation of strand-based models [Chai et al. 2016; Hu et al. 2015], convincing strand-level simulations [Chai et al. 2014] are not yet possible with our representation.

Though the use of polystrips and textures with alpha masks can capture the volumetric look of hair as opposed to image-based alternatives [Cao et al. 2016], we cannot digitize props such as headwear or glasses. Our method would also fail for longer facial hair such as beards, since our database does not contain these objects. We believe that adding more object types as samples in our database could make such inference possible. In addition, our system currently only

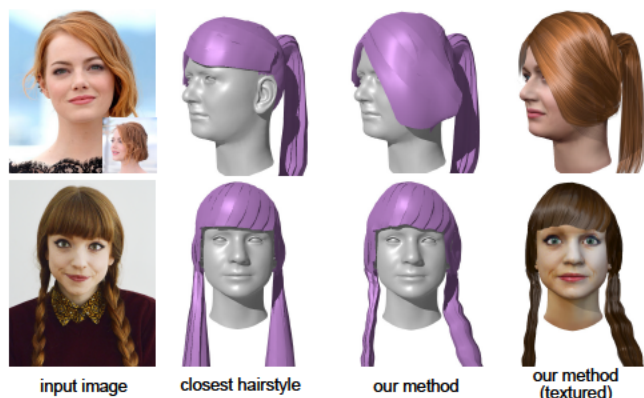


Fig. 16. Limitations. Wrong hairstyles can be retrieved due to incomplete visibility or insufficient hair samples in the database. Original images courtesy of Getty Images (row 1) and Alexandra Spence (row 2).

captures a single hair color for each subject. More powerful texture analysis and synthesis techniques would be needed to generate plausible multi-color hairstyles.

**Future Work.** Since our framework is designed around today’s real-time rendering environments and facial animation systems, we are still using commonly used parametric models for faces and hair, and the results may still look uncanny. In the future, we plan to explore end-to-end deep learning-based inference methods to generate more realistic avatars with dynamic textures and more compelling hair rendering techniques. Research in generative adversarial networks are promising directions.

## ACKNOWLEDGEMENTS

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## **Comparison SIGGRAPH Asia 2017 and ACM SIGTAPH RTL:**

(A) Hu et al. : "Avatar digitization from a single image for real-time rendering", ACM SIGGRAPH Asia 2017, 36(6), 195:1-195:14

(B) "Pinscreen: Creating Performance-Driven Avatars in Seconds", ACM SIGGRAPH Real-time Live 2017

[https://www.youtube.com/watch?v=hpuEdXn\\_M0Q&t=2353s](https://www.youtube.com/watch?v=hpuEdXn_M0Q&t=2353s)

<http://s2017.siggraph.org/content/real-time-live.html>

It appears both (A) and (B) present the same body of work. Parameters of the algorithms were tweaked, as is commonly done with such methods in computer graphics as it evolves over time and one tries it on new examples (or improves existing ones). However, both (A) and (B) come from the same research project with the same goal and core ideas.

### **\*\*\* Same goal \*\*\***

(A) and (B) share the same goal: create a human avatar with hair, facial textures and a facial rig from a single photograph. In work (B), they showed exactly what the title of (A) says: they digitized a human avatar using a single-image, and rendered it in real-time.

### **\*\*\* 10 out of 11 authors are the same \*\*\***

The authorship lists of the two projects match:

A: Liwen Hu, Shunsuke Saito, Lingyu Wei, Koki Nagano, Jaewoo Seo, Jens Fursund, Iman Sadeghi, Carrie Sun, Yen-Chun Chen, Hao Li [note: Pinscreen, USC, ICT affiliations]

B: Hao Li [note: Pinscreen, USC, ICT affiliations], Liwen Hu, Koki Nagano, Jaewoo Seo, Shunsuke Saito, Lingyu Wei, Iman Sadeghi, Jens Fursund, Yen-Chun Chen, Stephen Chen, Carrie Sun

List A has 10 authors and list B has 11 authors. The authors are the same, just re-ordered, except that B also has "Stephen Chen" ("Product Designer" at Pinscreen). This is strong evidence that it is the same research project. In academic research, one doesn't have 10 exact same people working on two different research projects at the period of time (and in the same institutions, and with exactly the same goal for the project).

### **\*\*\* The timelines match \*\*\***

The timelines of (A) and (B) match: (A) was first submitted to ACM SIGGRAPH in January 2017, then rejected in April 2017, then re-submitted in May 2017 to SIGGRAPH Asia, and presented at the SIGGRAPH Asia conference in November 2017. (B) was submitted in April



2017 to SIGGRAPH Real-time Live, and presented in July 2017 at ACM SIGGRAPH Real-time Live. This is a very typical natural evolution timeline for a research project in computer graphics.

**\*\*\* Same title image \*\*\***

(A) and (B) use the same person / 3d model as their title image: For (B), see the image at 31:30 in the youtube video, vs for (A) see Figure 1 (the person at the top-left).

**\*\*\* Same key technology: polystrips \*\*\***

Both (A) and (B) claim the ability to model hair as a key contribution. Both (A) and (B) use the same method to model hair: "**polystrips**" (long polygonal shapes; think of it as taking a ribbon tape and then bending, denting it somewhat, to model the shape of a wisp of hair). Note that "polystrips" are **not** the typical way to represent hair in computer graphics. The typical way done in prior work was to use "strands" (thin lines connected with joints.) In (A), they state, in the abstract, (quoted verbatim) "*While the generated face is a high-quality textured mesh, we propose a versatile and efficient polygonal strips (polystrips) representation for the hair... For real-time settings, we demonstrate the exhibility of polystrips in handling hairstyle variations, as opposed to conventional strand-based representations.*".

You can see the polystrips in Figure 1 of (A). They are the long purple polygonal strips of hair. In presentation (B), Iman Sadeghi explicitly says that they use "polystrips" at 34:32. And you can see the polystrips of Hao's hair at 34:36 (the purple polygonal strips that model the hair). Note that both (A) and (B) render them in the same color (purple).

So, both (A) and (B) use **the same new technology**, namely using polystrips as opposed to strands to model and represent hair. This is a very compelling algorithmic similarity between (A) and (B) because it departs from prior work that typically used strands.

**\*\*\* Same key technology: neural networks \*\*\***

Both (A) and (B) create the shape of the hair using a neural network. In (A), they state in the abstract, "The performance of our hairstyle retrieval is enhanced using a deep convolutional neural network for semantic hair attribute classification." In (B), Iman Sadeghi says at 34:26 that they use a neural network to select the hairstyle, create the hair geometry (the polystrips), the face geometry, albedo texture map, the eye color. The same is done in paper (A). The face geometry, albedo texture map creation and eye color determination is described in Section 4 of paper (A), "Face Digitization". Selecting the hair style and geometry is described in Section 5 of paper (A) "Hair digitization".

**\*\* Same modeling complexity and rendering style \*\*\***

Results in (A) and (B) look visually similar, even when applied to different people. Neither is really photorealistic, instead, they both look like cartoonish versions of the person, and they are both equally cartoonish. If the works (A) and (B) were independent, one would not expect the results to be so visually similar. There is approximately the same level of detail

in the facial expressions in the results of (A) vs results of (B). Shading is very similar too. See, for example Figure 14 in (A) where they compare to other methods. See, for example, the results of [loom.ai](http://loom.ai) or "itSeez3D". See how they look very different to either (A) or (B), but (A) and (B) look very similar to each other (even when applied to different people). IMO, (A) and (B) employed similar or the same modeling complexity and rendering technology.

# HaoLi



CEO & Co-Founder, Pinscreen Inc.

Associate Professor of Computer Science, USC

Director of the Vision and Graphics Lab, USC Institute for Creative Technologies

University of Southern California  
Department of Computer Science  
941 Bloom Walk, SAL 244  
Los Angeles, CA 90089-0781, USA

Tel +1 917 514 6980  
Email [hao@hao-li.com](mailto:hao@hao-li.com)  
Home page <http://www.hao-li.com/>  
Facebook <http://www.facebook.com/li.hao/>

## PROFILE

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Date of birth 17/01/1981  
Place of birth Saarbrücken, Germany  
Citizenship German  
Languages German, French, English, and Mandarin Chinese (all fluent and no accents)

## COMMITMENT

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I work at the intersection between Computer Graphics, Computer Vision, and Machine Learning, with focus on photorealistic human digitization and performance capture using deep learning and data-driven techniques. I'm known for my work on dynamic geometry processing, virtual avatar creation, facial performance capture, AI-driven 3D digitization, and deep fake detection. My research has led to the facial animation technology in Apple's iPhone X, I worked on the digital reenactment of Paul Walker in the movie Furious 7, and my algorithms on deformable shape alignment have improved the radiation treatment for cancer patients all over the world. I have been named one of the world's top 35 innovator under 35 by MIT Technology Review in 2013 and NextGen10: Innovators under 40 by C-Suite Quarterly in 2014. I received the Office of Naval Research (ONR) Young Investigator Award in 2018, the Google Faculty Research Award, the Okawa Foundation Research Grant, and the Andrew and Erna Viterbi Early Career Chair in 2015, the Swiss National Science Foundation fellowship for prospective researchers in 2011, and the best paper award at SCA 2009. I am ranked #1 on Microsoft Academic in 2016 on the top 10 leaderboard in Computer Graphics for the past five years. I am member of the Global Future Councils of the World Economic Forum (WEF) and have been named to the DARPA Information Science and Technology (ISAT) Study Group in 2019. I also serve as expert witness for IP litigation relating to Computer Vision and Graphics.

**Google Scholar** <https://scholar.google.com/citations?user=NFeigSoAAAAJ&hl=en>

## EDUCATION

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**Ph. D., Computer Science** 07/2006 - 11/2010  
ETH Zurich, Department of Computer Science  

- Thesis: *Animation Reconstruction of Deformable Surfaces*  
Advisor: Prof. M. Pauly

**M. Sc., Computer Science** 10/2000 - 01/2006  
Universität Karlsruhe (TH), Department of Computer Sciences  

- Thesis: *Reconstruction of Colored Objects from Structured Illuminated Views*  
Advisor: Prof. H. Prautzsch
- Major 1: Computer graphics and geometric modeling
- Major 2: Cryptography and security
- Minor: Differential and projective geometry

**ERASMUS Student Exchange, Computer Science** 10/2002 - 09/2003  
Institut National Polytechnique de Grenoble, ENSIMAG

**French-German High School Diploma** 09/1992 - 05/1999  
Lycée Franco-Allemand de Sarrebruck, Germany

USC000378

## POSITIONS

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<b>University of Southern California</b> Associate Professor (with Tenure), Computer Science Department	05/2019 - ongoing
<b>USC Institute for Creative Technologies</b> Director of the Vision and Graphics Lab	08/2016 - ongoing
<b>Pinscreen Inc.</b> CEO & Co-Founder	10/2015 - ongoing
<b>Weta Digital</b> Visiting Professor, Virtual Studio Group	06/2014 - 08/2014
<b>University of Southern California</b> Assistant Professor, Andrew and Erna Viterbi Early Career Chair, Computer Science Department	08/2013 - 05/2019
<b>Industrial Light &amp; Magic, Lucasfilm Ltd.</b> Research Lead, R&D Group	04/2012 - 07/2013
<b>Columbia University</b> Postdoctoral Fellow, Columbia Computer Graphics Group	04/2011 - 03/2012
<b>Princeton University</b> Visiting Postdoctoral Researcher, Princeton Computer Graphics Group	04/2011 - 03/2012
<b>École Polytechnique Fédérale de Lausanne</b> Visiting and Postdoctoral Researcher, Computer Graphics and Geometry Laboratory	02/2010 - 04/2011
<b>Industrial Light &amp; Magic, Lucasfilm Ltd.</b> Research Intern, R&D Group	07/2009 - 10/2009
<b>Stanford University</b> Visiting Researcher, Geometric Computing Group	07/2008 - 09/2008
<b>ETH Zurich</b> Research Assistant, Applied Geometry Group	07/2006 - 11/2010
<b>National University of Singapore</b> Visiting Research Scholar, Centre for Information Mining and Extraction	01/2006 - 07/2006

## TEACHING

**Lecturer**

University of Southern California, Computer Science Department

- CSCI 621: Digital Geometry Processing (Lecture) SS 2017, SS 2018, and SS 2019
- CSCI 420: Computer Graphics (Lecture) FS 2014, FS 2015, FS 2017, and FS 2018
- CSCI 599: Digital Geometry Processing (Lecture) SS 2014 and SS 2015

**Guest Lecturer**

University of Southern California, Computer Science Department

- CSCI 576: Multimedia Systems Design (Lecture) FS 2016
- EE 598: Electrical Engineering Research Seminar (Lecture) SS 2016
- CSCI 697: Seminar in Computer Science Research (Lecture) FS 2015 and FS 2017
- CSCI 109: Introduction to Computing (Lecture) SS 2014 and FS 2015
- CSCI 597: Seminar in Computer Science Research (Lecture) FS 2013
- ENGR 102: Freshmen Academies (Lecture) FS 2013

Stanford University, Computer Science Department

- CS148: Introduction to Computer Graphics & Imaging (Lecture) 2012

Columbia University, Computer Science Department

- Computer Graphics (Lecture) 2011

### Teaching Assistant

École Polytechnique Fédérale de Lausanne, School of Computer and Communication Sciences

- Digital 3D Geometry Processing (Lecture) 2010
- Computer Graphics (Lecture) 2010

ETH Zurich, Department of Computer Science

- Surface Representation and Geometric Modeling (Lecture) 2007, 2008, and 2009
- Introduction to Computer Graphics (Lecture) 2006, 2007, 2008, and 2009
- Advanced Topics in Computer Graphics (Seminar) 2006 and 2007
- Geometric Computing (Seminar) 2008

## MENTORING

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### Supervision

University of Southern California, Computer Science Department

- |  |                   |
|--|-------------------|
| • Jiaman Li, PhD Student   | 09/2019 - ongoing |
| • Ruilong Li, PhD Student  | 09/2019 - ongoing |
| • Hanyuan Xiao, PhD Student  | 09/2019 - ongoing |
| • Zhengfei Kuang, PhD Student                                      | 09/2019 - ongoing |
| • Yuliang Xiu, PhD Student   | 09/2019 - ongoing |
| • Kyle Morgenroth, PhD Student                                     | 09/2018 - ongoing |
| • Pengda Xiang, PhD Student  | 09/2018 - ongoing |
| • Haiwei Chen, PhD Student   | 09/2018 - ongoing |
| • Shichen Liu, PhD Student   | 09/2018 - ongoing |
| • Sitao Xiang, PhD Student   | 09/2016 - ongoing |
| • Zimo Li, PhD Student   | 09/2016 - ongoing |
| • Zeng Huang, PhD Student  | 09/2016 - ongoing |
| • Zhou Yi, PhD Student   | 09/2016 - ongoing |
| • Tianye Li, PhD Student (MSc in 2015)                             | 11/2015 - ongoing |
| • Kyle Olszewski, PhD Student                                      | 09/2014 - ongoing |
| • Shunsuke Saito, PhD Student (PhD defense in 12/2019)             | 09/2015 - 05/2019 |
| • Lingyu Wei, PhD Student (PhD defense in 03/2018)                 | 09/2014 - 05/2018 |
| • Liwen Hu, PhD Student (MSc in 2013 and PhD defense in 11/2018)   | 09/2014 - 05/2019 |
| • Nitika Aggarwal, MSc Student                                     | 01/2014 - 05/2014 |
| • Ronald Yu, MSc Student (next stop: Stanford University)          | 10/2016 - 05/2018 |
| • Carrie Sun, BSc Student  | 01/2014 - 05/2014 |
| • Lizhi Fan, BSc Student   | 01/2015 - 05/2015 |
| • Natalie Monger, BSc Student                                      | 09/2016 - 05/2017 |
| • Dr. Chongyang Ma, Postdoctoral Researcher (next stop: Snap Inc.) | 09/2013 - 06/2015 |

USC Institute for Creative Technologies, Vision and Graphics Lab

- |  |                   |
|--|-------------------|
| • Kathleen Haase, Special Projects Manager           | 06/2016 - ongoing |
| • Yajie Zhao, Researcher Associate                   | 10/2017 - ongoing |
| • Mingming He, Postdoctoral Researcher               | 12/2018 - ongoing |
| • Loc Huynh, PhD Student                             | 08/2017 - ongoing |
| • Kalle Bladin, Research Programmer                  | 08/2017 - ongoing |
| • Pratusha Prasad, Research Programmer (MSc in 2016) | 06/2016 - ongoing |
| • Xinglei Ren, Research Programmer (MSc in 2017)     | 04/2017 - ongoing |
| • Bipin Kishore, Research Programmer (MSc in 2017)   | 04/2017 - ongoing |
| • Chinmay Chinara, Research Programmer (MSc in 2018) | 05/2018 - ongoing |
| • Aakash Shanbhag, Research Programmer (MSc in 2018) | 05/2018 - ongoing |
| • Marcel Ramos, Digital Artist                       | 06/2016 - ongoing |

• Owen Ingraham, Digital Artist	07/2018 - ongoing
• Christina Trejo, Project Coordinator	06/2016 - ongoing
• Weikai Chen, Researcher Associate (now at Tencent America)	06/2017 - 09/2019
• Jun Xing, Postdoctoral Researcher (now at miHoYo)	05/2017 - 01/2019
• Andrew Jones, Sr. Research Associate (now at Raxium Inc.)	06/2016 - 01/2018
Columbia University, Computer Science Department	
• Nathaniel Clinger, BSc Student	01/2012 - 05/2012
• Papoj Thamjaroenporn, BSc Student	01/2012 - 05/2012
• Pei-Lun Hsieh, MSc Student	01/2012 - 05/2012
• Xiaochen Hu, BSc Student	01/2012 - 05/2012
EPFL, School of Computer and Communication Sciences	
• Alexandru Ichim, MSc Student	06/2010 - 09/2010
ETH Zurich, Department of Computer Science	
• Huw Bowles, MSc Student	11/2008 - 05/2009
• Jens Puwein, MSc Student	02/2008 - 08/2008
• Jeroen Dries, MSc Student	09/2006 - 03/2007
<b>PhD Defense</b>	
• Shunsuke Saito, <i>University of Southern California</i>	12/2019
• Jens Windau, <i>University of Southern California</i>	04/2019
• Liwen Hu, <i>University of Southern California</i>	11/2018
• Lingyu Wei, <i>University of Southern California</i>	03/2018
• Yi Guo, <i>University of Southern California</i>	03/2017
• Kai Chang, <i>University of Southern California</i>	02/2017
• Srinath Sridhar, <i>Saarland University / Max Planck Institute for Informatics</i>	12/2016
• Hongyi Xu, <i>University of Southern California</i>	11/2016
• Morten Bojsen-Hansen, <i>IST Austria</i>	07/2016
• Koki Nagano, <i>University of Southern California</i>	04/2016
• Sema Berkiten, <i>Princeton University</i>	02/2016
• Paul Graham, <i>University of Southern California</i>	05/2014
• Zhuoliang Kang, <i>University of Southern California</i>	04/2014
<b>PhD Qualifying Committee</b>	
• Yi Zhou, <i>University of Southern California</i>	01/2019
• Loc Huynh, <i>University of Southern California</i>	05/2018
• Weiyue Wang, <i>University of Southern California</i>	04/2018
• Chloe Legendre, <i>University of Southern California</i>	03/2018
• Lingyu Wei, <i>University of Southern California</i>	11/2017
• Jens Windau, <i>University of Southern California</i>	11/2017
• Yijing Li, <i>University of Southern California</i>	05/2017
• Sean Mason, <i>University of Southern California</i>	03/2017
• Soravit Changpinyo, <i>University of Southern California</i>	11/2016
• Yi Guo, <i>University of Southern California</i>	12/2015
• Inkyu Kim, <i>University of Southern California</i>	08/2016
• Matthias Hernandez, <i>University of Southern California</i>	05/2016
• Tran Tuan Anh, <i>University of Southern California</i>	04/2016
• Arnav Aghaarwal, <i>University of Southern California</i>	04/2016
• Kai Chang, <i>University of Southern California</i>	02/2016
• Ruizhe Wang, <i>University of Southern California</i>	12/2015
• Rongqi Qiu, <i>University of Southern California</i>	08/2015
• Christian Pothast, <i>University of Southern California</i>	05/2015
• Kai Chang, <i>University of Southern California</i>	05/2015
• Guan Pang, <i>University of Southern California</i>	05/2014
• Mohammad Abdel-Majeed, <i>University of Southern California</i>	03/2014
• Paul Graham, <i>University of Southern California</i>	09/2013



- Andrew Jones, *University of Southern California* 09/2013
- Morten Bojsen-Hansen, *IST Austria* 07/2012
- Breannan Smith, *Columbia University* 03/2012

### Outreach

University of Southern California, Computer Science Department

- USC Viterbi EngX 2019 (ONR STEM)
- USC London Hackathon 2018
- USC Academic Career Mentoring Panel 2017
- USC Viterbi K-12 STEM: Coding and Animation (Screening and Panel) 2015

### ACADEMIC SERVICES

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University of Southern California, Computer Science Department

- Annual Faculty Merit Review Committee, SS 2020
- CS Department Faculty Search Committee, FS 2019
- CSGames Curriculum Revision Committee, FS 2019
- SCA IMGD / CSGames Faculty Joint Appointment Committee (Chair), FS 2019
- ICT MxR Director Search Committee, FS 2018
- SCA IMGD / CSGames Faculty Tenure Committee, FS 2018
- CS Department PhD Admissions Committee, FS 2018
- SCA IMGD / CSGames Faculty Search Committee, SS 2018
- CS Department PhD Admissions Committee, FS 2017
- Annual Faculty Merit Review Committee, SS 2017
- CS Department PhD Admissions Committee, FS 2016
- CS Department Faculty Search Committee, FS 2015
- CS Department PhD Admissions Committee, FS 2015
- CS Department Faculty Search Committee, FS 2014
- CS Department Transformative Committee, FS 2013
- Co-Chair of CS Department Colloquium Committee, FS 2013

### CONSULTING

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Munger, Tolles & Olson LLP	10/2018 - ongoing
Huawei	09/2015 - 09/2016
LEIA, Inc.	04/2015 - 10/2015
L Squared Capital Partners	03/2015 - 04/2015
Oculus VR/Facebook	08/2014 - 07/2015
Embodee Corp.	03/2014 - 05/2015
Pelican Imaging	02/2014 - 11-2016
Innored, Inc.	09/2013 - 01/2014
Disney Research Zurich	09/2013 - 09/2016
Industrial Light & Magic, Lucasfilm Ltd.	07/2013 - 06/2014
The Jig Lab	07/2013 - 05/2014
Tuxedo Agency	11/2012 - 11/2012
Artec Group, Inc	08/2011 - 12/2014
3Gear Systems	05/2011 - 04/2012
XYZ RGB, Inc.	07/2011 - 01/2012
Max Planck Institute for Intelligent Systems	05/2011 - 11/2011
C-RAD AB	08/2010 - 08/2011
Mova LLC	08/2010 - 10/2010
Filmakademie Baden-Württemberg GmbH, Institute for Animation	04/2010 - 07/2010
Aguru Images, Inc.	08/2008 - 07/2009

RESEARCH GRANTS & GIFTS

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**Total Funding Awarded to PI:** \$17,528,472 where \$3,512,525 for USC and \$14,015,945 for USC/ICT.

**Federal Funding** (\$11,828,745)

Army Research Office (ARO)  
UARC 6.1: AI-Driven 3D Shape and Motion Synthesis  
Duration: 11/01/2019 - 10/31/2021  
Award Amount: \$2,636,190  
Role: PI (USC/ICT)

Army Research Office (ARO)  
RTO: Real-Time Dynamic Occlusion Handling for RGB-Based Augmented Reality  
Duration: 11/01/2019 - 10/31/2020  
Award Amount: \$200,000  
Role: PI (USC/ICT)

U.S. Army Natick (NATICK)  
Virtual Reality Testbed  
Duration: 08/06/2019 I - 12/06/2019  
Award Amount: \$100,500  
Role: PI (USC/ICT)

U.S. Government  
Project Nexus: Lifelike Digital Human Replica  
Duration: 09/01/2018 - 08/31/2019  
Award Amount: \$1,000,000  
Role: PI (USC/ICT)

Army Research Office (ARO)  
RTO: Scalable and Efficient Light Stage Pipeline for High-Fidelity Face Digitization  
Duration: 09/01/2018 - 08/31/2019  
Award Amount: \$200,000  
Role: PI (USC/ICT)

U.S. Army Natick (NATICK)  
High-Fidelity Rigging and Shading of Virtual Soldiers  
Duration: 09/01/2018 - 03/31/2019  
Award Amount: \$157,500  
Role: PI (USC/ICT)

Office of Naval Research (ONR - HPTE)  
Young Investigator Program (YIP): Complete Human Digitization and Unconstrained Performance Capture  
Duration: 06/01/2018 - 05/31/2021  
Award Amount: \$591,509  
Role: PI (USC)

Semiconductor Research Corporation (SRC) / Defense Advanced Research Projects Agency (DARPA)  
JUMP: Computing On Network Infrastructure for Pervasive, Cognition, and Action  
Duration: 01/01/2018 - 12/31/2022  
Award Amount: \$1,174,818  
Role: PI (USC)

Army Research Office (ARO)  
UARC 6.1/6.2: Avatar Digitization & Immersive Communication Using Deep Learning  
Duration: 11/01/2017 - 10/31/2019  
Award Amount: \$2,821,000  
Role: PI (USC/ICT)

Army Research Office (ARO)  
RTO: Strip-Based Hair Modeling Using Virtual Reality  
Duration: 11/01/2017 - 10/31/2018  
Award Amount: \$250,000  
Role: PI (USC/ICT)

Army Research Office (ARO)  
RTO: Head-Mounted Facial Capture & Rendering for Augmented Reality  
Duration: 11/01/2017 - 10/31/2018  
Award Amount: \$200,000  
Role: PI (USC/ICT)

Army Research Office (ARO)  
UARC 6.1/6.2: Capture, Rendering, & Display for Virtual Humans  
Duration: 11/01/2016 - 10/31/2017  
Award Amount: \$1,408,011  
Role: PI (USC/ICT)

United States SHARP Academy (ARO)  
Digital SHARP Survivor  
Duration: 07/01/2016 - 06/31/2017  
Award Amount: \$94,953  
Role: PI (USC/ICT)

Army Research Office (ARO)  
RTO: Lighting Reproduction for RGB Camouflage  
Duration: 01/01/2016 - 12/31/2017  
Award Amount: \$200,000  
Role: PI (USC/ICT)

U.S. Army Natick (NATICK)  
Research Contract  
Duration: 09/01/2015 - 12/31/2016  
Award Amount: \$145,000  
Role: PI (USC/ICT)

Office of Naval Research (ONR)  
Markerless Performance Capture for Automated Functional Movement Screening  
Duration: 08/01/2015 - 09/30/2017  
Award Amount: \$230,000  
Role: PI (USC)

Intelligence Advanced Research Projects Activity (IARPA), Department of Defense (DoD)  
GLAIVE: Graphics and Learning Aided Vision Engine for Janus  
Duration: 07/25/2014 - 07/24/2018  
Award Amount: \$419,264  
Role: Co-PI (USC)

**Industry Funding** (\$4,111,561)

Sony Corporation  
Light Stage Processing Research  
Duration: 10/01/2019 - 09/30/2020  
Award Amount: \$200,000  
Role: PI (USC/ICT)

Toppan Printing Co., Ltd.  
Research Contract  
Duration: 10/01/2019 - 09/30/2020  
Award Amount: \$697,150  
Role: PI (USC/ICT)

Engility Corporation  
Mystique  
Date: 06/01/2019 - 08/31-2019  
Award Amount: \$68,473  
Role: PI (USC/ICT)

Adobe Systems Inc.  
Research Gift Donation  
Date: 28/02/2019  
Award Amount: \$5,000  
Role: PI (USC)

Softbank Corp.  
3D Modeled, Rigged, and Animated Characters from 2D Video  
Duration: 01/01/2019 - 01/01/2020  
Award Amount: \$111,534  
Role: Co-PI (USC)

Snap Inc.  
Research Gift Donation  
Date: 10/29/2018  
Award Amount: \$20,000  
Role: PI (USC)

TOEI Company, Ltd.  
Research Contract  
Duration: 06/01/2018 - 03/01/2019  
Award Amount: \$580,000  
Role: PI (USC/ICT)

Lightstage, LLC / Otoy  
Research Contract  
Duration: 05/15/2018 - 12/31/2018  
Award Amount: \$152,000  
Role: PI (USC/ICT)

Sony Corporation  
Highly Sparse Volumetric Capture Using Deep Learning  
Duration: 05/01/2018 - 04/31/2019  
Award Amount: \$120,000  
Role: PI (USC)

Sony Corporation  
Geometry and Appearance Synthesis for 3D Human Performance Capture  
Duration: 05/01/2017 - 04/31/2018  
Award Amount: \$120,000  
Role: PI (USC)

Adobe Systems Inc.  
Research Gift Donation  
Date: 08/09/2017  
Award Amount: \$20,000  
Role: PI (USC)

Mediafront Inc.  
Research Contract  
Date: 06/28/2017  
Award Amount: \$38,095  
Role: PI (USC/ICT)

Activision Publishing Inc.  
Research Contract  
Date: 05/09/2017  
Award Amount: \$21,593  
Role: PI (USC/ICT)

Electronic Arts Inc.  
Research Contract  
Duration: 12/01/2016 - 12/01/2018  
Award Amount: \$460,000  
Role: PI (USC/ICT)

SOOVII Digital Media Technology, Ltd  
Research Contract  
Date: 11/01/2016  
Award Amount: \$1,080,000  
Role: PI (USC/ICT)

RL Leaders, LLC  
Research Contract  
Date: 10/01/2016  
Award Amount: \$630,216  
Role: PI (USC/ICT)

Sony Corporation  
Shape and Reflectance Estimation via Polarization Analysis  
Duration: 08/12/2016 - 08/23/2017  
Award Amount: \$50,000  
Role: PI (USC/ICT)

Adobe Systems Inc.  
Research Gift Donation  
Date: 01/07/2016  
Award Amount: \$10,000  
Role: PI (USC)

Sony Corporation  
Unconstrained Dynamic Shape Capture  
Duration: 11/01/2015 - 10/31/2016  
Award Amount: \$123,500  
Role: PI (USC)

Facebook / Oculus  
Facebook Award  
Date: 10/14/2015  
Award Amount: \$25,000  
Role: PI (USC)

Huawei  
Development of a 3D Hair Database  
Date: 09/01/2015  
Award Amount: \$50,000  
Role: PI (USC)

Okawa Foundation  
Okawa Foundation Award  
Date: 10/08/2015  
Award Amount: \$10,000  
Role: PI (USC)

Adobe Systems Inc.  
Research Gift Donation  
Date: 04/27/2015  
Award Amount: \$9,000  
Role: PI (USC)

Embodee Corporation  
Research Gift Donation  
Date: 03/17/2015  
Award Amount: \$70,000  
Role: PI (USC)

Google  
Google Faculty Research Award: Data-Driven Framework for Unified Face and Hair Digitization  
Date: 02/12/2015  
Award Amount: \$52,000  
Role: PI (USC)

Facebook / Oculus  
Facebook Award  
Date: 02/03/2015  
Award Amount: \$25,000  
Role: PI (USC)

Panasonic Corporation  
Markerless Real-Time Facial Performance Capture  
Date: 09/22/2014  
Award Amount: \$20,000  
Role: PI (USC)



Pelican Imaging Corporation  
 Research Gift Donation  
 Date: 07/22/2014  
 Award Amount: \$50,000  
 Role: PI (USC)

Innored Inc.  
 Research Gift Donation  
 Date: 11/01/2013  
 Award Amount: \$25,000  
 Role: PI (USC)

#### University Funding (\$856,166)

USC Shoah Foundation Institute  
 New Dimensions in Testimony  
 Duration: 05/01/2016 - 09/31/2017  
 Award Amount: \$625,266  
 Role: PI (USC/ICT)

University of Southern California  
 Andrew and Erna Viterbi Early Career Chair  
 Start Date: 08/16/2015  
 Award Amount: \$20,000 (to date)  
 Role: PI (USC)

University of Southern California - Integrated Media System Center (IMSC)  
 IMSC Award  
 Duration: 07/01/2013 - 06/30/2014  
 Award Amount: \$11,000  
 Role: PI (USC)

University of Southern California  
 USC Start-up Funding  
 Start Date: 09/01/2013  
 Award Amount: \$199,900  
 Role: PI (USC)

#### AWARDS & HONORS

DARPA Information Science and Technology (ISAT) Study Group Member	06/2019
Office of Naval Research (ONR) Young Investigator Program (YIP) Award	02/2018
USC Stevens Commercialization Award	05/2017
Microsoft Academic Top 10 Leaderboard in the past 5 years in Computer Graphics (ranking #1)	05/2016
World Technology Award Fellow	10/2015
Andrew and Erna Viterbi Early Career Chair	10/2015
Okawa Foundation Research Grant	09/2015
Google Faculty Research Award	02/2015
C-Suite Quaterly NextGen 10: Innovators under 40	01/2014
World's top 35 innovator under 35 by MIT Technology Review	08/2013
Swiss National Science Foundation fellowship for prospective researchers	03/2011
ACM Symposium on Computer Animation Best Paper Award '09	08/2009
National Science Foundation 3DPVT '06 Student Travel Stipend	05/2006
German Academic Exchange Service (DAAD) fellowship	01/2006
Karl-Steinbuch scholarship of the MFG Baden-Württemberg	10/2005

Thomas Gessmann-Stiftung fellowship, German Science Foundation	09/2004
Baden-Württemberg scholarship of the Markel Foundation	10/2004
Scholarship of the Richard Winter foundation	09/2004
ERASMUS scholarship	10/2002
E-fellows scholarship	11/2001

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 PEER-REVIEWED JOURNAL & CONFERENCE PAPERS
 

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**[61] LEARNING TO INFER IMPLICIT SURFACES WITHOUT 3D SUPERVISION**

Shichen Liu, Shunsuke Saito, Weikai Chen, Hao Li  
*Proceedings of the 33rd Conference on Neural Information Processing Systems 2019, (NeurIPS 2019), 12/2019*

**[60] DEEP FACE NORMALIZATION**

Koki Nagano, Huiwen Luo, Zejian Wang, Jaewoo Seo, Jun Xing, Liwen Hu, Lingyu Wei, Hao Li  
*ACM Transactions on Graphics, Proceedings of the 12th ACM SIGGRAPH Conference and Exhibition in Asia 2019, (SIGGRAPH Asia 2019), 11/2019*

**[59] SOFTRASTERIZER: DIFFERENTIABLE RENDERING FOR IMAGE-BASED 3D REASONING**

Shichen Liu, Tianye Li, Weikai Chen, Hao Li  
*Proceedings of the IEEE International Conference on Computer Vision 2019, (ICCV 2017 Oral Presentation), 10/2019*

**[58] PIFU: PIXEL-ALIGNED IMPLICIT FUNCTION FOR HIGH-RESOLUTION CLOTHED HUMAN DIGITIZATION**

Shunsuke Saito, Zeng Huang, Ryota Natsume, Shigeo Morishima, Angjoo Kanazawa, Hao Li  
*Proceedings of the IEEE International Conference on Computer Vision 2019, (ICCV 2017), 10/2019*

**[57] LEARNING PERSPECTIVE UNDISTORTION OF PORTRAITS**

Yajie Zhao, Zeng Huang, Tianye Li, Weikai Chen, Chloe LeGendre, Xinglei Ren, Jun Xing, Ari Shapiro, Hao Li  
*Proceedings of the IEEE International Conference on Computer Vision 2019, (ICCV 2017 Oral Presentation), 10/2019*

**[56] TRANSFORMABLE BOTTLENECK NETWORKS**

Kyle Olszewski, Sergey Tulyakov, Oliver Woodford, Hao Li, Linjie Luo  
*Proceedings of the IEEE International Conference on Computer Vision 2019, (ICCV 2017 Oral Presentation), 10/2019*

**[55] HAIRBRUSH FOR IMMERSIVE DATA-DRIVEN HAIR MODELING**

Jun Xing, Koki Nagano, Weikai Chen, Haotian Xu, Li-Yi Wei, Yajie Zhao, Jingwan Lu, Byungmoon Kim, Hao Li  
*Proceedings of the 32nd ACM User Interface Software and Technology Symposium 2019, (UIST 2019), 10/2019*

**[54] PROTECTING WORLD LEADERS AGAINST DEEP FAKES**

Shruti Agarwal, Hany Farid, Yuming Gu, Mingming He, Koki Nagano, Hao Li  
*IEEE International Conference on Computer Vision and Pattern Recognition 2019 Workshop on Media Forensics, (CVPR 2019 Workshops), 06/2019*

**[53] SICLOPE: SILHOUETTE-BASED CLOTHED PEOPLE**

Ryota Natsume, Shunsuke Saito, Zeng Huang, Weikai Chen, Chongyang Ma, Hao Li, Shigeo Morishima  
*Proceedings of the 32nd IEEE International Conference on Computer Vision and Pattern Recognition 2019, (CVPR 2019 Oral Presentation - Best Paper Award Finalist), 06/2019*

**[52] ON THE CONTINUITY OF ROTATION REPRESENTATION IN NEURAL NETWORKS**

Yi Zhou, Connelly Barnes, Jingwan Lu, Jimei Yang, Hao Li

*Proceedings of the 32nd IEEE International Conference on Computer Vision and Pattern Recognition 2019, (CVPR 2019), 06/2019***[51] PAGAN: REAL-TIME AVATARS USING DYNAMIC TEXTURES**

Koki Nagano, Jaewoo Seo, Jun Xing, Lingyu Wei, Zimo Li, Shunsuke Saito, Aviral Agarwal, Jens Fursund, Hao Li

*ACM Transactions on Graphics, Proceedings of the 11th ACM SIGGRAPH Conference and Exhibition in Asia 2018, (SIGGRAPH Asia 2018), 12/2018***[50] 3D HAIR SYNTHESIS USING VOLUMETRIC VARIATIONAL AUTOENCODERS**

Shunsuke Saito, Liwen Hu, Chongyang Ma, Hikaru Ibayashi, Linjie Luo, Hao Li

*ACM Transactions on Graphics, Proceedings of the 11th ACM SIGGRAPH Conference and Exhibition in Asia 2018, (SIGGRAPH Asia 2018), 12/2018***[49] REAL-TIME HAIR RENDERING USING SEQUENTIAL ADVERSARIAL NETWORKS**

Lingyu Wei, Liwen Hu, Vladimir Kim, Ersin Yumer, Hao Li

*Proceedings of the 15th European Conference on Computer Vision 2018, (ECCV 2018), 09/2018***[48] HAIRNET: SINGLE-VIEW HAIR RECONSTRUCTION USING CONVOLUTIONAL NEURAL NETWORKS**

Yi Zhou, Liwen Hu, Jun Xing, Weikai Chen, Han-Wei Kung, Xin Tong, Hao Li

*Proceedings of the 15th European Conference on Computer Vision 2018, (ECCV 2018), 09/2018***[47] DEEP VOLUMETRIC VIDEO FROM VERY SPARSE MULTI-VIEW PERFORMANCE CAPTURE**

Zeng Huang, Tianye Li, Weikai Chen, Yajie Zhao, Jun Xing, Chloe LeGendre, Linjie Luo, Chongyang Ma, Hao Li

*Proceedings of the 15th European Conference on Computer Vision 2018, (ECCV 2018), 09/2018***[46] HYBRID FUSION: REAL-TIME PERFORMANCE CAPTURE USING A SINGLE DEPTH SENSOR AND SPARSE IMUS**

Zerong Zheng, Tao Yu, Hao Li, Kaiwen Guo, Qionghai Dai, Lu Fang, Yebin Liu

*Proceedings of the 15th European Conference on Computer Vision 2018, (ECCV 2018), 09/2018***[45] CONTEXTUAL-BASED IMAGE INPAINTING: INFER, MATCH, AND TRANSLATE**

Yuhang Song, Chao Yang, Zhe Lin, Xiaofeng Liu, Qin Huang, Hao Li, C.-C. Jay Kuo

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<b>The Fifth Estate: The Deepfake</b> (CBC, Himself)	2018
<b>Follow This</b> (BuzzFeed/Netflix, Himself)	2018
<b>Blade Runner 2049</b> (USC Institute for Creative Technologies, Light Stage Processing Supervisor)	2017
<b>Valerian and the City of a Thousand Planets</b> (Vision & Graphics Lab, Director)	2017
<b>Furious 7</b> (Weta Digital, Researcher)	2015
<b>The Hobbit: The Battle of the Five Armies</b> (Weta Digital, Researcher)	2014
<b>Noah</b> (ILM, R&D)	2014
<b>Captain America: The Winter Soldier</b> (ILM, R&D)	2014
<b>Snickers - Hungry Face Morph</b>	2013
<b>Star Trek Into Darkness</b> (ILM, R&D)	2013
<b>The Lone Ranger</b> (ILM, R&D)	2013
<b>Pacific Rim</b> (ILM, R&D)	2013
<b>Space Pirate Captain Harlock</b>	2013
<b>G.I. Joe: Retaliation</b> (ILM, R&D)	2012
<b>Maattrraan</b>	2012
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<b>3D Underwater Motion Capture of Dana Vollmer Olympic Gold Medalist 2012</b>	2012

## INVITED TALKS

**DEEPPAKES: DO NOT BELIEVE WHAT YOU SEE**

*Speaker, World Economic Forum: Annual Meeting 2020, Davos, 01/2020*

**DIGITAL HUMANS & DEEP FAKES**

*Keynote Speaker, VFXRIO 2019, Rio de Janeiro, 11/2019*

**AI-DRIVEN HUMAN AND CONTENT DIGITIZATION**

*Speaker, Amazon Research Days 2019, Los Angeles, 11/2019*

*Keynote Speaker, Infinity Festival, Los Angeles, 11/2019*

*Speaker, USC Viterbi Grand Challenge Scholars Lecture Series, Los Angeles, 11/2019*

*Speaker, USC Viterbi Computer Science Advisory Board Meeting, Los Angeles, 11/2019*

*Keynote Speaker, 10th International Workshop on Human Behaviour Understanding, ICCV 2019, Seoul, 10/2019*

*Speaker, 3rd Global Programmers' Festival 2019, Xi'an, 10/2019*

*Invited Talk, GAMES (Graphics And Mixed Environment Symposium) Webinar, Los Angeles, 10/2019*

*Invited Talk, MIT Computer Vision Seminar, Massachusetts Institute of Technology, Cambridge, 09/2019*

**AI-DRIVEN 3D SHAPE AND MOTION SYNTHESIS**

*Speaker, UIARC Technical Advisory Board Meeting 2019, Los Angeles, 11/2019*

**IS THAT REAL? DEEPPAKES AND TRUSTED CONTENT**

*Speaker, NAB Show 2019, New York, 10/2019*

**AI-BASED TELEPORTATION**

*Speaker, Second CONIX Annual Review 2019, Carnegie Mellon University, Pittsburgh, 10/2019*

**COMPLETE HUMAN DIGITIZATION USING PIXEL-ALIGNED IMPLICIT FUNCTIONS**

*Speaker, ONR HPT&E Technical Review and S&T Expo, Quantico US Marine Corps Base, Stafford County, 09/2019*

**REIMAGINING INNOVATION IN ERA OF AI: FROM VIRTUAL BEINGS TO DEEPPAKES**

*Speaker, MIT Technology Review EmTech 2019, Cambridge, 09/2019*

**CONNECTING 3D SHAPES AND 2D IMAGES USING AI AND DIFFERENTIABLE RENDERING**

*Speaker, Scenes from Video IV, San Bernardo, 09/2019*

**DESIGNING A HUMAN-CENTERED FUTURE**

*Speaker, World Economic Forum: Annual Meeting of the New Champions, Dalian, 07/2019*

**AI AND HUMAN DIGITIZATION: WHEN SEEING IS NOT BELIEVING?**

*Speaker, DARPA ISAT Summer Conference 2019, Woods Hole, 08/2019*

*Speaker, Virtual Beings Summit, San Francisco, 07/2019*

*Speaker, World Economic Forum: Technology Pioneers Welcome Reception & Dinner, Dalian, 07/2019*

*Speaker, CVPR Workshop on 3D Humans 2019, Long Beach, 06/2019*

*Speaker, Refactor Camp 2019, Santa Monica, 06/2019*

*Keynote Speaker, Vivid Sydney 2019, Sydney, 06/2019*

*Invited Talk, The University of New South Wales, Sydney, 06/2019*

*Speaker, Naval Postgraduate School, MOVES Institute, Monterey, 05/2019*

*Speaker, ICSF Robotics & AI in Extreme Environments, ARL West, Los Angeles, 03/2019*

*Speaker, DARPA MediFor PI Meeting 2019, DARPA Conference Center, Arlington, 02/2019*

*Speaker, MIT Technology Review EmTech Asia 2019, Singapore, 01/2019*

*Keynote Speaker, DISRUPT.SYDNEY 2018, Sydney, 09/2018*

*Speaker, IET EngTalks, London, 09/2018*

**PINSREEN/USC/ICT OR: HOW I LEARNED TO STOP WORRYING AND LOVE 3 JOBS**

*Speaker, CMIC Workshop 2019, Computational Media Innovation Centre, Victoria University, Wellington, 04/2019*

**COMPLETE 3D HUMAN DIGITIZATION**

*Speaker, ONR HPT&E Technical Review: Warrior Resilience 2019, Orlando Science Center, Orlando, 02/2019*

**PHOTOREALISTIC HUMAN DIGITIZATION AND RENDERING USING DEEP LEARNING**

*Speaker, Softbank Open Innovation The Second BBM Summit 2018, Hakodate, 12/2018*

*Invited Talk, Sony Corporation, Tokyo, 12/2018*

*Invited Talk, Waseda University, Tokyo, 12/2018*



*Keynote Speaker, VRST 2018, Tokyo, 12/2018*

*Invited Talk, Dreamscape Immersive, Los Angeles, 08/2018*

*Invited Talk, Amazon, Seattle, 08/2018*

*Speaker, US Army TRADOC Workshop 2018, Los Angeles, 08/2018*

*Speaker, Machine Learning for 3D Understanding, TUM Institute for Advanced Study, Munich, 07/2018*

*Speaker, Sixth International Workshop on Computer Vision 2018, Modena, 05/2018*

*Keynote Speaker, CMS Meeting of the Minds, Caltech, Pasadena, 05/2018*

#### **THE FUTURE OF MIXED REALITY**

*Speaker, First CONIX Annual Review 2018, Carnegie Mellon University, Pittsburgh, 09/2018*

#### **3D AVATARS, VIRTUAL REALITY, AND DEEP LEARNING**

*Speaker, USC London Delegation Trip 2018, London, 02/2018*

#### **THE FUTURE OF FAKE NEWS**

*Speaker, World Congress of Science and Factual Producers, San Francisco, 12/2017*

#### **VIRTUAL AVATAR CREATION USING DEEP LEARNING**

*Speaker, SIGGRAPH Asia Symposium on AR and VR 2017, Bangkok, 12/2017*

#### **DIGITAL HUMAN TELEPORTATION USING DEEP LEARNING**

*Speaker, USC Viterbi Corporate Advisory Board Meeting, Los Angeles, 04/2018*

*Keynote Speaker, CVMP 2017, London, 11/2017*

*Speaker, Sony US Research Center, San Jose, 11/2017*

*Keynote Speaker, SoftBank Ventures Forum 2017, Seoul, 10/2017*

*Speaker, USC China Miniforum, Los Angeles, 9/2017*

*Speaker, SCA 2017 Symposium on Computer Animation, Los Angeles, 7/2017*

*Speaker, ICVSS 2017 International Computer Vision Summer School, Sicily, 7/2017*

*Keynote Speaker, ACM SIGGRAPH Taipei Chapter Computer Graphics Workshop 2017, Taichung, 6/2017*

*Keynote Speaker, S3PM 2017 International Convention on Shape, Solid, Structure, & Physical Modeling, Berkeley, 6/2017*

*Speaker, FMX 2017, Stuttgart, 05/2017*

*Invited Talk, Ochanomizu University, Tokyo, 2/2017*

#### **AVATAR DIGITIZATION AND IMMERSIVE COMMUNICATION USING DEEP LEARNING**

*Speaker, UARC Technical Advisory Board Meeting 2017, Los Angeles, 09/2017*

#### **CAPTURE, RENDERING, AND DISPLAY FOR VIRTUAL HUMANS**

*Speaker, UARC ICT Mission Projects 2017, Los Angeles, 02/2017*

#### **LEARNING CORRESPONDENCES BETWEEN CLOTHED HUMAN SHAPES**

*Speaker, ECCV Workshop on Geometry Meets Deep Learning 2016, Amsterdam, 10/2016*

#### **MARKERLESS MOTION CAPTURE**

*Speaker, Human Performance, Training & Education Tech Review, Quantico US Marine Corps Base, Stafford County, 10/2016*

#### **REAL-TIME FACIAL MOTION CAPTURE AND ITS APPLICATIONS**

*Speaker, 4th Huawei Smart Device Summit on Multimedia Technology, Shenzhen, 09/2016*

#### **DEMOCRATIZING HUMAN DIGITIZATION**

*Invited talk, Nickelodeon Animation Studio, Burbank, 02/2017*

*Keynote Speaker, SIGGRAPH Asia Workshop on Virtual Reality Meets Physical Reality 2016, Macao, 12/2016*

*Speaker, The Real Deal @ USC, Los Angeles, 11/2016*

*Speaker, TEDxHollywood, Los Angeles, 09/2016*

#### **DEEP LEARNING: A NEW TOOL FOR CONTENT CREATION AND GAME DESIGN**

*Speaker, SIGGRAPH 2016 Special Session, Open Problems in Real-Time Rendering, Anaheim, 07/2016*

**TÊTE-À-TÊTE IN CYBERSPACE**

*Speaker, Fifth International Workshop on Computer Vision 2016, Lecce, 05/2016*

**DIGITIZING HUMANS INTO VR USING DEEP LEARNING**

*Speaker, REAL 2016, San Francisco, 3/2016*

*Speaker, NVidia Deep Learning Workshop, Los Angeles, 02/2016*

**MARKERLESS PERFORMANCE CAPTURE FOR AUTOMATED FUNCTIONAL MOVEMENT SYSTEM**

*Speaker, Warrior Resilience Tech Review, Office of Naval Research, Arlington, 02/2016*

**BRIDGING PHYSICAL AND DIGITAL WORLDS**

*Speaker, 16th KOCSEA Technical Symposium 2015, Harvey Mudd College, Claremont, 12/2015*

*Speaker, SLUSH Conference 2015, Helsinki, 11/2015*

*Speaker, USC Global Conference 2015, Shanghai, 10/2015*

**HUMAN DIGITIZATION AND FACIAL PERFORMANCE CAPTURE FOR SOCIAL INTERACTIONS IN VR**

*Speaker, VRLA Winter Expo, Los Angeles, 01/2016*

*Invited Talk, Google, Seattle, 10/2015*

*Invited Talk, Disney Consumer Products, Glendale, 07/2015*

*Invited Talk, MIT Computer Graphics Group, Massachusetts Institute of Technology, Cambridge, 06/2015*

**SOCIAL INTERACTION IN CYBERSPACE**

*Speaker, SLUSH Future Brunch, No Name Club, Los Angeles, 05/2015*

**DATA-DRIVEN HAIRSTYLING**

*Speaker, Workshop on Functoriality in Geometric Data 2015, HKUST IAS, Hong Kong, 04/2015*

**IMMERSIVE TELEPRESENCE WITH 3D SENSING AND VR HMD**

*Speaker, USC Integrated Media Systems Center Retreat 2015, Los Angeles, 04/2015*

**DEMOCRATIZING 3D HUMAN CAPTURE: GETTING HAIRY!**

*Invited Talk, Google, Mountain View, 09/2015*

*Speaker, Rotary Club, Santa Monica, 09/2015*

*Invited Talk, Intel, Santa Clara, 06/2015*

*Invited Talk, Apple, Cupertino, 05/2015*

*IST Lunch Bunch, Caltech, Pasadena, 05/2015*

*Invited Talk, SnapChat, Venice, 04/2015*

*Speaker, LA ACM SIGGRAPH Innovative Research in Computer Graphics at USC and ICT, Los Angeles, 03/2015*

*Keynote Speaker, International Conference on 3D Vision, Tokyo, 12/2014*

*Keynote Speaker, ACM SIGGRAPH Conference on Motion in Games 2014, Los Angeles, 11/2014*

**THE FUTURE OF EXPERIENCING REALITY**

*Speaker, New York Global Conversation 2014, New York, 10/2014*

**ON THE FUTURE OF DIGITAL CHARACTERS**

*Keynote Speaker, Vivid Sydney 2014, Sydney, 06/2014*

**HUMAN CAPTURE WITH DEPTH SENSORS**

*Keynote Speaker, Making Augmented Reality Real, NAIST, Nara 08/2014*

*Invited Talk, Victoria University, Wellington, 07/2014*

*Chalk Talk, Weta Digital, Wellington, 07/2014*

*Invited Talk, Pelican Imaging Corporation, Mountain View, 05/2014*

**3D SELFIES!**

*Speaker, Depth Camera Birds of Feather, SIGGRAPH 2014, Vancouver, 08/2014*

*Speaker, FMX 2014, Stuttgart, 04/2014*

**DEMOCRATIZING 3D SCANNING FOR 3D PRINTING**

*Speaker, USC Trustee Conference, La Quinta, 03/2014*

**3D HUMAN CAPTURE: FROM VFX TO THE MAINSTREAM**

*Speaker, Interactive Media Forum, USC's School of Cinematic Arts, Los Angeles, 04/2014*

*Speaker, CESASC 52nd Annual Convention, San Gabriel, 04/2014*

*Invited Talk, University of California, Santa Barbara, 02/2014*

**HOW DEPTH SENSING TECHNOLOGY WILL CHANGE US**

*Speaker, Tech Plus Forum (tech+), Seoul, 11/2013*

**DEMOCRATIZING HUMAN CAPTURE**

*TR35 Talk, MIT Technology EmTech 2013, Cambridge, 10/2013*

**3D HUMAN CAPTURE FOR EVERYONE**

*Invited Talk, SIAT Chinese Academy of Sciences, Shenzhen, 11/2013*

*Invited Talk, Harvard University, Cambridge, 10/2013*

**LOW-IMPACT HUMAN DIGITIZATION AND PERFORMANCE CAPTURE**

*Invited Talk, Dreamworks Animation, Glendale, 08/2013*

**DIGITIZING HUMANS IN MOTION FROM A GEOMETRIC PERSPECTIVE**

*3D Imaging and Computing 2012, National Chiao Tung University, Hsinchu, 12/2012*

**DYNAMIC SHAPE RECONSTRUCTION AND TRACKING**

*R&D Forum, Industrial Light & Magic, Letterman Digital Arts Center, San Francisco, 04/2012*

**GEOMETRIC CAPTURE OF HUMAN PERFORMANCES**

*Faculty Candidate Seminars, Department of Computer Science, Columbia University, New York, 03/2012*

*Guest Presentation, Rhythm & Hues Studios, Los Angeles, 03/2012*

*Chalk Talk, Digital Domain, Venice, 03/2012*

*CS Colloquium Series, Computer Science Department, University of Southern California, Los Angeles, 03/2012*

**MAYA FOR GRAPHICS SCIENTISTS**

*Invited Talk, Princeton Computer Graphics Group, Princeton University, New Jersey, 02/2012*

**TRACKING DEFORMABLE SURFACES**

*Computer Graphics Reading Group, University of Pennsylvania, Philadelphia, 01/2012*

**CAPTURING 3D ANIMATION FOR ENTERTAINMENT AND SCIENCES**

*CVGC Seminar, Columbia Computer Graphics Group, Columbia University, New York, 12/2011*

**DYNAMIC SHAPE CAPTURE WITH APPLICATIONS IN ART AND SCIENCES**

*Invited Talk, Microsoft, Redmond, 11/2011*

**NON-RIGID REGISTRATION IN ENTERTAINMENT AND SCIENCE**

*Invited Talk, Department for Perceiving Systems, Max-Planck-Institut für Intelligente Systeme, Tübingen, 09/2011*

**HUMAN BODIES, FACES, AND HAIR**

*Guest Lecture, Courant Institute of Mathematical Sciences, New York University, New York, 09/2011*

**ROBUST NON-RIGID 3D ALIGNMENT AND APPLICATIONS**

*R&D Seminar, Vision Technologies, SRI International/Sarnoff Corporation, New Jersey, 07/2011*

**CAPTURE, RECONSTRUCT, TRACK, RIG, RETARGET!**

*Invited Talk, Princeton Computer Graphics Group, Princeton University, New Jersey, 08/2010*

**INVERSE ENGINEERING DYNAMIC SHAPES FOR COMPUTER ANIMATION**

*Invited Talk, Courant Institute of Mathematical Sciences, New York University, New York, 08/2010*

**ANIMATION RECONSTRUCTION**

*Invited Talk, Columbia Computer Graphics Group, Columbia University, New York, 08/2010*

**GENERATING BLENDSHAPES FROM EXAMPLES AND CAPTURING WATERTIGHT HUMAN PERFORMANCES**

*R&D Seminar, Industrial Light & Magic, Letterman Digital Arts Center, San Francisco, 08/2010*

**A PRACTICAL FACIAL ANIMATION SYSTEM: FROM CAPTURE TO RETARGETING**

*Research Seminar, Pixar Animation Studios, Emeryville, 08/2010*

**ART-DIRECTABLE AND DATA-DRIVEN FACIAL ANIMATION**

*Invited Talk, Institute of Animation, Visual Effects and Digital Postproduction, Filmakademie Baden-Württemberg, Ludwigsburg, 05/2010*

**ROBUST RECONSTRUCTION OF DYNAMIC SHAPES AND REAL-TIME FACIAL ANIMATION**

*Invited Talk, Institute for Creative Technologies, University of Southern California, Marina del Rey, 11/2009*

**DEFORMING GEOMETRY RECONSTRUCTION AND LIVE FACIAL PUPPETRY**

*R&D Seminar, Industrial Light & Magic, Letterman Digital Arts Center, San Francisco, 10/2009*

**ANIMATION RECONSTRUCTION FROM A SINGLE-VIEW**

*Invited Talk, Computer Graphics Department, Max-Planck-Institut für Informatik, Saarbrücken, 05/2009*

**ACTIVE SHAPE ACQUISITION: FROM IMAGES TO 3-D SURFACES**

*Invited Talk, Graduate School of Global Information and Telecommunication Studies, Waseda University, Tokyo, 06/2006*

**3D SCANNING FOR EVERYONE**

*Ninth SIAM Conference on Geometric Design and Computing (SIAM-GD'05), Phoenix, Arizona, 10/2005*

**SURFACE RECONSTRUCTION USING COLORED STRIPE PROJECTIONS**

*Graphics Lunch Seminar, Computer Graphics Laboratory, ETH Zurich, 09/2005*

**REKONSTRUKTION MIT STRUKTURIERTEM LICHT**

*First Status Report Meeting of the Institute for Scientific Computing and Mathematical Modeling, Universität Karlsruhe (TH), 04/2005*

**SOFTWARE & DATASETS**

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**Pinscreen**

<http://www.pinscreen.com>

*A mobile app that allows anyone to instantly create a 3D avatar by uploading a selfie or an arbitrary 2D photograph. The avatar can then be animated using the phone camera and produce AR selfie content or Animojis. The software can be downloaded from Apple's App Store and has been developed by the entire Pinscreen team.*

**USC-HairSalon**

*A large publicly accessible 3D hairstyle database for hair capture, modeling, simulation, and rendering research. This data collection is also a great resource for benchmark and evaluation purposes. My co-authors are Liwen Hu, Chongyang Ma, and Linjie Luo.*

**Shapify.me**

<http://www.shapify.me>

*A free application for creating 3D self-portraits directly using Microsoft's Kinect sensor. A person rotates in front of the sensor and the software automatically produces a complete textured digital model of the person. The 3D model can be uploaded to a server and 3D printed. My co-authors are E. Vouga, A. Gudym, and G. Gusev.*

**ILM's Monster Mirror**

*Industrial Light & Magic's proprietary depth sensor-driven real-time facial animation system for instantaneous high fidelity facial performance capture for virtual filmmaking. The calibration-free system sets the current bar for realtime facial tracking accuracy and robustness. I co-developed the software with J. Yu, Y. Ye, and C. Bregler.*

**BeNTO 3D**

<http://www.bento3d.com>

*An easy to use geometry processing application created exclusively for Mac. The Cocoa based tool distinguishes from other competitors in that development of additional plugins and GUI extensions are considerably simplified.*

**faceshift**

<http://www.faceshift.com>

*A software for real-time and markerless facial performance capture using Microsoft's Kinect sensor. The Qt-based application runs on Mac OS X and Windows 7 and is co-developed with T. Weise and S. Bouaziz. Faceshift has been acquired by Apple Inc. and its technology has been incorporated into the iPhone X.*

**Artec Studio**

<http://www.artec3d.com>

*Development of a state-of-the-art geometry processing pipeline for aligning and merging non-rigid 3D scan data.*

## PROFESSIONAL ACTIVITIES

**Co-Curator and Member of the Global Future Councils**

World Economic Forum (WEF) - Virtual and Augmented Reality Transformation Maps 2017, 2018, and 2019

**Associate Editor**

Computer Graphics Forum 2016-2019

**Organizer**

ACM SIGGRAPH Asia 2019 Workshop: Truth in Graphics and the Future of AI-Generated Content, Brisbane, 11/2019  
CONIX Mixed Reality Workshop 2018, USC Institute for Creative Technologies, Playa Vista, 08/2018

**Program Committee (Computer Graphics)**

ACM SIGGRAPH 2015 and 2016

ACM SIGGRAPH Asia 2017 and 2018

ACM SIGGRAPH Asia (Technical Briefs & Posters) 2014, 2015, and 2016

ACM SIGGRAPH Asia (E-Tech) 2013, 2014, 2015, and 2016

ACM SIGGRAPH Asia (Symposium in Mobile Graphics and Interactive Applications) 2015

Symposium on Computer Animation 2013, 2014, 2015, 2016, 2017, 2018, and 2019

Symposium on Geometry Processing 2012, 2016, 2017, 2018, and 2019

Eurographics 2014, 2015, and 2016

Eurographics (STAR) 2015

Eurographics (Short Papers) 2013, 2014, and 2015

Pacific Graphics 2012, 2013, 2014, 2015, 2016, 2017, and 2019

Shape Modeling International 2013 and 2017

International Conference on Computer Aided Design and Computer Graphics 2013 and 2015

International Conference on Computer Animation and Social Agents 2014, 2015, and 2016

**Program Committee (Computer Vision)**

IEEE International Conference on Computer Vision and Pattern Recognition 2017, and 2018  
 IEEE CVPR Workshop on Morphable Face Models: from Present to Future 2018  
 International Conference on 3D Vision 2014 and 2015  
 International Symposium on 3D Data Processing, Visualization and Transmission 2010  
 Workshop on Non-rigid Shape Analysis and Deformable Image Alignment 2010, 2011, 2012, and 2014

**Reviewer**

Nature Communications 2020  
 ACM SIGGRAPH 2008, 2009, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, and 2020  
 ACM SIGGRAPH Asia 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, and 2019  
 ACM Transaction on Graphics 2010, 2011, 2013, 2015, 2016, 2017, 2018, and 2019  
 IEEE International Conference on Computer Vision and Pattern Recognition 2016, 2017, 2018, 2019, and 2020  
 International Conference on Computer Vision 2017 and 2019  
 European Conference on Computer Vision 2016 and 2020  
 ACM User Interface software and Technology Symposium 2014  
 Symposium on Computer Animation 2013, 2014, 2015, 2016, 2017, 2018, and 2019  
 Symposium on Geometry Processing 2007, 2008, 2012, 2016, 2017, 2018, and 2019  
 Eurographics 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2020  
 Computer Graphics Forum 2010, 2011, 2016, 2017, and 2018  
 International Conference on 3D Vision 2014, 2015, 2017, and 2019  
 Workshop for Women in Machine Learning 2018  
 IEEE International Symposium on mixed and Augmented Reality 2015  
 3D Data Processing, Visualization and Transmission 2010  
 Non-rigid Shape Analysis and Deformable Image Alignment 2010, 2011, 2012, and 2014  
 Transactions on Visualization and Computer Graphics 2009, 2012, 2013, 2014, 2015, 2016, 2017, 2018, and 2019  
 Transactions on Pattern Analysis and Machine Intelligence 2007, 2012, and 2017  
 International Journal of Computer Vision 2015  
 IEEE Computer Graphics and Applications 2013  
 International Conference on Computer Animation and Social Agents 2014, 2015, and 2016  
 EURASIP Journal on Advances in Signal Processing 2011  
 Graphical Models 2014  
 Computers & Graphics 2013 and 2014  
 Asian Conference on Computer Vision 2010  
 Pacific Graphics 2009, 2011, 2012, 2013, 2014, 2015, 2016, 2017, and 2019  
 Vision, Modeling, and Visualization Workshop 2006  
 Geometric Modeling and Processing 2006  
 Computer-Aided Design 2013

**Chair**

International Conference on 3D Vision 2019 Area Chair  
 International Conference on 3D Vision 2017 Area Chair  
 SIGGRAPH Asia 2018 Session Chair  
 SIGGRAPH Asia 2017 Session Chair  
 SIGGRAPH 2017 Session Chair  
 SIGGRAPH 2016 Session Chair  
 SIGGRAPH 2015 Session Chair  
 SIGGRAPH Asia (E-Tech) Prize 2013 and 2014  
 International Conference on 3D Vision 2015 Area Chair

**Panels**

Judge's Panel for the MIT TR 35 Innovators of 2020	03/2020
Judge's Panel for the MIT TR 35 Innovators of 2019	03/2019
National Science Foundation (FW-HTF) Research Proposal	07/2018
Judge's Panel for the MIT TR 35 Innovators of 2018	03/2018



Qiu Shi Outstanding Young Scholar Award Selection Committee	05/2017
Judge's Panel for the MIT TR 35 Innovators of 2017	05/2017
European Research Council Research Proposal	12/2016
Judge's Panel for the MIT TR 35 Innovators of 2016	05/2016
European Research Council Research Proposal	12/2015
Judge's Panel for the MIT TR 35 Innovators of 2015	04/2014
Swiss National Science Foundation Research Proposal	12/2014
Judge's Panel for the MIT TR 35 Innovators of 2014	05/2014

### Membership

World Economic Forum Global Future Councils	11/2018 - ongoing
ACM SIGGRAPH	06/2006 - ongoing
IEEE	09/2019 - ongoing
Eurographics Association	08/2011 - ongoing
National Academy of Inventors	05/2017 - ongoing
World Future Society	08/2017 - ongoing

### Testimony

Senate Committee of the 66th Washington State Legislature (SB 6513: Restricting the use of deepfake audio and visual media in campaigns for elective office), 01/2020

### BOARD

Tekcapital, Scientific Advisory Board	08/2017
European Conference on Visual Media Production, Scientific Advisory Board	02/2017
Pinscreen Inc., Board of Director	10/2015
Pelican Imaging, Technical Advisory Board	09/2014 - 11/2016

### EXTRACURRICULAR ACTIVITIES

World Economic Forum, Annual Meeting, Davos	01/2020
World Economic Forum, Annual Meeting of the Global Future Councils, Dubai	11/2019
DARPA ISAT Summer Conference, Woods Hole	08/2019
World Economic Forum, Annual Meeting of the New Champions, Dalian	07/2019
World Economic Forum, Annual Meeting of the Global Future Councils, Dubai	11/2018
Lucasfilm Training LDAC, Practical & CG Cinematography, San Francisco	08/2009
Credit Suisse Group, Equity Derivatives Workshop, Zurich	03/2008
McKinsey&Company, Business Technology Office's European Seminar, Portugal	05/2007

### TECHNICAL SKILLS

#### Operating Systems

Mac OS X, Linux/Unix, and Windows

#### Programming Languages

C/C++, Objective C, Python, Java, and HTML/CSS

#### Professional Tools

Unity, Autodesk Maya, Autodesk 3ds MAX, Pixologic ZBrush, Zeno, Adobe AfterEffects, Adobe Premiere, Adobe Photoshop, and Adobe Illustrator

### MILITARY SERVICE

<b>German Federal Armed Forces</b>	11/1999 - 08/2000
Division for Special Operations (DSO) - Airborne Brigade 26	
2 <sup>nd</sup> Company of the Antitank Parachute Battalion 262, Merzig, Germany	
<ul style="list-style-type: none"> <li>German parachutist badge in bronze</li> </ul>	

REFERENCES

---

**Prof. Dr. Leonidas J. Guibas**

Paul Pigott Professor of Computer Science and Electrical Engineering  
Stanford University, Computer Science Department

**Email** guibas@cs.stanford.edu

**Home page** <http://geometry.stanford.edu/>

**Prof. Dr. Michael J. Black**

Director and Distinguished Amazon Scholar  
Max Planck Institute for Intelligent Systems, Perceiving Systems Department

**Email** black@tuebingen.mpg.de

**Home page** <http://ps.is.tue.mpg.de>

**Prof. Dr. Steven Seitz**

Robert E. Dinning Professor of Computer Science and Director of Teleportation at Google  
University of Washington, Department of Computer Science and Engineering

**Email** seitz@cs.washington.edu

**Home page** <http://www.cs.washington.edu/homes/seitz>

**Prof. Dr. Hany Farid**

Professor of Electrical Engineering and Computer Science  
University of California, Berkeley

**Email** hfarid@berkeley.edu

**Home page** <https://farid.berkeley.edu>

**Prof. Dr. Yaser Ajmal Sheikh**

Associate Professor of Computer Science and Director at Facebook Reality Labs  
Carnegie Mellon University, Robotics Institute

**Email** yaser@cs.cmu.edu

**Home page** <http://www.cs.cmu.edu/~yaser/>

**Prof. Dr. Wojciech Matusik**

Associate Professor of Computer Science  
Massachusetts Institute of Technology, Department of Electrical Engineering and Computer Science

**Email** wojciech@mit.edu

**Home page** <http://people.csail.mit.edu/wojciech>

**Dr. Chris Bregler**

Senior Staff Scientist  
Google AI

**Email** bregler@google.com

**Home page** <http://chris.bregler.com/>

**Kim Libreri**

Chief Technology Officer  
Epic Games

**Email** available upon request

**Home page** <http://epicgames.com/>

# Institute of Creative Technologies (ICT)

## Dr. Hao Li

### Information Security Summary

July 8, 2019

Rob Groome – Director of Security Operations  
Alan Hong – Senior Incident Response Analyst

## Privileged and Confidential



**USC** University of  
Southern California

Privileged and Confidential: Attorney Work Product

Office of Compliance  
University of Southern California  
Los Angeles, CA 90089

Dear Dr. Grace,

We have completed our analysis of the MacBook Pro with Serial Number C02V20C9J93D. Our engagement was performed in accordance with our Incident Request Number, REQ0131116, and our procedures were as follows:

- Image the device
- Locate items of interest(s)
- Provide any further assistance you may need

The procedures and findings from our initial analysis are provided in this report.

We appreciate the cooperation and assistance provided to us during the course of our work. If you have any questions, please feel free to reach out to us.

Kind regards,  
USC Information Security Office

# Table of Contents

<b><u>EXECUTIVE SUMMARY</u></b>	<b><u>4</u></b>
<b><u>HISTORY/BACKGROUND</u></b>	<b><u>4</u></b>
<b><u>FINDINGS</u></b>	<b><u>4</u></b>
<b><u>SCOPE AND ANALYSIS CONSIDERATIONS</u></b>	<b><u>5</u></b>

# Executive Summary

## History/Background

- On June 21, 2019, Rob Groome informed me, Alan Hong, about the need to acquire a device for an investigation for the Office of Compliance. Details of the data size were later revealed to provide an approximate time it would take to forensically image the device(s) and return them to the owner. Furthermore, details of evidence drop off were also discussed.
- Communications between the Information Security Office and the Office of Compliance has primarily been done over email with a few phone calls for verification purposes on scheduling
- Dr. Grace and Dr. Li both agreed to meet at the Carole Little Building on June 27, 2019 at 10:00 AM for the evidence hand off
- The only evidence that was presented and handed over with Dr. Grace present to witness, was the MacBook Pro with Serial Number C02V20C9J93D
- Chain of Custody documentation was filled out and the imaging process commence the same day June 27, 2019 at approximately 10:45 AM.

## Findings

- It was discovered that the machine contains very little data and appears to have been recently re-imaged. The relevant data that was located was the exact folder that Dr. Li mentioned that he copied from his external hard drive to the laptop.
- The following is a summary of the important items/artifacts/information to gain a better understanding of the laptop:
  - The earliest system file times are all documented to be 2019-06-24 at 23:01:56 (PDT)
  - Internet History, Cookies, and Cache were all bare and contained little to no information
  - The User Account that was created for him by the "IT Group" to use, pinscreen, had a creation time of 2019-06-24 at 23:33:14 (PDT)
  - The SIGAsia17 Directory had the Date Modified as 2019-06-26 at 09:54:59 (PDT)



# Scope and Analysis Considerations

This report summarizes the Information Security Office's analysis and findings related to the areas of investigation. The Information Security Office's engagement was limited by the amount of data provided by Dr. Hao Li.

Dr. Hao Li Provided the following:

- Apple MacBook Pro – 15" – Serial Number C02V20C9J93D

Areas of Interest / Relevant Areas of Analysis

- User account creation
  - Pinscreen account was created on 2019-06-24 at 23:33:14 (PDT)
- System File creation
  - System file creation times start at 2019-06-24 at 23:01:56 (PDT)
- Internet/Browser History
  - Contained the opening pages and little history by going to GitHub
- Research Folder – SIGAsia17
  - Folder is confirmed to be in the location mentioned. The folder has 309,830 items
  - The folder was added to the computer on 2019-06-25 at 18:26:18 (PDT)
- Desktop / Documents / Downloads Folder
  - They were all empty and contained no data

Items that should be noted are:

- It should be noted that the laptop referenced above, is not an USC Asset but one that Dr. Hao Li presented and claimed all his work was on there
- Furthermore, the folder that was copied (SIGAsia17) all has last modified times pointing back to 2019-06-25 at 18:26:18 (PDT) which means we do not have the visibility into the original creation time because the items have been tampered with since the copy was made from another media source to this laptop.
- If possible, it would be best if we were able to obtain the original sources
- Dr. Li mentioned during the time of evidence drop off that the laptop was worked on by the "IT Group". It is currently unknown which "IT Group" this is.

# Institute of Creative Technologies (ICT)

## Dr. Hao Li

### Information Security Summary

July 29, 2019

Rob Groome – Director of Security Operations  
Alan Hong – Senior Incident Response Analyst

### Privileged and Confidential



**USC** University of  
Southern California

Office of Compliance  
University of Southern California  
Los Angeles, CA 90089

Dear Dr. Grace,

We have completed our analysis of the following items:

- MacBook Pro with Serial Number C02V20C9J93D
- MacBook Pro with Serial Number C02SXE11GTF1
- Western Digital Elements External Hard Drive with Serial Number WXS1EC7EKWMF

Our engagement was performed in accordance with our Incident Request Number, REQ0131116, and our procedures were as follows:

- Image the device
- Locate items of interest(s)
- Provide any further assistance you may need

The procedures and findings from our initial analysis are provided in this report.

We appreciate the cooperation and assistance provided to us during the course of our work. If you have any questions, please feel free to reach out to us.

Kind regards,  
USC Information Security Office

# Table of Contents

<b>EXECUTIVE SUMMARY</b>	<b>4</b>
<b>HISTORY/BACKGROUND</b>	<b>4</b>
<b>FINDINGS</b>	<b>4</b>
<b>SCOPE AND ANALYSIS CONSIDERATIONS</b>	<b>6</b>

# Executive Summary

## History/Background

- On June 21, 2019, Rob Groome informed me, Alan Hong, about the need to acquire a device for an investigation for the Office of Compliance. Details of the data size were later revealed to provide an approximate time it would take to forensically image the device(s) and return them to the owner. Furthermore, details of evidence drop off were also discussed.
- Communications between the Information Security Office and the Office of Compliance has primarily been done over email with a few phone calls for verification purposes on scheduling
- Dr. Grace and Dr. Li both agreed to meet at the Carole Little Building on June 27, 2019 at 10:00 AM for the evidence hand off
- The only evidence that was presented and handed over with Dr. Grace present to witness, was the MacBook Pro with Serial Number C02V20C9J93D
- Chain of Custody documentation was filled out and the imaging process commenced the same day June 27, 2019 at approximately 10:45 AM.
- Further communications occurred and there was an agreement that Dr. Li would bring his ICT assigned laptop for imaging as well as the external hard drive that contained the original research.
- Dr. Li handed over a MacBook Pro with Serial Number C02SXE11GTF1 and a Western Digital Elements External Hard Drive with Serial Number WXS1EC7EKWMF on July 10, 2019 and imaging commenced the same day.
- After imaging and verification of data, the devices were returned to Dr. Li on July 15, 2019.

## Findings

- MacBook Pro with Serial Number C02V20C9J93D
  - It was discovered that the machine contains very little data and appears to have been recently re-imaged. The relevant data that was located was the exact folder that Dr. Li mentioned that he copied from his external hard drive to the laptop.
  - The following is a summary of the important items/artifacts/information to gain a better understanding of the laptop:
    - The earliest system file times are all documented to be 2019-06-24 at 23:01:56 (PDT)
    - Internet History, Cookies, and Cache were all bare and contained little to no information
    - The User Account that was created for him by the "IT Group" to use, pinscreen, had a creation time of 2019-06-24 at 23:33:14 (PDT)
    - The SIGAsia17 Directory had the Date Modified as 2019-06-26 at 09:54:59 (PDT)
- MacBook Pro with Serial Number C02SXE11GTF1
  - It was discovered that the machine had two separate partitions<sup>1</sup> on the computer and it was running both macOS and Windows 10 Enterprise. The same scenario, recent

---

<sup>1</sup> Partitions can typically be referenced as logical separations of a hard drive. This allows for the installation of multiple Operating Systems on a single hard drive in this scenario.

imaging, appears to have also taken place with both partitions as the date stamps all traverse back to 2016/2017 activity and nothing recent.

- macOS Partition
  - The last event that occurred documented to 2016-01-01 at 14:10:43 (PDT) which was attributed to JAMF Agent, which is an imaging software.
  - There were 4 user accounts that were located: Administrator, bullfrog, li, shared. On all accounts the Desktop, Documents, Downloads directories were all empty
- Windows Partition – Windows 10 Enterprise
  - The system's last timestamp of change is 2017-01-17 at 15:42:09 (PDT)
  - There were 4 user accounts that were located: bullfrog, defaultuser0, ict, and public. All of which the directories of Desktop, Document, and Downloads were empty
- Western Digital Elements External Hard Drive with Serial Number WXS1EC7EKWMF
  - The hard drive was a 4TB external hard drive in which 115 GB was utilized.
  - This was a storage drive and per the previous engagement with Dr. Li, the directory of interest was labeled "SIGAsia17". The directory had the following attributes:
    - Date Created - 2019-06-24 at 10:47:16 (PDT)
    - Date Modified - 2019-06-24 at 10:47:16 (PDT)
    - Date Accessed - 2019-07-09 at 15:49:52 (PDT)



# Scope and Analysis Considerations

This report summarizes the Information Security Office's analysis and findings related to the areas of investigation. The Information Security Office's engagement was limited by the amount of data provided by Dr. Hao Li.

Dr. Hao Li Provided the following:

- Apple MacBook Pro – 15" – Serial Number C02V20C9J93D
- Apple MacBook Pro – 15" – Serial Number C02SXE11GTF1
- Western Digital Elements External Hard Drive – Serial Number WXS1EC7EKWMF

Areas of Interest / Relevant Areas of Analysis

- Apple MacBook Pro – 15" – Serial Number C02V20C9J93D
  - User account creation
    - Pincscreen account was created on 2019-06-24 at 23:33:14 (PDT)
  - System File creation
    - System file creation times start at 2019-06-24 at 23:01:56 (PDT)
  - Internet/Browser History
    - Contained the opening pages and little history by going to GitHub
  - Research Folder – SIGAsia17
    - Folder is confirmed to be in the location mentioned. The folder has 309,830 items
    - The folder was added to the computer on 2019-06-25 at 18:26:18 (PDT)
  - Desktop / Documents / Downloads Folder
    - They were all empty and contained no data
- Apple MacBook Pro – 15" – Serial Number C02SXE11GTF1
  - Running macOS and a Bootcamp partition. Both partitions have system dates pointing back to 2016 and 2017 which means that there is a high possibility that the Operating System(s) has been recently re-imaged.
    - macOS Partition
      - The last event that occurred documented to 2016-01-01 at 14:10:43 (PDT) which was attributed to JAMF Agent, which is an imaging software.
      - The Operating System Version was running macOS Sierra version 10.12.2. Which is an outdated version as of the current writing of this report, the most recent version Apple Inc has released is 10.14.5
      - There were 4 user accounts that were located: Administrator, bullfrog, li, shared. The Desktop, Documents, Downloads directories on all 4 accounts were all empty
    - Windows Partition
      - The system's earliest timestamp is 2017-01-17 at 12:22:54 (PDT)
      - The system's last timestamp of change is 2017-01-17 at 15:42:09 (PDT)
      - The operating system is running Windows 10 Enterprise
      - There were 4 user accounts that were located: bullfrog, defaultuser0, ict, and public. All of which the directories of Desktop, Document, and Downloads were empty

- Western Digital Elements External Hard Drive – Serial Number WXS1EC7EKWMF
  - The hard drive was a 4TB external hard drive in which 115 GB was utilized.
  - This was a storage drive and per the previous engagement with Dr. Li, the directory of interest was labeled “SIGAsia17”. The directory had the following attributes:
    - Date Created - 2019-06-24 at 10:47:16 (PDT)
    - Date Modified - 2019-06-24 at 10:47:16 (PDT)
    - Date Accessed - 2019-07-09 at 15:49:52 (PDT)
    - Contains 4 folders (then each folder has a lot of their own details):
      - hair\_data
        - Date Created - 2018-09-28 at 11:29:42 (PDT)
        - Date Modified - 2019-07-09 at 11:29:51 (PDT)
        - Date Accessed - 2019-07-09 at 15:50:03 (PDT)
      - hair\_database
        - Date Created - 2018-09-28 at 09:58:17 (PDT)
        - Date Modified - 2018-09-28 at 11:19:41 (PDT)
        - Date Accessed - 2019-07-09 at 15:50:00 (PDT)
      - inputs
        - Date Created - 2017-03-05 at 02:02:16 (PDT)
        - Date Modified - 2018-10-20 at 20:56:13 (PDT)
        - Date Accessed - 2019-07-09 at 15:49:56 (PDT)
      - siga17
        - Date Created - 2018-09-26 at 16:18:47 (PDT)
        - Date Modified - 2018-09-26 at 17:29:17 (PDT)
        - Date Accessed - 2019-07-09 at 15:49:55 (PDT)

Items that should be noted are:

- It should be noted that the MacBook Pro with Serial Number C02V20C9J93D, is not an USC Asset but one that Dr. Hao Li presented and claimed all his work was on there
- Furthermore, the folder that was copied (SIGAsia17) all has last modified times pointing back to 2019-06-25 at 18:26:18 (PDT) which means we do not have the visibility into the original creation time because the items have been tampered with since the copy was made from another media source to MacBook Pro with Serial Number C02V20C9J93D.
- Dr. Li mentioned during the time of evidence drop off (June 27, 2019) that the laptop was worked on by the “IT Group”. It is currently unknown which “IT Group” this is.
- The MacBook Pro with Serial Number C02SXE11GTF1, contains 2 partitions and both Operating Systems did not have any recent data and all system times points to a historical time space. Although we are unable to determine the exact date of when imaging occurred, it can be said that the action took place prior to the relinquishment of the machine.
- The external hard drive appears to have the relevant data for further queries and analysis.

# Report on Analysis of Pinscreen Demonstration at SIGGRAPH RTL 2017

**Date:** November 21, 2019  
**Author:** George Edwards, Ph.D.  
**Prepared for:** USC Office of Research

## 1. Task

I was asked by Dr. Kristen Grace, M.D., Ph.D., Research Integrity Officer at USC's Office of Research (the "Research Integrity Officer") to analyze software that was demonstrated by Dr. Hao Li and Dr. Iman Sadeghi at the ACM SIGGRAPH 2017 Real Time Live! ("SIGGRAPH RTL 2017") conference which took place on August 1, 2017. The demo was titled "Pinscreen: Creating Performance-Driven Avatars in Seconds."

I understand from reviewing materials provided to me by the Research Integrity Officer that Dr. Li is alleged to have, *inter alia*:

1. Falsified data in an abstract to SIGGRAPH RTL 2017 by representing that he had developed a "fully automatic framework for creating a complete 3D avatar...to build a high-quality head model within seconds," when in fact the technology took approximately a minute and a half to generate; and
2. Falsified data in the live SIGGRAPH RTL 2017 demonstration by claiming that the creation of an avatar using his technology was in real time and accomplished in a matter of seconds, when in fact the avatar creation was pre-loaded ("cached") on the computer. In addition, it is alleged that Dr. Li instructed his team to manually modify the outputs actually being generated to improve the avatars' quality such that the output demonstrated was not an accurate representation of the output his technology generated.

I analyzed the actual capabilities of the Pinscreen software that was presented at SIGGRAPH RTL 2017 (the "Pinscreen Demo Software"). This report states the results of that analysis.

## 2. Information Analyzed

I received and reviewed the following information:

- USC's list of allegations
- Information provided to USC by Dr. Sadeghi
- USC ICT ITS report of forensic analysis of hard drives
- The Amended Complaint brought against Pinscreen by Dr. Sadeghi
- The USC Inquiry Report and attachments

- The manuscripts and abstract referenced in USC’s list of allegations
- The Pinscreen Demo Software downloaded from <https://gitlab.com/pinscreen/rtl-app>
- “SIGGRAPH 2017 Real Time Live” video at:  
[https://www.youtube.com/watch?v=hpuEdXn\\_M0Q](https://www.youtube.com/watch?v=hpuEdXn_M0Q)

### 3. Summary of Findings

My analysis determined that:

1. The Pinscreen Demo Software does not include functionality for creating a 3D avatar from an image, either fully automatically or otherwise.
2. The Pinscreen Demo Software includes at least eleven pre-built, pre-stored avatars. Four of these avatars – “Iman”, “Hao”, “JohnRoot”, and “Christobal” – were displayed by Dr. Sadeghi during the Pinscreen Demo.
3. The Pinscreen Demo Software allows the user to take a picture using an attached webcam. No matter what picture is taken with the webcam, the rtl-app will then display the pre-built the “Iman” avatar.
4. The Pinscreen Demo Software also allows the user to select a previously captured picture file. If the name of the picture file corresponds to one of the pre-built avatars (e.g., “JohnRoot.jpeg”), then the app displays the corresponding pre-built avatar. If the name of the picture file does not correspond to one of the pre-built avatars (e.g., “GeorgeEdwards.jpg”), no avatar is displayed.
5. The Pinscreen Demo Software is designed to mislead the viewer. For example, the Pinscreen Demo Software includes a “progress bar” that appears to show the progress of an underlying computation to generate an avatar, when in fact the progress bar simply fills up according to a timer.

### 4. Detailed Description of Findings

The Pinscreen Demo Software was provided to me in the form of a Git repository at [gitlab.com/pinscreen/rtl-app](https://gitlab.com/pinscreen/rtl-app). The Pinscreen Demo Software is implemented using an off-the-shelf game engine named Unity. Unity applications include components (such as 3D models and scenes) that are created within the Unity Editor as well as C# code files, called scripts, that define behaviors for those components.

The video of the live Pinscreen demonstration shows that the presentation included two main parts. In the first part (shown at 31:06 to 35:43 of the video), Dr. Sadeghi demonstrates the purported avatar generation capabilities of the software. He takes a picture of himself and then shows an avatar that was purportedly generated in real-time from that picture. He then selects image files of three other people and shows an avatar of each person purportedly generated from the image file. This first portion of the demo was the focus of my analysis since it included the functionality that was allegedly falsified.

In the second portion of the demo (shown at 35:43 to 40:16), other capabilities are demonstrated, such as the ability to animate avatars. I did not analyze this portion of the demo.

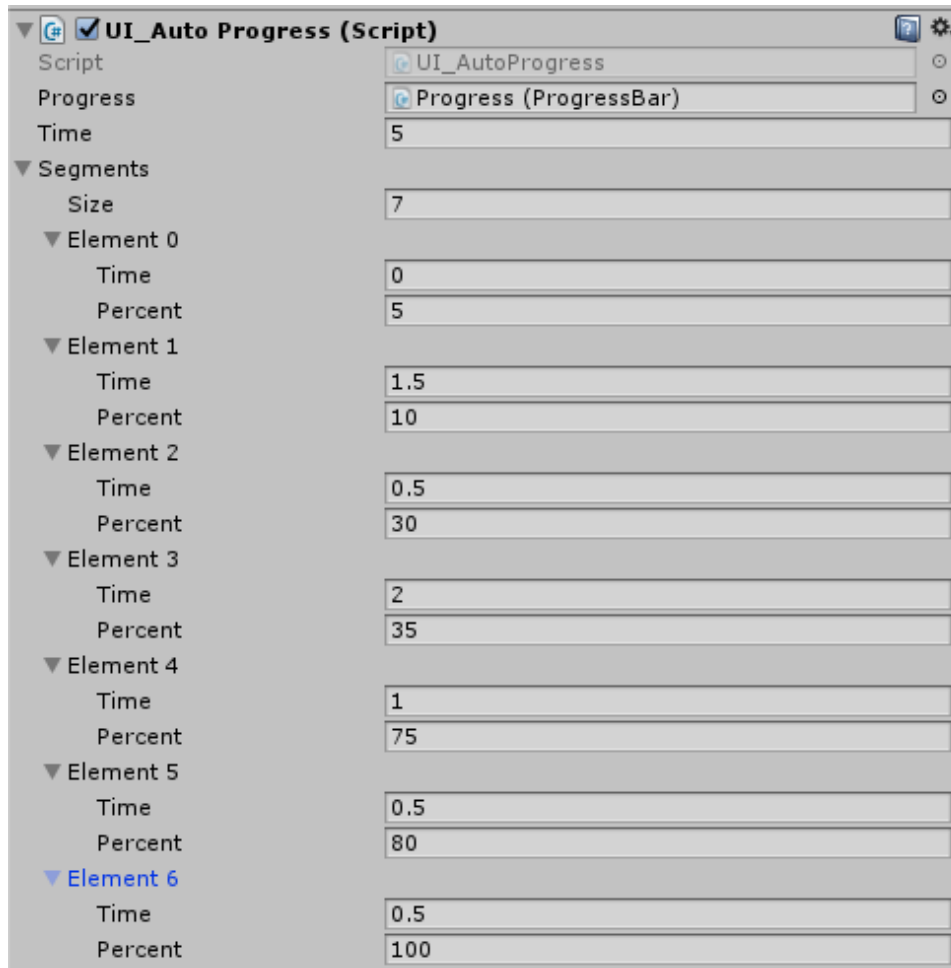
My analysis of the Pinscreen Demo Software included an inspection of the application's C# source code; Unity objects, assets, and settings; and Git repository logs. I also built and ran the application and experimented with different inputs. Instructions for inspecting, building, and running the Pinscreen Demo Software are provided in **Exhibit A**.

#### 4.1. "Iman" Avatar Generated from Webcam Picture

The C# source code of the Pinscreen Demo Software shows that the first feature presented in the demo – the ability to generate an avatar in a few seconds from a webcam picture – did not actually exist in the software. The file `rtl-app\Assets\RTLUI\RTLUIHack.cs` shows the functions that are called after the user has taken a picture with the webcam. First, the function `GenerateAvatar` is called (line 94). At line 96, the function `SetAvatar` is called with the hardcoded parameters `avatarData["Iman"].texture, "Iman"`.

```
94     public void GenerateAvatar()  
95     {  
96         SetAvatar(avatarData["Iman"].texture, "Iman");  
97     }  
98
```

At line 125, the `SetAvatar` function displays a progress bar on the screen. The progress bar is implemented in the file `rtl-app\Assets\RTLUI\ProgressBar.cs`. The progress bar's `Update` function at line 70 shows that the progress bar is filled based on a timer, not based on the actual progress of any underlying computation. Moreover, the Git repository logs indicate that specific efforts were made to make the progress bar more believable: code was added to the file `rtl-app\Assets\RTLUI\AutoProgress.cs` on July 22, 2017, with the commit comment "Replace Trump animation, make progress more " natural". This revision caused the progress bar to increase at a variable speed, rather than increasing at a uniform speed. The progress is defined in the `Segments` array in Unity.



Returning to the `SetAvatar` function (line 125 of `RTLUIHack.cs`), when the progress bar completes, the `SelectAvatar` function is called at line 153. The `SelectAvatar` function begins at line 187. At line 202, a lookup is performed to retrieve an avatar `Transform` object from a collection of pre-built avatars. In this case, the value of the name parameter is "Iman" so the avatar named "Iman" is retrieved. The collection of pre-built avatars can be viewed in the "Hierarchy" window of Unity Editor (top left) under the Avatars item.

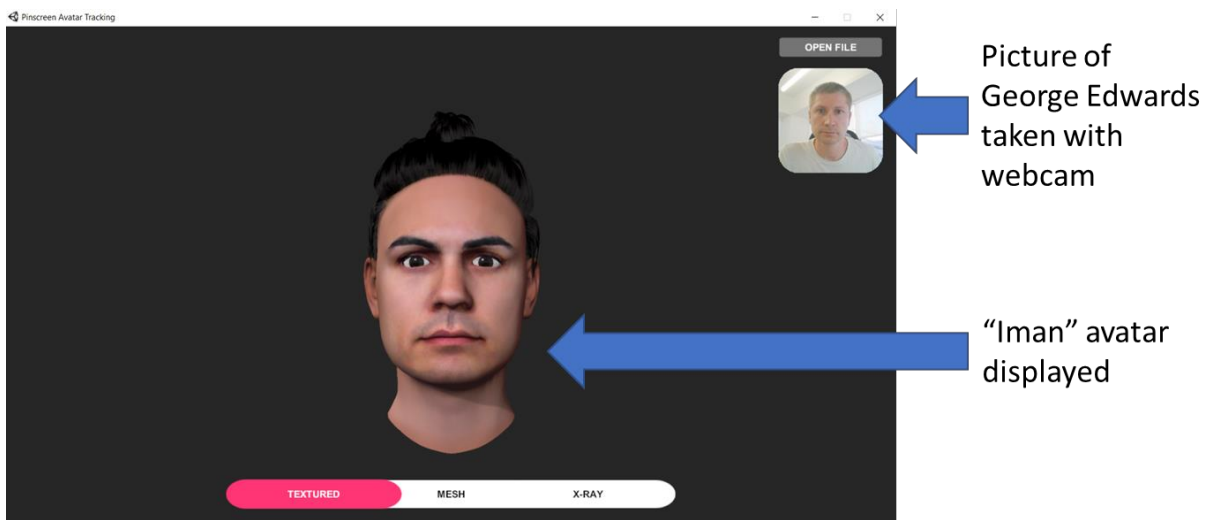




Next, the `SelectAvatar` function sets `visibleAvatar` to the avatar object that was just retrieved from the pre-built collection and displays that avatar on the screen.

I confirmed that the description above correctly characterizes the operation of the Pinscreen Demo Software by running the application with Script Debugging turned on. The generated `output_log.txt` file is attached as **Exhibit B**.

I also ran the Pinscreen Demo Software and took a picture of myself using my computer's webcam. As expected, once the progress bar completed, the "Iman" avatar was displayed.



## 4.2. “Hao”, “JohnRoot”, and “Christobal” Avatars Generated from Image Files

The C# source code of the Pinscreen Demo Software also shows that the next feature presented in the demo – the ability to generate an avatar in a few seconds from a stored image file – also did not actually exist in the software. When the user clicks the OPEN FILE button in the demo, the `OpenFileWindow` function is called (`rtl-app\rtl-app\Assets\RTLUI\OpenAvatarImage.cs`, line 19). After a file is selected, the `SetAvatar` function is called at line 25.

The `SetAvatar` function called here is different than the one described above (the `SetAvatar` function is overloaded). This `SetAvatar` function begins at line 159 of `RTLUIHack.cs`. The function strips the file extension off the file name provided as a parameter and saves the name in the `name` variable.

```

159     public void SetAvatar(string file)
160     {
161         // set avatar image
162         string name = Path.GetFileNameWithoutExtension(file);
163
164         Texture2D texture = AvatarAnimationController.LoadPNG(file);
165         texture.Apply();
166
167         SetAvatar(texture, name);
168     }
  
```

Next, at line 167 `SetAvatar(texture, name)` is called, is the `SetAvatar` function described above in Section 4.1. At this point, the program proceeds in the same manner as previously described: a lookup is performed to retrieve the appropriate avatar from the collection of pre-built avatars, based on the value of the name parameter. For example, if the user selected the image file `JohnRoot.jpeg`, the `JohnRoot` avatar is displayed. It does not matter what the contents of the `JohnRoot.jpeg` file actually are – it could be a picture of anything and the same avatar will be displayed. Also, if the user selects an image file with a name that does not correspond to one of the pre-built avatars, no avatar is displayed.

I again confirmed that the description above correctly characterizes the operation of the Pinscreen Demo Software by running the application with Script Debugging turned on. The generated `output_log.txt` file is attached as **Exhibit B**.

I also ran the Pinscreen Demo Software and selected a picture of myself. As expected, once the progress bar completed, no avatar was displayed.

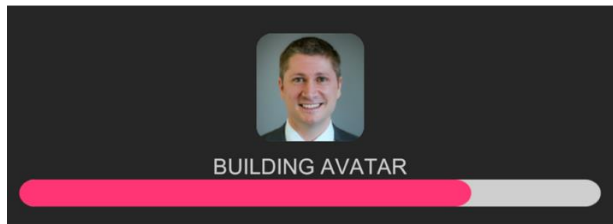
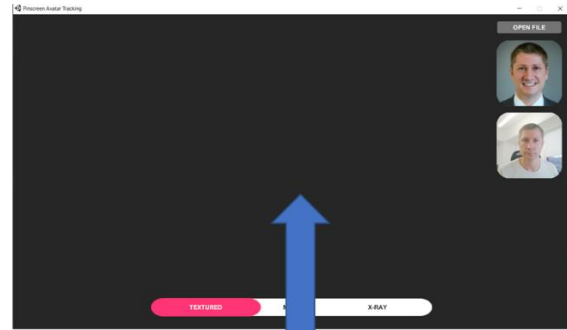


Image file of George Edwards selected;  
BUILDING AVATAR progress bar displayed



No avatar built or displayed



## 5. Conclusions

Based on my analysis of the Pinscreen Demo Software, Dr. Li and Dr. Sadeghi falsely claimed – both in the published abstract and in oral statements – that the software they presented at SIGGRAPH RTL 2017 had the capability to automatically generate complete 3D avatars from a single image. The false statements appear to be significant in that they go well beyond overstatements or exaggerations. Rather, the false statements claim capabilities that are completely absent in the software. Also, there is strong circumstantial evidence (such as the fake progress bar and Git repo logs) that the fabrication was intentional and premeditated.

The false statements relate to the core research contribution claimed by the authors. For example, even if the pre-built avatars were created using some other Pinscreen software program, and the demo was fabricated because the generation process took over a minute (as alluded to in USC's list of allegations) and was deemed too slow for a live demo, this would still represent a substantial fabrication because the authors claimed the speed of their system – the ability to generate an avatar “within seconds” – as a key innovation of their work.

Note that my analysis did not address the question of whether Dr. Li instructed his team to manually modify the avatar models to improve their quality. My analysis did not investigate the process that was actually used to create the pre-built models that were displayed during the demo, so I cannot at this time provide any information on the extent to which that process was fully automatic.

## Exhibit A

To inspect, build, and run the Pinscreen Demo Software:

1. Download and install Unity 5.5.0 from <https://unity3d.com/get-unity/download/archive>.
2. Next, within the Unity Editor, select File→Open Scene and choose the file rtl-app\Assets\RTLMaster.unity.
3. Choose File→Build Settings... and ensure that under Scenes In Build only RTLMaster is checked. If RTLMaster is not listed, click Add Open Scene.
4. Make sure the Target Platform and Architecture drop-down menus are selected correctly for the computer on which you plan to run the application.
5. Choose Build and Run. For the application to work without further adjustments, you must choose to save the generated executable file in the rtl-app folder.

## Exhibit B

```
Mono path[0] = 'C:/code/rtl-app/rtl-app/rtl-app_Data/Managed'
Mono path[1] = 'C:/code/rtl-app/rtl-app/rtl-app_Data/Mono'
Mono config path = 'C:/code/rtl-app/rtl-app/rtl-app_Data/Mono/etc'
PlayerConnection initialized from C:/code/rtl-app/rtl-app/rtl-app_Data (debug
= 0)
PlayerConnection initialized network socket : 0.0.0.0 55015
Multi-casting "[IP] 192.168.163.1 [Port] 55015 [Flags] 3 [Guid] 288996400
[EditorId] 957138342 [Version] 1048832 [Id] WindowsPlayer(DELL-E7470) [Debug]
1" to [225.0.0.222:54997]...
Waiting for connection from host on [0.0.0.0:55015]...
PlayerConnection accepted from [192.168.128.20] handle:0x3c4
Started listening to [0.0.0.0:55015]
Using monoOptions --debugger-
agent=transport=dt_socket,embedding=1,defer=y,address=0.0.0.0:56400
PlayerConnection already initialized - listening to [0.0.0.0:55015]
Initialize engine version: 5.5.0f3 (38b4efef76f0)
GfxDevice: creating device client; threaded=1
Direct3D:
  Version:   Direct3D 11.0 [level 11.0]
  Renderer: Intel(R) HD Graphics 520 (ID=0x1916)
  Vendor:    Intel
  VRAM:      4196 MB
  Driver:    22.20.16.4836
Begin MonoManager ReloadAssembly
Platform assembly: C:\code\rtl-app\rtl-app\rtl-
app_Data\Managed\UnityEngine.dll (this message is harmless)
Loading C:\code\rtl-app\rtl-app\rtl-app_Data\Managed\UnityEngine.dll into
Unity Child Domain
Platform assembly: C:\code\rtl-app\rtl-app\rtl-app_Data\Managed\Assembly-
CSharp-firstpass.dll (this message is harmless)
Loading C:\code\rtl-app\rtl-app\rtl-app_Data\Managed\Assembly-CSharp-
firstpass.dll into Unity Child Domain
Platform assembly: C:\code\rtl-app\rtl-app\rtl-app_Data\Managed\Assembly-
CSharp.dll (this message is harmless)
Loading C:\code\rtl-app\rtl-app\rtl-app_Data\Managed\Assembly-CSharp.dll into
Unity Child Domain
Platform assembly: C:\code\rtl-app\rtl-app\rtl-
app_Data\Managed\UnityEngine.UI.dll (this message is harmless)
Loading C:\code\rtl-app\rtl-app\rtl-app_Data\Managed\UnityEngine.UI.dll into
Unity Child Domain
Platform assembly: C:\code\rtl-app\rtl-app\rtl-
app_Data\Managed\UnityEngine.Networking.dll (this message is harmless)
Loading C:\code\rtl-app\rtl-app\rtl-
app_Data\Managed\UnityEngine.Networking.dll into Unity Child Domain
Platform assembly: C:\code\rtl-app\rtl-app\rtl-
app_Data\Managed\UnityEngine.PlaymodeTestsRunner.dll (this message is
harmless)
Loading C:\code\rtl-app\rtl-app\rtl-
app_Data\Managed\UnityEngine.PlaymodeTestsRunner.dll into Unity Child Domain
Platform assembly: C:\code\rtl-app\rtl-app\rtl-
app_Data\Managed\System.Windows.Forms.dll (this message is harmless)
Loading C:\code\rtl-app\rtl-app\rtl-app_Data\Managed\System.Windows.Forms.dll
into Unity Child Domain
```

```
- Completed reload, in 0.103 seconds
Platform assembly: C:\code\rtl-app\rtl-app\rtl-
app_Data\Managed\System.Core.dll (this message is harmless)
Platform assembly: C:\code\rtl-app\rtl-app\rtl-app_Data\Managed\System.dll
(this message is harmless)
<RI> Initializing input.

XInput1_3.dll not found. Trying XInput9_1_0.dll instead...
<RI> Input initialized.

desktop: 1920x1080 60Hz; virtual: 4920x1991 at -3000,-482
<RI> Initialized touch support.

Shader 'Hair/OIT DP/Opaque Initialization': fallback shader
'Diffuse/VertexLit' not found
Shader 'Hair/OIT DP/Final Blend': fallback shader 'Diffuse/VertexLit' not
found
The referenced script on this Behaviour (Game Object
'teethTongue_teethUpper_geom') is missing!

(Filename: C:/buildslave/unity/build/Runtime/Mono/MonoBehaviour.cpp Line:
1754)

The referenced script on this Behaviour (Game Object
'teethTongue_teethUpper_geom') is missing!

(Filename: C:/buildslave/unity/build/Runtime/Mono/MonoBehaviour.cpp Line:
1754)

The referenced script on this Behaviour (Game Object
'teethTongue_gumsUpper_geom') is missing!

(Filename: C:/buildslave/unity/build/Runtime/Mono/MonoBehaviour.cpp Line:
1754)

The referenced script on this Behaviour (Game Object
'teethTongue_teethUpper_geom') is missing!

(Filename: C:/buildslave/unity/build/Runtime/Mono/MonoBehaviour.cpp Line:
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1754)

The referenced script on this Behaviour (Game Object  
'teethTongue\_teethUpper\_geom') is missing!

(Filename: C:/buildslave/unity/build/Runtime/Mono/MonoBehaviour.cpp Line:  
1754)

The referenced script on this Behaviour (Game Object  
'teethTongue\_gumsUpper\_geom') is missing!

(Filename: C:/buildslave/unity/build/Runtime/Mono/MonoBehaviour.cpp Line:  
1754)

The referenced script on this Behaviour (Game Object  
'teethTongue\_gumsUpper\_geom') is missing!

(Filename: C:/buildslave/unity/build/Runtime/Mono/MonoBehaviour.cpp Line:  
1754)

The referenced script on this Behaviour (Game Object  
'teethTongue\_gumsUpper\_geom') is missing!

(Filename: C:/buildslave/unity/build/Runtime/Mono/MonoBehaviour.cpp Line:  
1754)

The referenced script on this Behaviour (Game Object  
'teethTongue\_gumsUpper\_geom') is missing!

(Filename: C:/buildslave/unity/build/Runtime/Mono/MonoBehaviour.cpp Line:  
1754)

The referenced script on this Behaviour (Game Object  
'teethTongue\_gumsUpper\_geom') is missing!

(Filename: C:/buildslave/unity/build/Runtime/Mono/MonoBehaviour.cpp Line:  
1754)

The referenced script on this Behaviour (Game Object  
'teethTongue\_gumsUpper\_geom') is missing!

(Filename: C:/buildslave/unity/build/Runtime/Mono/MonoBehaviour.cpp Line:  
1754)

The referenced script on this Behaviour (Game Object  
'teethTongue\_teethUpper\_geom') is missing!

(Filename: C:/buildslave/unity/build/Runtime/Mono/MonoBehaviour.cpp Line:  
1754)

The referenced script on this Behaviour (Game Object  
'teethTongue\_gumsUpper\_geom') is missing!

(Filename: C:/buildslave/unity/build/Runtime/Mono/MonoBehaviour.cpp Line:  
1754)

The referenced script on this Behaviour (Game Object  
'teethTongue\_teethUpper\_geom') is missing!

(Filename: C:/buildslave/unity/build/Runtime/Mono/MonoBehaviour.cpp Line:  
1754)

The referenced script on this Behaviour (Game Object  
'teethTongue\_teethUpper\_geom') is missing!

(Filename: C:/buildslave/unity/build/Runtime/Mono/MonoBehaviour.cpp Line:  
1754)

The referenced script on this Behaviour (Game Object  
'teethTongue\_teethUpper\_geom') is missing!

(Filename: C:/buildslave/unity/build/Runtime/Mono/MonoBehaviour.cpp Line:  
1754)

The referenced script on this Behaviour (Game Object  
'teethTongue\_gumsUpper\_geom') is missing!

(Filename: C:/buildslave/unity/build/Runtime/Mono/MonoBehaviour.cpp Line:  
1754)

UnloadTime: 1.738600 ms

Selecting Avatar Iman

UnityEngine.DebugLogHandler:Internal\_Log(LogType, String, Object)

UnityEngine.DebugLogHandler:LogFormat(LogType, Object, String, Object[])

UnityEngine.Logger:LogFormat(LogType, String, Object[])

UnityEngine.Debug:LogFormat(String, Object[])

RTLUIHack:ChangeInputImage(String) (at C:\code\rtl-app\rtl-  
app\Assets\RTLUI\RTLUIHack.cs:181)

RTLUIHack:SetAvatar(Texture, String) (at C:\code\rtl-app\rtl-  
app\Assets\RTLUI\RTLUIHack.cs:123)

RTLUIHack:GenerateAvatar() (at C:\code\rtl-app\rtl-  
app\Assets\RTLUI\RTLUIHack.cs:96)

UnityEngine.Events.InvokeableCall:Invoke(Object[]) (at

C:\buildslave\unity\build\Runtime\Export\UnityEvent.cs:153)

UnityEngine.Events.InvokeableCallList:Invoke(Object[]) (at

C:\buildslave\unity\build\Runtime\Export\UnityEvent.cs:634)

UnityEngine.Events.UnityEventBase:Invoke(Object[]) (at

C:\buildslave\unity\build\Runtime\Export\UnityEvent.cs:769)

```
UnityEngine.Events.UnityEvent:Invoke() (at
C:\buildslave\unity\build\Runtime\Export\UnityEvent_0.cs:53)
UnityEngine.UI.Button:Press() (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\UI\Core\Button.
cs:35)
UnityEngine.UI.Button:OnPointerClick(PointerEventData) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\UI\Core\Button.
cs:44)
UnityEngine.EventSystems.ExecuteEvents:Execute(IPointerClickHandler,
BaseEventData) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Exe
cuteEvents.cs:52)
UnityEngine.EventSystems.ExecuteEvents:Execute(GameObject, BaseEventData,
EventFunction`1) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Exe
cuteEvents.cs:269)
UnityEngine.EventSystems.StandaloneInputModule:ProcessMousePress(MouseButtonE
ventData) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Inp
utModules\StandaloneInputModule.cs:531)
UnityEngine.EventSystems.StandaloneInputModule:ProcessMouseEvent(Int32) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Inp
utModules\StandaloneInputModule.cs:430)
UnityEngine.EventSystems.StandaloneInputModule:ProcessMouseEvent() (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Inp
utModules\StandaloneInputModule.cs:410)
UnityEngine.EventSystems.StandaloneInputModule:Process() (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Inp
utModules\StandaloneInputModule.cs:184)
UnityEngine.EventSystems.EventSystem:Update() (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Eve
ntSystem.cs:287)
```

(Filename: C:/code/rtl-app/rtl-app/Assets/RTLUI/RTLUIHack.cs Line: 181)

Selecting Avatar Iman

```
UnityEngine.DebugLogHandler:Internal_Log(LogType, String, Object)
UnityEngine.DebugLogHandler:LogFormat(LogType, Object, String, Object[])
UnityEngine.Logger:LogFormat(LogType, String, Object[])
UnityEngine.Debug:LogFormat(String, Object[])
RTLUIHack:ChangeInputImage(String) (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\RTLUIHack.cs:181)
RTLUIHack>SelectAvatar(String) (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\RTLUIHack.cs:191)
<SetAvatar>c__AnonStorey0:<>m__0() (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\RTLUIHack.cs:153)
ProgressBar:UpdateProgress() (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\ProgressBar.cs:107)
ProgressBar:Update() (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\ProgressBar.cs:83)
```

(Filename: C:/code/rtl-app/rtl-app/Assets/RTLUI/RTLUIHack.cs Line: 181)

Textured (UnityEngine.UI.Toggle)

```
UnityEngine.DebugLogHandler:Internal_Log(LogType, String, Object)
UnityEngine.DebugLogHandler:LogFormat(LogType, Object, String, Object[])
```

```
UnityEngine.Logger:Log(LogType, Object)
UnityEngine.Debug:Log(Object)
RTLUIHack:SelectAvatar(String) (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\RTLUIHack.cs:218)
<SetAvatar>c__AnonStorey0:<>m__0() (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\RTLUIHack.cs:153)
ProgressBar:UpdateProgress() (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\ProgressBar.cs:107)
ProgressBar:Update() (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\ProgressBar.cs:83)
```

(Filename: C:/code/rtl-app/rtl-app/Assets/RTLUI/RTLUIHack.cs Line: 218)

here

```
UnityEngine.DebugLogHandler:Internal_Log(LogType, String, Object)
UnityEngine.DebugLogHandler:LogFormat(LogType, Object, String, Object[])
UnityEngine.Logger:Log(LogType, Object)
UnityEngine.Debug:Log(Object)
OpenAvatarImage:OpenFileWindow() (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\OpenAvatarImage.cs:21)
UnityEngine.Events.InvokableCall:Invoke(Object[]) (at
C:\buildslave\unity\build\Runtime\Export\UnityEvent.cs:153)
UnityEngine.Events.InvokableCallList:Invoke(Object[]) (at
C:\buildslave\unity\build\Runtime\Export\UnityEvent.cs:634)
UnityEngine.Events.UnityEventBase:Invoke(Object[]) (at
C:\buildslave\unity\build\Runtime\Export\UnityEvent.cs:769)
UnityEngine.Events.UnityEvent:Invoke() (at
C:\buildslave\unity\build\Runtime\Export\UnityEvent_0.cs:53)
UnityEngine.UI.Button:Press() (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\UI\Core\Button.
cs:35)
UnityEngine.UI.Button:OnPointerClick(PointerEventData) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\UI\Core\Button.
cs:44)
UnityEngine.EventSystems.ExecuteEvents:Execute(IPointerClickHandler,
BaseEventData) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Exe
cuteEvents.cs:52)
UnityEngine.EventSystems.ExecuteEvents:Execute(GameObject, BaseEventData,
EventFunction`1) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Exe
cuteEvents.cs:269)
UnityEngine.EventSystems.StandaloneInputModule:ProcessMousePress(MouseButtonE
ventData) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Inp
utModules\StandaloneInputModule.cs:531)
UnityEngine.EventSystems.StandaloneInputModule:ProcessMouseEvent(Int32) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Inp
utModules\StandaloneInputModule.cs:430)
UnityEngine.EventSystems.StandaloneInputModule:ProcessMouseEvent() (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Inp
utModules\StandaloneInputModule.cs:410)
UnityEngine.EventSystems.StandaloneInputModule:Process() (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Inp
utModules\StandaloneInputModule.cs:184)
```

```
UnityEngine.EventSystems.EventSystem:Update() (at  
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Eve  
ntSystem.cs:287)
```

```
(Filename: C:/code/rtl-app/rtl-app/Assets/RTLUI/OpenAvatarImage.cs Line: 21)
```

```
Platform assembly: C:\code\rtl-app\rtl-app\rtl-  
app_Data\Managed\System.Drawing.dll (this message is harmless)  
Platform assembly: C:\code\rtl-app\rtl-app\rtl-  
app_Data\Managed\Accessibility.dll (this message is harmless)  
Fallback handler could not load library C:/code/rtl-app/rtl-app/rtl-  
app_Data/Mono/libc  
Fallback handler could not load library C:/code/rtl-app/rtl-app/rtl-  
app_Data/Mono/.\libc  
Fallback handler could not load library C:/code/rtl-app/rtl-app/rtl-  
app_Data/Mono/libc  
Platform assembly: C:\code\rtl-app\rtl-app\rtl-  
app_Data\Managed\Mono.Posix.dll (this message is harmless)  
Fallback handler could not load library C:/code/rtl-app/rtl-app/rtl-  
app_Data/Mono/libc  
Fallback handler could not load library C:/code/rtl-app/rtl-app/rtl-  
app_Data/Mono/.\libc  
Fallback handler could not load library C:/code/rtl-app/rtl-app/rtl-  
app_Data/Mono/libc  
Fallback handler could not load library C:/code/rtl-app/rtl-app/rtl-  
app_Data/Mono/libX11  
Fallback handler could not load library C:/code/rtl-app/rtl-app/rtl-  
app_Data/Mono/.\libX11  
Fallback handler could not load library C:/code/rtl-app/rtl-app/rtl-  
app_Data/Mono/libX11  
Fallback handler could not load library C:/code/rtl-app/rtl-app/rtl-  
app_Data/Mono/libX11  
Fallback handler could not load library C:/code/rtl-app/rtl-app/rtl-  
app_Data/Mono/.\libX11  
Fallback handler could not load library C:/code/rtl-app/rtl-app/rtl-  
app_Data/Mono/libX11  
Fallback handler could not load library C:/code/rtl-app/rtl-app/rtl-  
app_Data/Mono/libX11  
Fallback handler could not load library C:/code/rtl-app/rtl-app/rtl-  
app_Data/Mono/.\libX11  
Fallback handler could not load library C:/code/rtl-app/rtl-app/rtl-  
app_Data/Mono/libX11  
Platform assembly: C:\code\rtl-app\rtl-app\rtl-  
app_Data\Managed\System.Xml.dll (this message is harmless)  
Fallback handler could not load library C:/code/rtl-app/rtl-app/rtl-  
app_Data/Mono/./System/Library/Frameworks/Carbon.framework/Versions/Current/  
Carbon  
Fallback handler could not load library C:/code/rtl-app/rtl-app/rtl-  
app_Data/Mono/lib/System/Library/Frameworks/Carbon.framework/Versions/Current  
/Carbon  
Fallback handler could not load library C:/code/rtl-app/rtl-app/rtl-  
app_Data/Mono/./lib/System/Library/Frameworks/Carbon.framework/Versions/Curre  
nt/Carbon  
Fallback handler could not load library C:/code/rtl-app/rtl-app/rtl-  
app_Data/Mono/lib/System/Library/Frameworks/Carbon.framework/Versions/Current  
/Carbon
```

```
Selecting Avatar Hao
UnityEngine.DebugLogHandler:Internal_Log(LogType, String, Object)
UnityEngine.DebugLogHandler:LogFormat(LogType, Object, String, Object[])
UnityEngine.Logger:LogFormat(LogType, String, Object[])
UnityEngine.Debug:LogFormat(String, Object[])
RTLUIHack:ChangeInputImage(String) (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\RTLUIHack.cs:181)
RTLUIHack:SetAvatar(Texture, String) (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\RTLUIHack.cs:123)
RTLUIHack:SetAvatar(String) (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\RTLUIHack.cs:167)
OpenAvatarImage:OpenFileWindow() (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\OpenAvatarImage.cs:25)
UnityEngine.Events.InvokableCall:Invoke(Object[]) (at
C:\buildslave\unity\build\Runtime\Export\UnityEvent.cs:153)
UnityEngine.Events.InvokableCallList:Invoke(Object[]) (at
C:\buildslave\unity\build\Runtime\Export\UnityEvent.cs:634)
UnityEngine.Events.UnityEventBase:Invoke(Object[]) (at
C:\buildslave\unity\build\Runtime\Export\UnityEvent.cs:769)
UnityEngine.Events.UnityEvent:Invoke() (at
C:\buildslave\unity\build\Runtime\Export\UnityEvent_0.cs:53)
UnityEngine.UI.Button:Press() (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\UI\Core\Button.
cs:35)
UnityEngine.UI.Button:OnPointerClick(PointerEventData) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\UI\Core\Button.
cs:44)
UnityEngine.EventSystems.ExecuteEvents:Execute(IPointerClickHandler,
BaseEventData) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Exe
cuteEvents.cs:52)
UnityEngine.EventSystems.ExecuteEvents:Execute(GameObject, BaseEventData,
EventFunction`1) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Exe
cuteEvents.cs:269)
UnityEngine.EventSystems.StandaloneInputModule:ProcessMousePress(MouseButtonE
ventData) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Inp
utModules\StandaloneInputModule.cs:531)
UnityEngine.EventSystems.StandaloneInputModule:ProcessMouseEvent(Int32) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Inp
utModules\StandaloneInputModule.cs:430)
UnityEngine.EventSystems.StandaloneInputModule:ProcessMouseEvent() (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Inp
utModules\StandaloneInputModule.cs:410)
UnityEngine.EventSystems.StandaloneInputModule:Process() (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Inp
utModules\StandaloneInputModule.cs:184)
UnityEngine.EventSystems.EventSystem:Update() (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Eve
ntSystem.cs:287)
```

(Filename: C:/code/rtl-app/rtl-app/Assets/RTLUI/RTLUIHack.cs Line: 181)

```
Selecting Avatar Hao
UnityEngine.DebugLogHandler:Internal_Log(LogType, String, Object)
```



```
UnityEngine.DebugLogHandler:LogFormat(LogType, Object, String, Object[])
UnityEngine.Logger:LogFormat(LogType, String, Object[])
UnityEngine.Debug:LogFormat(String, Object[])
RTLUIHack:ChangeInputImage(String) (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\RTLUIHack.cs:181)
RTLUIHack:SelectAvatar(String) (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\RTLUIHack.cs:191)
<SetAvatar>c__AnonStorey0:<>m__0() (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\RTLUIHack.cs:153)
ProgressBar:UpdateProgress() (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\ProgressBar.cs:107)
ProgressBar:Update() (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\ProgressBar.cs:83)
```

(Filename: C:/code/rtl-app/rtl-app/Assets/RTLUI/RTLUIHack.cs Line: 181)

```
Textured (UnityEngine.UI.Toggle)
UnityEngine.DebugLogHandler:Internal_Log(LogType, String, Object)
UnityEngine.DebugLogHandler:LogFormat(LogType, Object, String, Object[])
UnityEngine.Logger:Log(LogType, Object)
UnityEngine.Debug:Log(Object)
RTLUIHack:SelectAvatar(String) (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\RTLUIHack.cs:218)
<SetAvatar>c__AnonStorey0:<>m__0() (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\RTLUIHack.cs:153)
ProgressBar:UpdateProgress() (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\ProgressBar.cs:107)
ProgressBar:Update() (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\ProgressBar.cs:83)
```

(Filename: C:/code/rtl-app/rtl-app/Assets/RTLUI/RTLUIHack.cs Line: 218)

```
here
UnityEngine.DebugLogHandler:Internal_Log(LogType, String, Object)
UnityEngine.DebugLogHandler:LogFormat(LogType, Object, String, Object[])
UnityEngine.Logger:Log(LogType, Object)
UnityEngine.Debug:Log(Object)
OpenAvatarImage:OpenFileWindow() (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\OpenAvatarImage.cs:21)
UnityEngine.Events.InvokableCall:Invoke(Object[]) (at
C:\buildslave\unity\build\Runtime\Export\UnityEvent.cs:153)
UnityEngine.Events.InvokableCallList:Invoke(Object[]) (at
C:\buildslave\unity\build\Runtime\Export\UnityEvent.cs:634)
UnityEngine.Events.UnityEventBase:Invoke(Object[]) (at
C:\buildslave\unity\build\Runtime\Export\UnityEvent.cs:769)
UnityEngine.Events.UnityEvent:Invoke() (at
C:\buildslave\unity\build\Runtime\Export\UnityEvent_0.cs:53)
UnityEngine.UI.Button:Press() (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\UI\Core\Button.
cs:35)
UnityEngine.UI.Button:OnPointerClick(PointerEventData) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\UI\Core\Button.
cs:44)
UnityEngine.EventSystems.ExecuteEvents:Execute(IPointerClickHandler,
BaseEventData) (at
```

```
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\ExecuteEvents.cs:52)
UnityEngine.EventSystems.ExecuteEvents:Execute(GameObject, BaseEventData,
EventFunction`1) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\ExecuteEvents.cs:269)
UnityEngine.EventSystems.StandaloneInputModule:ProcessMousePress(MouseButtonEventData) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\InputModules\StandaloneInputModule.cs:531)
UnityEngine.EventSystems.StandaloneInputModule:ProcessMouseEvent(Int32) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\InputModules\StandaloneInputModule.cs:430)
UnityEngine.EventSystems.StandaloneInputModule:ProcessMouseEvent() (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\InputModules\StandaloneInputModule.cs:410)
UnityEngine.EventSystems.StandaloneInputModule:Process() (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\InputModules\StandaloneInputModule.cs:184)
UnityEngine.EventSystems.EventSystem:Update() (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\EventSystem.cs:287)
```

(Filename: C:/code/rtl-app/rtl-app/Assets/RTLUI/OpenAvatarImage.cs Line: 21)

```
Selecting Avatar JohnRoot
UnityEngine.DebugLogHandler:Internal_Log(LogType, String, Object)
UnityEngine.DebugLogHandler:LogFormat(LogType, Object, String, Object[])
UnityEngine.Logger:LogFormat(LogType, String, Object[])
UnityEngine.Debug:LogFormat(String, Object[])
RTLUIHack:ChangeInputImage(String) (at C:\code\rtl-app\rtl-app\Assets\RTLUI\RTLUIHack.cs:181)
RTLUIHack:SetAvatar(Texture, String) (at C:\code\rtl-app\rtl-app\Assets\RTLUI\RTLUIHack.cs:123)
RTLUIHack:SetAvatar(String) (at C:\code\rtl-app\rtl-app\Assets\RTLUI\RTLUIHack.cs:167)
OpenAvatarImage:OpenFileWindow() (at C:\code\rtl-app\rtl-app\Assets\RTLUI\OpenAvatarImage.cs:25)
UnityEngine.Events.InvokableCall:Invoke(Object[]) (at
C:\buildslave\unity\build\Runtime\Export\UnityEvent.cs:153)
UnityEngine.Events.InvokableCallList:Invoke(Object[]) (at
C:\buildslave\unity\build\Runtime\Export\UnityEvent.cs:634)
UnityEngine.Events.UnityEventBase:Invoke(Object[]) (at
C:\buildslave\unity\build\Runtime\Export\UnityEvent.cs:769)
UnityEngine.Events.UnityEvent:Invoke() (at
C:\buildslave\unity\build\Runtime\Export\UnityEvent_0.cs:53)
UnityEngine.UI.Button:Press() (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\UI\Core\Button.cs:35)
UnityEngine.UI.Button:OnPointerClick(PointerEventData) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\UI\Core\Button.cs:44)
UnityEngine.EventSystems.ExecuteEvents:Execute(IPointerClickHandler,
BaseEventData) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\ExecuteEvents.cs:52)
```

```
UnityEngine.EventSystems.ExecuteEvents:Execute (GameObject, BaseEventData,
EventFunction`1) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Exe
cuteEvents.cs:269)
UnityEngine.EventSystems.StandaloneInputModule:ProcessMousePress (MouseButtonE
ventData) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Inp
utModules\StandaloneInputModule.cs:531)
UnityEngine.EventSystems.StandaloneInputModule:ProcessMouseEvent (Int32) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Inp
utModules\StandaloneInputModule.cs:430)
UnityEngine.EventSystems.StandaloneInputModule:ProcessMouseEvent () (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Inp
utModules\StandaloneInputModule.cs:410)
UnityEngine.EventSystems.StandaloneInputModule:Process () (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Inp
utModules\StandaloneInputModule.cs:184)
UnityEngine.EventSystems.EventSystem:Update () (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Eve
ntSystem.cs:287)
```

(Filename: C:/code/rtl-app/rtl-app/Assets/RTLUI/RTLUIHack.cs Line: 181)

Selecting Avatar JohnRoot

```
UnityEngine.DebugLogHandler:Internal_Log (LogType, String, Object)
UnityEngine.DebugLogHandler:LogFormat (LogType, Object, String, Object[])
UnityEngine.Logger:LogFormat (LogType, String, Object[])
UnityEngine.Debug:LogFormat (String, Object[])
RTLUIHack:ChangeInputImage (String) (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\RTLUIHack.cs:181)
RTLUIHack>SelectAvatar (String) (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\RTLUIHack.cs:191)
<SetAvatar>c_AnonStorey0:<>m_0 () (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\RTLUIHack.cs:153)
ProgressBar:UpdateProgress () (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\ProgressBar.cs:107)
ProgressBar:Update () (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\ProgressBar.cs:83)
```

(Filename: C:/code/rtl-app/rtl-app/Assets/RTLUI/RTLUIHack.cs Line: 181)

Textured (UnityEngine.UI.Toggle)

```
UnityEngine.DebugLogHandler:Internal_Log (LogType, String, Object)
UnityEngine.DebugLogHandler:LogFormat (LogType, Object, String, Object[])
UnityEngine.Logger:Log (LogType, Object)
UnityEngine.Debug:Log (Object)
RTLUIHack>SelectAvatar (String) (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\RTLUIHack.cs:218)
<SetAvatar>c_AnonStorey0:<>m_0 () (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\RTLUIHack.cs:153)
ProgressBar:UpdateProgress () (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\ProgressBar.cs:107)
ProgressBar:Update () (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\ProgressBar.cs:83)
```

(Filename: C:/code/rtl-app/rtl-app/Assets/RTLUI/RTLUIHack.cs Line: 218)

here

```
UnityEngine.DebugLogHandler:Internal_Log(LogType, String, Object)
UnityEngine.DebugLogHandler:LogFormat(LogType, Object, String, Object[])
UnityEngine.Logger:Log(LogType, Object)
UnityEngine.Debug:Log(Object)
OpenAvatarImage:OpenFileWindow() (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\OpenAvatarImage.cs:21)
UnityEngine.Events.InvokableCall:Invoke(Object[]) (at
C:\buildslave\unity\build\Runtime\Export\UnityEvent.cs:153)
UnityEngine.Events.InvokableCallList:Invoke(Object[]) (at
C:\buildslave\unity\build\Runtime\Export\UnityEvent.cs:634)
UnityEngine.Events.UnityEventBase:Invoke(Object[]) (at
C:\buildslave\unity\build\Runtime\Export\UnityEvent.cs:769)
UnityEngine.Events.UnityEvent:Invoke() (at
C:\buildslave\unity\build\Runtime\Export\UnityEvent_0.cs:53)
UnityEngine.UI.Button:Press() (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\UI\Core\Button.
cs:35)
UnityEngine.UI.Button:OnPointerClick(PointerEventData) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\UI\Core\Button.
cs:44)
UnityEngine.EventSystems.ExecuteEvents:Execute(IPointerClickHandler,
BaseEventData) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Exe
cuteEvents.cs:52)
UnityEngine.EventSystems.ExecuteEvents:Execute(GameObject, BaseEventData,
EventFunction`1) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Exe
cuteEvents.cs:269)
UnityEngine.EventSystems.StandaloneInputModule:ProcessMousePress(MouseButtonE
ventData) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Inp
utModules\StandaloneInputModule.cs:531)
UnityEngine.EventSystems.StandaloneInputModule:ProcessMouseEvent(Int32) (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Inp
utModules\StandaloneInputModule.cs:430)
UnityEngine.EventSystems.StandaloneInputModule:ProcessMouseEvent() (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Inp
utModules\StandaloneInputModule.cs:410)
UnityEngine.EventSystems.StandaloneInputModule:Process() (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Inp
utModules\StandaloneInputModule.cs:184)
UnityEngine.EventSystems.EventSystem:Update() (at
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Eve
ntSystem.cs:287)
```

(Filename: C:/code/rtl-app/rtl-app/Assets/RTLUI/OpenAvatarImage.cs Line: 21)

Selecting Avatar Cristobal

```
UnityEngine.DebugLogHandler:Internal_Log(LogType, String, Object)
UnityEngine.DebugLogHandler:LogFormat(LogType, Object, String, Object[])
UnityEngine.Logger:LogFormat(LogType, String, Object[])
UnityEngine.Debug:LogFormat(String, Object[])
RTLUIHack:ChangeInputImage(String) (at C:\code\rtl-app\rtl-
app\Assets\RTLUI\RTLUIHack.cs:181)
```

```
RTLUIHack:SetAvatar(Texture, String) (at C:\code\rtl-app\rtl-  
app\Assets\RTLUI\RTLUIHack.cs:123)  
RTLUIHack:SetAvatar(String) (at C:\code\rtl-app\rtl-  
app\Assets\RTLUI\RTLUIHack.cs:167)  
OpenAvatarImage:OpenFileWindow() (at C:\code\rtl-app\rtl-  
app\Assets\RTLUI\OpenAvatarImage.cs:25)  
UnityEngine.Events.InvokableCall:Invoke(Object[]) (at  
C:\buildslave\unity\build\Runtime\Export\UnityEvent.cs:153)  
UnityEngine.Events.InvokableCallList:Invoke(Object[]) (at  
C:\buildslave\unity\build\Runtime\Export\UnityEvent.cs:634)  
UnityEngine.Events.UnityEventBase:Invoke(Object[]) (at  
C:\buildslave\unity\build\Runtime\Export\UnityEvent.cs:769)  
UnityEngine.Events.UnityEvent:Invoke() (at  
C:\buildslave\unity\build\Runtime\Export\UnityEvent_0.cs:53)  
UnityEngine.UI.Button:Press() (at  
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\UI\Core\Button.  
cs:35)  
UnityEngine.UI.Button:OnPointerClick(PointerEventData) (at  
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\UI\Core\Button.  
cs:44)  
UnityEngine.EventSystems.ExecuteEvents:Execute(IPointerClickHandler,  
BaseEventData) (at  
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Exe  
cuteEvents.cs:52)  
UnityEngine.EventSystems.ExecuteEvents:Execute(GameObject, BaseEventData,  
EventFunction`1) (at  
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Exe  
cuteEvents.cs:269)  
UnityEngine.EventSystems.StandaloneInputModule:ProcessMousePress(MouseButtonE  
ventData) (at  
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Inp  
utModules\StandaloneInputModule.cs:531)  
UnityEngine.EventSystems.StandaloneInputModule:ProcessMouseEvent(Int32) (at  
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Inp  
utModules\StandaloneInputModule.cs:430)  
UnityEngine.EventSystems.StandaloneInputModule:ProcessMouseEvent() (at  
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Inp  
utModules\StandaloneInputModule.cs:410)  
UnityEngine.EventSystems.StandaloneInputModule:Process() (at  
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Inp  
utModules\StandaloneInputModule.cs:184)  
UnityEngine.EventSystems.EventSystem:Update() (at  
C:\buildslave\unity\build\Extensions\guisystem\UnityEngine.UI\EventSystem\Eve  
ntSystem.cs:287)
```

(Filename: C:/code/rtl-app/rtl-app/Assets/RTLUI/RTLUIHack.cs Line: 181)

Selecting Avatar Cristobal

```
UnityEngine.DebugLogHandler:Internal_Log(LogType, String, Object)  
UnityEngine.DebugLogHandler:LogFormat(LogType, Object, String, Object[])  
UnityEngine.Logger:LogFormat(LogType, String, Object[])  
UnityEngine.Debug:LogFormat(String, Object[])  
RTLUIHack:ChangeInputImage(String) (at C:\code\rtl-app\rtl-  
app\Assets\RTLUI\RTLUIHack.cs:181)  
RTLUIHack:SelectAvatar(String) (at C:\code\rtl-app\rtl-  
app\Assets\RTLUI\RTLUIHack.cs:191)
```

```
<SetAvatar>c__AnonStorey0:<>m__0() (at C:\code\rtl-app\rtl-  
app\Assets\RTLUI\RTLUIHack.cs:153)  
ProgressBar:UpdateProgress() (at C:\code\rtl-app\rtl-  
app\Assets\RTLUI\ProgressBar.cs:107)  
ProgressBar:Update() (at C:\code\rtl-app\rtl-  
app\Assets\RTLUI\ProgressBar.cs:83)
```

(Filename: C:/code/rtl-app/rtl-app/Assets/RTLUI/RTLUIHack.cs Line: 181)

```
Textured (UnityEngine.UI.Toggle)  
UnityEngine.DebugLogHandler:Internal_Log(LogType, String, Object)  
UnityEngine.DebugLogHandler:LogFormat(LogType, Object, String, Object[])  
UnityEngine.Logger:Log(LogType, Object)  
UnityEngine.Debug:Log(Object)  
RTLUIHack:SelectAvatar(String) (at C:\code\rtl-app\rtl-  
app\Assets\RTLUI\RTLUIHack.cs:218)  
<SetAvatar>c__AnonStorey0:<>m__0() (at C:\code\rtl-app\rtl-  
app\Assets\RTLUI\RTLUIHack.cs:153)  
ProgressBar:UpdateProgress() (at C:\code\rtl-app\rtl-  
app\Assets\RTLUI\ProgressBar.cs:107)  
ProgressBar:Update() (at C:\code\rtl-app\rtl-  
app\Assets\RTLUI\ProgressBar.cs:83)
```

(Filename: C:/code/rtl-app/rtl-app/Assets/RTLUI/RTLUIHack.cs Line: 218)

```
Setting up 1 worker threads for Enlighten.  
Thread -> id: 1b8c8 -> priority: 1  
Waiting for finish
```



# PINSCREEN: CREATING PERFORMANCE-DRIVEN AVATARS IN SECONDS

Real-Time Live!

## Contact:

pinscreen.com

Pinscreen



With this fully automatic framework for creating a complete 3D avatar from a single unconstrained image, users can upload any photograph to build a high-quality head model within seconds. The model can be immediately animated via performance capture using a webcam. It digitizes the entire model using a textured-mesh representation for the head and volumetric strips for the hair. A simple web interface uploads any photograph, and a high-quality head model, including animation-friendly blend shapes and joint-based rigs, is reconstructed within seconds. Several animation examples are instantly generated for preview purposes, and the model can be loaded into Unity for immediate performance capture using a webcam.

The system integrates state-of-the-art advances in facial-shape modeling, appearance inference, and a new pipeline for single-view hair generation based on hairstyle retrieval from a massive database, followed by a strand-to-hair-strip conversion method.

Pinscreen-generated models are visually comparable to state-of-the-art game characters. With its scalable and instant asset generation, the method can significantly influence next-generation virtual film and game production, as well as VR applications, in which personalized avatars can be used for social interactions.

This live demonstration shows that compelling avatars and animations can be generated in very little time by anyone, with minimal effort.

Hao Li  
*University of Southern California*

Shunsuke Saito  
Lingyu Wei  
Iman Sadeghi  
Liwen Hu  
Jaewoo Seo

Koki Nagano  
Jens Fursund  
Yen-Chun Chen  
Stephen Chen  
*Pinscreen, Inc.*

Reviewer ID	Role	Submission	Title	QuestionNurr	Question	Answer	
45729	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	1	Innovative use of Real Time rendering (pushes the boundaries)		5
45729	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	2	Technical achievement within Real Time context		4
45729	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	3	Creativity/originality of submission		3
45729	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	4	Interest/Entertainment value for conference participants		4
45729	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	5	Production Values (appropriate to its context)	Impressive tech, and the capture of the facial geometry from a single image, plus rigging and real-time animation, is remarkable in that short amount of time.  Hair shape reproduction is a really good start and it doesn't seem production ready just yet. Blending some hair color on the scalp of the head texture would help ease the sharp delineation between hair and head. Further work on glints, texture variability, and alpha/softness would be critical for getting this up to par with state-of-the-art game characters.  Eyes would be another good place to improve - proper fitting in the sockets would do wonders for the overall visual quality.	2
45729	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	6	Public Comments	The character rendering and animation is impressive given the single source image, but it's not up to state-of-the-art yet. Still seems like an interesting real-time demo.	
45729	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	7	Private Comments	Live demonstration during the TED talk was kind of neat: <a href="https://youtu.be/RBytZIKSiSU?t=10m15s">https://youtu.be/RBytZIKSiSU?t=10m15s</a>	
45729	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	8	Overall Score		3.6
39557	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	1	Innovative use of Real Time rendering (pushes the boundaries)		4
39557	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	2	Technical achievement within Real Time context		4
39557	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	3	Creativity/originality of submission		4
39557	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	4	Interest/Entertainment value for conference participants		4
39557	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	5	Production Values (appropriate to its context)		4

39557	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	6	Public Comments	This is really interesting and has some fantastic potential use in social VR and beyond. This reminds me of some research coming out of Industrial Light & Magic where they were looking to drive automated facial rigs for their characters - this solution has seemingly made it generic and easy to use, which is exciting. It'd be great to hear more detail about the underlying technology involved with evaluating the images and how the rigs are generated based on the inputs.	
39557	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	7	Private Comments	Could be a lot of fun as a live demo for RTL - good entertainment value potential.	
39557	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	8	Overall Score		4
45728	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	1	Innovative use of Real Time rendering (pushes the boundaries)		2
45728	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	2	Technical achievement within Real Time context		5
45728	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	3	Creativity/originality of submission		3
45728	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	4	Interest/Entertainment value for conference participants		4
45728	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	5	Production Values (appropriate to its context)		4
45728	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	6	Public Comments	There's a lot of amazing tech going on here. Honestly the categories in which I can judge it don't really apply to this technology so it gets kinda low marks. The magic doesn't actually happen in real-time, but it does generate something that does. I dunno how to judge this!	
45728	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	7	Private Comments		
45728	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	8	Overall Score		3.6
27791	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	1	Innovative use of Real Time rendering (pushes the boundaries)		2
27791	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	2	Technical achievement within Real Time context		4
27791	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	3	Creativity/originality of submission		2
27791	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	4	Interest/Entertainment value for conference participants		3
27791	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	5	Production Values (appropriate to its context)		2
27791	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	6	Public Comments	Perhaps not the most technically advanced solution, but it did put a smile on my face :)	

27791	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	7 Private Comments	
27791	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	8 Overall Score	2.6
				Innovative use of Real Time rendering (pushes the boundaries)	2
23345	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	1 Technical achievement within Real Time context	2
23345	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	2 Creativity/originality of submission	2
23345	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	3 Interest/Entertainment value for conference participants	3
23345	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	4 Production Values (appropriate to its context)	3
					The presentation will provide an automatic capture and reconstruction of low-resolution and low-animation-/rigging quality avatars from a single image. That is actually quite an impressive achievement (especially since the rig is automatically created). However, the rendering elements are not that impressive. The authors also claim that they generate visually comparable models to state of the art video game characters, which is just outrageously wrong (take a look at any game shipping on PS4 currently). The capture and reconstruction technology is quite innovative and interesting.
23345	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	6 Public Comments	
					I'm not convinced this would be an exciting RTL presentation. Without a doubt, there is a ton of excellent research in the reconstruction tech, but the rest of the presentation is very bare-bones.
23345	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	7 Private Comments	
23345	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	8 Overall Score	2.4
				Innovative use of Real Time rendering (pushes the boundaries)	4
31519	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	1 Technical achievement within Real Time context	4
31519	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	2 Creativity/originality of submission	4
31519	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	3 Interest/Entertainment value for conference participants	4
31519	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	4 Production Values (appropriate to its context)	4
					Nice demonstration for picture to 3D model. Although the model is a bit crude, and the facial animation can be better, this submission should be encouraged considering the complexity of putting the system together. I hope by the time of presentation, the work can be more polished.
31519	primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	6 Public Comments	

31519 primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	7 Private Comments
31519 primary	realtime_0027	Pinscreen: Creating Performance-Driven Avatars in Seconds	8 Overall Score

**From:** [Iman Sadeghi](#)  
**To:** [Kristen Grace](#)  
**Subject:** Re: Question  
**Date:** Monday, December 9, 2019 2:36:42 PM

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Dear Kristen,

You are correct.

There were no connectivity issues at RTL and all presentations were supposed to be in Real-Time and Live.

In fact, SIGGRAPH RTL crew asked Pinscreen during the RTL Virtual Rehearsal, on July 7, 2017, if Pinscreen needed extra bandwidth or special equipment to ensure that the Real-Time presentations would be executed smoothly:

<https://docs.google.com/spreadsheets/d/14bMnCvs9NvIb3OLpOL4Jauf1XEQZxzOLXX6du7Wza74/edit#gid=0>

Pinscreen had no alternative code other than the <https://gitlab.com/pinscreen/rtl-app.git> for its avatar generation demo. If needed I can provide Skype messages in support of this.

Pinscreen intentionally misrepresented these manually prepared and pre-built avatars as autogenerated and in Real-Time. "Li revealed his intention to deceive the RTL audience, in writing, on July 20, 2017, when he proposed on 'PinscreenTeamAll' Skype thread that Pinscreen would 'give the people the feeling the avatar is not pre-built' and that 'we should give them a sense that it is computing.'" (See [FAC PP 179-183](#))

Would you be able to share if you have been able to interview Carrie Sun? And to inquire Li about Leszek's hair model (Haley\_017.obj) which was misrepresented as automatic in Pinscreen's RTL submission, on April 4, 2017?

Regards,  
-Iman

On Mon, Dec 9, 2019 at 1:05 PM Kristen Grace <[gracekri@usc.edu](mailto:gracekri@usc.edu)> wrote:

Thanks for the info. What I meant to ask relates to the claim that Pinscreen was pre-recording avatar creation in the event there were internet issues. The conference organizers indicated to him that it was acceptable to do IF there was a problem. This would mean that the full working code was available, but that code was not able to be implemented after running in real-time and having internet issues. At this point the decision would be made to use a cached version instead. If this were the case, the presenter should explain this to the audience. According to you, the presenter, and the Skype conversations, there were no attempts to run a working code at SIGGRAPH RTL, one that actually does what you presented, but could not run effectively due to connectivity issues.

I'm just trying to counter Li's argument that it is acceptable to present a non-realtime presentation based on problems with connectivity. That argument is moot if there was no test at SIGGRAPH for any connectivity problems. Either way, the presentation itself was misrepresented with no explanation to the audience. As presentation of a newly researched and developed computer science technology, that in-and-of itself is falsification and research misconduct. Verifying from you the presenter that the <https://gitlab.com/pinscreen/rtl-app.git> was the only code available at the time and the one you presented to the audience is a key piece of information. Also that you, as presenter, knew and admit that Pinscreen was knowingly misleading the audience (under Li's direction) by not informing them that the presentation was manually created and pre-recorded and not a RT demo, as was introduced by the moderator, Li and you at the time.

Kristen

On Dec 9, 2019, at 12:36 PM, Iman Sadeghi <[sadeghi@gmail.com](mailto:sadeghi@gmail.com)> wrote:

Dear Kristen,



There was no alternative code that would be able to actually autogenerate the avatars since Pinscreen did not have the capability:

- The actual autogenerated avatars would take around 90 seconds and would likely result in inaccurate hairstyles. (See [First Amended Complaint](#) Paragraphs 184-188)

The next step would be to request the code as it existed on <https://gitlab.com/pinscreen/rtl-app.git> branch master on each day from July 24, to Aug 1, 2017:

- The historical snapshots of the code from July 24, to Aug 1, 2017, which are available through Gitlab, would confirm that Carrie Sun manually and gradually improved the avatars and their hair models. (See [First Amended Complaint](#) Paragraphs 200-214)
- If Pinscreen could actually autogenerate these avatars, there would have been no need for Carrie Sun to manually create and gradually improve them.

Just to clarify your statement:

"As the presenter, it was obvious that there were no attempts by you to run a *non-cached* code, nor did you inform the audience that you were presenting an illustration of the technology." Did you mean to say ... there were no attempts by you to run a *cached* version of the presentation?

Regards,  
-Iman

On Mon, Dec 9, 2019 at 11:30 AM Kristen Grace <[gracekri@usc.edu](mailto:gracekri@usc.edu)> wrote:

Dear Dr. Sadeghi,

Thank you for getting back to me. We have done a full analysis of the code below, and it is as you described. Dr. Li's defense is the presentation was cached in the event of internet connectivity issues. This would indicate (as suggested by a conference coordinator) that if there were an issue in this regard that the presenter could present a pre-cached illustration or movie of the technology but also making it clear to alert the audience to this fact. As the presenter, it was obvious that there were no attempts by you to run a non-cached code, nor did you inform the audience that you were presenting an illustration of the technology.

While it is obvious from the Skype conversations that the caching of pre-constructed avatars and a false progress bar was premeditated, my question for you, as presenter, was there another code (besides the Gitlab code) that you had access to at that time that could successfully run in the event connectivity and band-width issues were no problem?

Thanks,

Kristen

---

**From:** Iman Sadeghi <[sadeghi@gmail.com](mailto:sadeghi@gmail.com)>  
**Date:** Monday, December 9, 2019 at 11:18 AM  
**To:** Kristen Grace <[gracekri@usc.edu](mailto:gracekri@usc.edu)>  
**Subject:** Re: Question

Dear Dr. Grace,

The main repository related to Pinscreen's RTL 2017 presentation was stored at:  
<https://gitlab.com/pinscreen/rtl-app.git>

The stored code corresponding to August 1, 2017 in this repository demonstrates that the webcam avatar generation was fake:

"No matter who uses this version of the application to generate their own avatar from a webcam—as Pinscreen demonstrated—the pre-built avatar of Sadeghi will be displayed every time." (See [Second Amended Complaint](#) Paragraph 93)

The commit history of this repository prior to August 1, 2017 demonstrates that all supposedly autogenerated avatars presented during the demo were manually prepared by Pinscreen employees including Carrie Sun.

If the code that you received does not match this description, then you have received an inauthentic code.

Gitlab's legal department would be able to confirm the authenticity of the code that you have received.

I am available to answer further questions via email or phone.

Regards,  
-Iman Sadeghi, PhD

On Fri, Dec 6, 2019 at 1:22 PM Kristen Grace <[gracekri@usc.edu](mailto:gracekri@usc.edu)> wrote:

Dear Dr. Sadeghi,

As USC finalizes one portion of its Investigation regarding the RTL 2017 presentation a question has arisen. I have gained access to the GitLab code that was utilized for the presentation and have had it fully analyzed. Was there any other code that was presented to the SIGGRAPH RTL committee or stored elsewhere to be made available for RTL 2017? Or a code stored elsewhere that would illustrate, at the time, that the ability to perform that which was presented at RTL 2017 was impossible at that time?

**Kristen Grace, M.D., Ph.D.**

*Research Integrity Officer*

*Office of Research*

**University of Southern California**

3720 S Flower Street, Suite 325

(213) 821 7297

[gracekri@usc.edu](mailto:gracekri@usc.edu)

**From:** Hao Li hao@pnscreen.com  
**Subject:** Re: SIGGRAPH Rea -T me L ve quest on  
**Date:** January 19, 2019 at 5:34 PM  
**To:** Hasegawa Isamu hase sam@square-en x.com  
**Cc:** jun.kato@a st.go.jp



On Jan 15, 2019, at 3:14 AM, Hasegawa Isamu <hase sam@square-en x.com> wrote:

H Hao,

Our reply as SIGGRAPH As a 2018 Rea -T me L ve! cha r and comm ttee are as fo ows:

Regard ng 1/A:

We(SA18 RTL comm ttee) supposed that w re ess network connect on that we prov ded dur ng SA18 m ght be unre ab e, and to d you that dur ng the on ne rehearsa .

Regard ng 2/A and 3/A:

I, as the SA18 RTL cha r, determ ned that t s va d for SA18 RTL presenters to prepare "cache" as a fa back p an, and to perform the r cache w th the r exp anat on n case of some troub es, s nce we(SA18 RTL comm ttee) a ready confirmed that each presenters technology s su tab e for SA18 RTL at the po nt of our curat on, and the unre ab ty of the W F s not presenter s fau t. In add t on, we have never requ red the cond t on "everyth ng must be Rea -T me" to presenters. Actua y some teams showed mov es to exp a n the r context.

Regard ng 4/A:

At east n SIGGRAPH As a 2018, Rea -T me L ve! does not necessar y present presenter s "research outputs" as s. And I, as the SA18 RTL cha r, judged that your presentat on dur ng SA18 RTL meets the requ rements of SA18 RTL.

If you have any further quest ons, p ease et us know.

Regards,

Isamu HASEGAWA  
SIGGRAPH As a 2018 Rea -T me L ve! Cha r  
SQUARE ENIX

On Jan 9, 2019, at 1:39 AM, Hao L <hao@pnscreen.com> wrote:

Dear Kato-San,

hope th ngs are we + Happy New year!  
BTW can you prov de the fo ow ng confirmat ons?

1/ A confirmat on that dur ng SIGGRAPH As a, there cou d be unre ab e w re ess connect on, hence t s recommended that SIGGRAPH Rea -T me L ve demos do not re y on w re ess.

2/ A confirmat on that dur ng our on ne rehearsa , I exp c ty asked you f we shou d cache our resu ts as a fa back, s nce we p anned to not used cach ng, but n case someth ng wou d go wrong t m ght be better, and you sa d "yes defin te y cache".

3/ A confirmat on, that you as a cha r for SIGGRAPH As a Rea -T me L ve, cach ng s okay to perform, s nce t s more a show than a research presentat on, and a so there wou d be no need of exp c ty d sc os ng f someth ng wou d have been cached.

4/ SIGGRAPH Rea -T me ve does not necessar y present "research outputs", but most y mpress ve nteract ve demos, more s m ar to a tradeshow.



# USC University of Southern California

OFFICE OF RESEARCH  
*Randolph W. Hall*  
Vice President of Research  
vpres@usc.edu

June 21, 2019

Dr. Hao Li  
Computer Science  
University Park Campus  
SAL 300 MC 0781

Dear Dr. Li,

As you are aware the University has conducted an inquiry into allegations of research misconduct against you and has determined that an investigation is warranted. According to the University Policy on Scientific Misconduct (see attached) the subject of an allegation has the duty to furnish data, records and other documents as requested by the university so that a thorough review can be completed. The destruction, absence of, or any failure to provide research records adequately documenting the questioned research at any point in the process is evidence of research misconduct where it is established by a preponderance of the evidence that the subject of an allegation intentionally, knowingly, or recklessly had research records and destroyed them, had the opportunity to maintain the records but did not do so, or maintained the records and failed to produce them in a timely manner, and that the subject's conduct constitutes a significant departure from accepted practices (Policy 4.1.4).

The Investigation Committee has requested access to your laptop and any other hard drives (e.g., group servers, on the cloud or elsewhere) where the program codes relevant to the allegations being reviewed (see attached) may be found. You may do so in person. All hard drives will be immediately copied and returned to you. Please provide the requested items and any other materials you think would be relevant to the Committee's investigation to the Office of the Vice President of Research by July 8. Non-compliance with this request will subject you to University Policy violations and appropriate disciplinary actions.

We appreciate your cooperation with this request.

Sincerely,

Randolph Hall, PhD  
Vice President, Research

CC: Dr. Kristen Grace, USC Research Integrity Officer

Hao Li, PhD, Assistant Professor of Engineering, is alleged of falsification and/or fabrication in two papers, an abstract submission and a live technology demonstration.

Specifically, Dr. Li is alleged to have:

1. Fabricated data in a paper submitted to SIGGRAPH 2017, a paper submitted to SIGGRAPH Asia 2017 and an abstract to SIGGRAPH Real-Time Live 2017 by representing manually prepared avatar hair shapes as being automatically generated;
2. Falsified data in a paper submitted to SIGGRAPH Asia 2017 by representing manually "fixed" avatar eye color, while the paper represented that eye color recognition was accomplished through technology he developed based on advances in deep learning;
3. Falsified data in an abstract to SIGGRAPH Real-Time Live 2017 by representing that he had developed a "fully automatic framework for creating a complete 3D avatar...to build a high-quality head model within seconds", when in-fact the technology took approximately a minute and a half to generate;
4. Falsified data in a SIGGRAPH Real-Time Live demonstration 2017 by claiming that the demonstration represented that the creation of an avatar using his technology was in real time and accomplished in a matter of seconds, when in fact the avatar creation was pre-loaded ("cached") on the computer. In addition it is alleged that Dr. Li instructed his team to manually modify the outputs actually being generated to improve the avatars' quality such that the output demonstrated was not an accurate representation of the output his technology generated.



July 30, 2013

# Scientific Misconduct

## 1. Purpose

USC faculty, staff and students are expected to conduct research in accordance with the highest ethical standards. The university does not tolerate misconduct in any aspect of research, and will promptly investigate all such allegations.

This document defines the behaviors that constitute research misconduct and describes the university's policies and procedures for investigating such allegations, including actions the university may take depending on the outcome. The policies and procedures in this document adhere to federal requirements of our research sponsors as well as the university's due process considerations.

## 2. Scope

This policy applies to all university faculty members (including part-time and visiting faculty), staff and other employees, (such as postdoctoral scholars) who propose, conduct, report, or review research on behalf of the university regardless of funding source.

In addition, USC subcontractors, collaborators, and other third parties are expected to comply with their respective policies and procedures for investigating scientific misconduct allegations. Such policies should comply with federal regulations and be consistent with USC's policy.

This policy does not address and specifically excludes fiscal improprieties, issues concerning the ethical treatment of human or animal subjects, authorship disputes, sexual harassment or discrimination, general matters not within the definition of scientific misconduct, and criminal matters.

## 3. Definitions

### 3.1 Research

Research includes all basic, applied, and demonstration research, including but not limited to all fields of science, medicine, engineering, mathematics and social sciences and encompassing research training, applications or proposals for support of research or research training regardless of whether an application or proposal resulted in a grant, contract, cooperative agreement, or other form of support, and related research activities.

### 3.2 Research Misconduct

Research misconduct is defined as fabrication, falsification, plagiarism in proposing, performing, or reviewing research, or in reporting research results. It does not include honest error or honest differences of opinion.

1. **Fabrication** is making up data or results and recording or reporting them.

2. **Falsification** is manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.
3. **Plagiarism** is the appropriation of another person's ideas, processes, results, or words without giving appropriate credit.

### **3.3 Research Record**

The Research Record is defined as the record of data or results that embodies the facts resulting from scientific inquiry, including, for example, laboratory records, research proposals, reports, abstracts, theses, oral presentations, journal articles, and any documents or materials provided to the university by the subject of the allegations in the course of a research misconduct proceeding.

The Research Record also includes all records secured in connection with a Preliminary Inquiry or Investigation; documentation of the determination of irrelevant or duplicate records not retained; the Preliminary Inquiry report and final documents produced in the course of preparing that report; and the Investigation report and all records (other than drafts of the report) in support of that report, including the recordings or transcriptions of interviews conducted in the course of an Investigation.

## **4. Process**

### **4.1 Receipt of an Allegation**

**4.1.1 Making an Allegation.** An individual with an allegation of research misconduct involving a USC faculty member, staff, or student employee may make an allegation orally or in writing, and must bring the allegation to either the **Vice President of Research** or the **University Compliance Officer**. The Vice President of Research will determine whether the allegation is sufficiently credible, specific, and falls within the scope of this policy. The Vice President of Research should ensure that he or she does not have an actual or potential personal, professional, or financial conflict of interest with the complainant, respondent, or witnesses. If the Vice President of Research determines that he or she does have such a conflict, he or she shall disclose such actual or potential conflicts to the Provost, who shall determine whether someone other than the Vice President of Research should assume the responsibilities assigned to the Vice President of Research under this policy.

The university will provide confidentiality, to the extent possible and allowed by law, to those who in good faith report apparent misconduct, to the subject of a research misconduct allegation(s), and to research subjects identifiable from research records or evidence, by limiting disclosure of their identities to those who need to know, consistent with a thorough, competent, objective, and fair research misconduct proceeding.

**4.1.2 Contents of Allegation.** An allegation of research misconduct must include a detailed description of the alleged misconduct, the individual(s) who is (are) the subject(s) of the allegation, as well as supporting evidence or documentation, if available. An allegation may be made orally or in writing.

**4.1.3 Pursuit of Allegations.** Inquiries and Investigations begun in response to an allegation will continue even if the subject of the allegation leaves the university before the process is completed. The university has the authority to obtain all relevant documentation, data and other

records in connection with the allegations of research misconduct, and to request that the appropriate department, unit or school sequester all such materials.

**4.1.4 Duty to Cooperate and Provide Evidence.** The subject(s) of an allegation has the duty to furnish data, records, and other documents as requested by the university so that a thorough review can be completed. The destruction, absence of, or any failure to provide research records adequately documenting the questioned research at any point in the process is evidence of research misconduct where it is established by a preponderance of the evidence that the subject(s) of an allegation intentionally, knowingly, or recklessly had research records and destroyed them, had the opportunity to maintain the records but did not do so, or maintained the records and failed to produce them in a timely manner, and that the subject's conduct constitutes a significant departure from accepted practices of the relevant research community.

## **4.2 Step 1—Preliminary Inquiry**

Should the Vice President of Research determine that an allegation falls within the scope of this policy and is sufficiently credible and specific so that potential evidence of research misconduct may be identified, he or she will refer the matter to the appropriate dean who has the responsibility to promptly initiate a Preliminary Inquiry (and appoint a Preliminary Inquiry Committee) into the allegation or other evidence of possible misconduct in scientific research. The purpose of the Preliminary Inquiry is to determine whether a formal investigation into the allegation is warranted.

The dean shall forward to the Provost the Preliminary Inquiry Committee's report, conclusions, and recommendations, any comments submitted by the complainant and/or subject of the allegations, the documentation of the Preliminary Inquiry, and the dean's comments on the Committee's recommendations. The Committee's report is only a recommendation to the Provost. The Provost will complete the Preliminary Inquiry by determining whether or not to affirm the recommendations of the Preliminary Inquiry Committee, or to take different action.

The procedures and conditions of a Preliminary Inquiry are described in Appendix 2.

## **4.3 Step 2—Investigation**

Should the Provost decide to proceed with an Investigation, the Vice President of Research will appoint a special committee to investigate the allegations. The purpose of the Investigation is the formal development of a record, and the examination of that record to determine whether to recommend a finding that research misconduct occurred.

A finding of research misconduct requires that:

1. There be a significant departure from accepted practices of the relevant research community for maintaining the integrity of the research record;
2. The misconduct be committed intentionally, knowingly, or recklessly; and
3. The allegation be proven by a preponderance of the evidence.

The Vice President of Research will forward the Investigation Committee's report to the Provost. The Committee's report is only a recommendation to the Provost. The Provost will complete the



Investigation by determining whether or not to affirm the recommendation(s) by the Investigation Committee, or to take different action.

If the Provost determines that research misconduct took place, he or she will require the investigator to notify any journals where the research was reported and request that any articles related to the research be retracted.

The procedures and conditions of an Investigation are described in Appendix 3.

#### **4.4 Step 3—Resolution**

Resolution of an Investigation by the Provost may involve a finding that either the allegation(s) of misconduct cannot be substantiated or further action is necessary, and that disciplinary action, up through and including formal proceedings for dismissal, should commence. The nature of the disciplinary action taken will take into account the seriousness of the misconduct, including but not limited to:

1. The degree to which the misconduct was knowing, intentional, or reckless;
2. Whether the misconduct was an isolated event or part of a pattern; and/or
3. If the misconduct had a significant impact on the research record, research subjects, other researchers, institutions, or the public welfare.

The nature of disciplinary actions taken will also depend on whether the subject of the allegation(s) is a faculty member, staff or other non-faculty employee, postdoctoral fellow, or student employee. The respective actions and formal proceedings for dismissal or application of other sanctions are described in Appendix 4.

If the Provost or President determines, following a Preliminary Inquiry, Investigation or Hearing, that there has been a failure to substantiate an allegation of research misconduct, the university will make appropriate and reasonable efforts to protect the reputations of the persons alleged to have engaged in the misconduct. Depending on the case, this may include communicating the university's findings to the complainant, respondent and any witnesses who are aware of the allegations.

In all cases, the university will undertake reasonable and appropriate efforts to seek to protect the positions and reputations of those persons who, in good faith, make allegations, submit evidence, or otherwise participate in the process. This may include communicating its determination that allegations were made in good faith to the complainant, respondent, and any witnesses who are aware of the findings. The university will also seek to appropriately discipline any member of the university community who retaliates against someone who makes allegations of research misconduct, gives evidence, or participates in the proceedings.

## **5. Reporting to Government**

### **5.1 Notification**

When the university receives an allegation of research misconduct that involves federally funded research (or an application for federal funding) the Provost will:

1. Upon completion of the Preliminary Inquiry through the Provost's action, notify the relevant federal agency (or agencies) in writing within the required time frames of the agency (or agencies), including but not limited to the Office of Research Integrity (ORI), if the allegation meets the definition of research misconduct above, and there is sufficient evidence to proceed to an Investigation.
2. Upon completion of the Investigation through the Provost's action, forward to the relevant agency (or agencies) a copy of the Investigation report and the university's action.
3. Upon completion of the adjudication phase through a Hearing and the President's or Provost's action, forward the university's decision and notify the agency (or agencies) of any corrective action taken or planned.

The Provost is also responsible for notifying the appropriate government agency (or agencies) within the agency's required time frames if he/she ascertains at any stage of the Preliminary Inquiry, Investigation, or Hearing that any of the following conditions exist:

1. There is an immediate public safety or health risk involved, including an immediate need to protect human or animal subjects;
2. There is an immediate need to protect Federal funds or equipment;
3. There is a need to suspend research activities;
4. There is a need for Federal action to protect the interests of those involved in the research misconduct proceeding;
5. It is probable that the alleged incident is going to be reported prematurely to the public, so that appropriate steps are needed to safeguard evidence and protect the rights of those involved;
6. The research community or public should be informed; or
7. There is a reasonable indication of possible violations of civil or criminal law.

## **5.2 Final Reporting**

The final report submitted by the Provost to the government shall address each of the items set forth in Appendix 3 of this Policy.

## **5.3 Additional Sanctions**

The relevant federal agency has the right under federal regulations to impose additional sanctions, beyond those applied by the institution, upon investigators or institutions, if it deems such action appropriate in situations involving funding from the agency.

## **Responsible office**

Office of Research  
[research.usc.edu/about/vp/](http://research.usc.edu/about/vp/)  
[vice.president.research@usc.edu](mailto:vice.president.research@usc.edu)  
(213) 740-6709

## Issued by

Elizabeth Garrett, Provost and Senior Vice President, Academic Affairs  
Todd R. Dickey, Senior Vice President, Administration  
University of Southern California

## Appendix 1: Web Resources

Additional resources regarding this subject include the following:

### USC Resources

- [USC Faculty Handbook](#)
- [SCampus](#)
- [Misappropriation of University Assets policy](#)
- [Office of Research](#)
- [Conflict of Interest in Research policy](#)
- [Office for Protection of Research Subjects](#)
- [USC Stevens Center for Innovation](#)

### Government Resources

- [Office of Research Integrity](#)
- [Office of Science and Technology Policy](#)
- [Public Health Service \(PHS Regulations Issued in 2005\)](#)
- [National Science Foundation \(scientific misconduct policy\)](#)

## Appendix 2: Procedures and Conditions of a Preliminary Inquiry of Research Misconduct

### A.2.1 Notification of External Funding Source.

Upon initiation of a Preliminary Inquiry, the Vice President of Research or his or her designee will determine whether there is any outside funding source(s) for the research that is the subject of the Preliminary Inquiry. The Vice President of Research will advise the Provost if it is necessary to notify the appropriate government agency as set forth in Section 5 of this policy.

### A.2.2 Discussion with Subject.

At the time of or before beginning the Preliminary Inquiry, the dean or his or her designee will make a good faith effort to notify the subject(s) in writing of the allegations against them. The dean or his or her designee will also make a good faith effort to meet with the subject(s) to discuss the university process for inquiring into and investigating the allegation(s). If the Preliminary Inquiry subsequently identifies additional subject(s) of allegation(s) of research misconduct, the dean shall, in the same manner as with the original subject(s) of allegation(s) of research misconduct, make a good faith effort to notify such additional subject(s) of the allegations against them. The dean or his or her designee will also make a good faith effort to meet with any such additional subject(s) and discuss the university process for inquiring into and



investigating the allegation(s). If needed, the dean should consult with the Vice President of Research for assistance.

### **A.2.3 Custody of the Research Record.**

On or before the date on which the subject is notified of the allegations or when the Preliminary Inquiry begins, whichever is earlier, the dean or his or her designee will promptly take all reasonable and practical steps to obtain custody of all research records and evidence needed to conduct the research misconduct proceeding, inventory the records and evidence, and sequester them in a secure manner, except that where the research records or evidence encompass scientific instruments shared by a number of users, custody may be limited to copies of the data or evidence on such instruments, so long as those copies are substantially equivalent to the evidentiary value of the instruments themselves. The dean or his or her designee will also take all reasonable and practical steps to take custody of additional research records or evidence discovered during the course of a research misconduct proceeding. If needed, the dean should consult with the Vice Provost for Research Advancement for assistance.

### **A.2.4 Preliminary Inquiry Committee Appointment.**

The dean will designate a faculty standing or ad hoc committee under the practices of that school with the appropriate expertise to conduct a Preliminary Inquiry into the allegations. If the subject of the allegation is a faculty member with tenure or whose contract or term of appointment has not yet expired, the faculty committee may include a faculty member from outside the school drawn from either the Faculty Rights and Responsibilities Committee or the University Committee on Faculty Tenure and Privileges Appeals, to the extent appropriate. The dean should consult with the Vice President of Research for assistance. The dean shall take reasonable steps to confirm that neither he or she nor the members of the Preliminary Inquiry Committee have an actual or potential personal, professional, or financial conflict of interest with the complainant, respondent, or witnesses. The members of the Preliminary Inquiry Committee will be reminded of the importance of strict confidentiality during the Preliminary Inquiry and the right to privacy for those under investigation. As necessary, the Preliminary Inquiry Committee may also rely on the opinion of third party subject matter experts to assist in its assessment.

### **A.2.5 Preliminary Inquiry Process.**

The purpose of the Preliminary Inquiry is to gather relevant information to determine if the allegations appear to have substance and if an Investigation is warranted. An Investigation is warranted if there is a reasonable basis for concluding that the allegation falls within the definition of research misconduct, and preliminary information-gathering and fact-finding from the Preliminary Inquiry indicates that the allegation may have substance. A Preliminary Inquiry does not require a full review of all the evidence related to an allegation.

Any individuals with information relevant to the Preliminary Inquiry, including the individual(s) who raised the concern and the subject of the allegations, should be interviewed if possible. Witnesses should be reminded of the importance of strict confidentiality during the Preliminary Inquiry and the right to privacy for those under investigation.

The Vice President of Research, the Office of General Counsel and the Office of Compliance are available to provide administrative and legal support to the faculty committee conducting the Preliminary Inquiry. The Vice Provost for Faculty Affairs and the President of the Academic Senate also are available resources if faculty members are involved. The Preliminary Inquiry Committee may also elicit the opinion of their party subject matter experts to assist in its assessment.

### **A.2.6 Rights of the Subject.**

The Preliminary Inquiry Committee should inform the subject of the allegation of the content of the allegations and should provide the subject with an opportunity to comment on the allegations. The Preliminary Inquiry Committee should also assure the subject(s) of an allegation that their rights are protected and that an allegation in itself will not be the basis for disciplinary action.

In the event that the subject of the allegation is a faculty member with tenure or whose term of appointment or contract has not yet expired, the chair of the Academic Senate Committee on Faculty Rights and Responsibilities is available to the dean and faculty member for consultation. In the event that the accused is a student employee, the dean shall notify the Vice President for Student Affairs or his or her designee of the allegation.

### **A.2.7 Preliminary Inquiry Report.**

The Preliminary Inquiry Committee shall prepare a written report to the dean that includes the following information:

- The name and position of the subject of the complaint;
- A description of the allegations of research misconduct;
- A description of the federal support (if any), including, for example, grant numbers, grant applications, contracts, and publications listing federal support;
- A summary of what evidence was reviewed;
- A summary of information obtained from relevant interviews; and
- The recommendations of the Preliminary Inquiry committee and the basis for them.

The Preliminary Inquiry report should include sufficiently detailed documentation to permit a later assessment, if necessary, of the reasons for determining that an Investigation was or was not warranted. The Preliminary Inquiry Committee may also consider whether the allegations were made in good faith and may include its recommended findings on that issue in the Preliminary Inquiry report.

After receiving a copy of the Preliminary Inquiry Report, the dean must make a good faith attempt to notify the subject in writing of the findings of the Preliminary Inquiry Committee, and must include a copy of its Preliminary Inquiry report with any such notice. The dean must provide an opportunity for the subject to submit written comments on the Preliminary Inquiry report and attach any comments received to it. The dean also may notify the complainant who made the allegation of the findings of the Preliminary Inquiry, and may provide relevant portions

of the Preliminary Inquiry report to the complainant for comment. Any comments on the report by the complainant should be included in the Preliminary Inquiry report.

### **A.2.8 Completion of the Preliminary Inquiry.**

The Preliminary Inquiry should be completed within 60 days (or within the time frames established by the relevant federal agency), including conducting the Preliminary Inquiry, preparing a report of findings, and obtaining comments. If the Committee determines that it will not be able to complete the Preliminary Inquiry within the applicable time frames, the Committee must notify the dean as soon as possible and request a reasonable extension. If the dean grants an extension, the Preliminary Inquiry record must document the reasons for exceeding the applicable time frames. If federal funds are involved, the Provost may be required to seek an extension from the relevant federal agency.

Within 30 days of any finding that an Investigation is warranted, the Provost will provide ORI with the written finding and a copy of its Preliminary Inquiry report if the possible research misconduct relates to federally supported research.

The Office of the Provost shall secure the research record of the Preliminary Inquiry for a period of at least seven years after termination of the Preliminary Inquiry, including sufficiently detailed documentation of inquiries where the university decides not to conduct an investigation, and upon request, provide them to ORI or other authorized HHS personnel.

## **Appendix 3: Procedures and Conditions of an Investigation of Research Misconduct**

### **A.3.1 Investigation Committee.**

The Investigation Committee shall be appointed by the Vice President of Research and consist of no fewer than three individuals with appropriate expertise to investigate the allegations. No more than one person from the Preliminary Inquiry Committee can serve on the Investigation Committee. If the subject of the allegation is a faculty member, the Vice President of Research will consult with the President of the Academic Senate regarding the membership of the committee. The Vice President of Research shall take reasonable steps to confirm that neither he or she nor the members of the Investigation Committee have an actual or potential personal, professional, or financial conflict of interest with the complainant, respondent, or witnesses, and that the Investigation Committee has an appropriate level of scientific expertise to competently analyze the allegations. The members of the Investigation Committee will be reminded of the importance of strict confidentiality during the Investigation and the right to privacy for those under Investigation.

### **A.3.2 Process for Investigation.**

The Investigation should begin within 30 calendar days following completion of the Preliminary Inquiry, and should examine all available relevant documentation, including but not necessarily limited to research data and proposals, publications, correspondence, and memoranda of telephone calls.



To the extent it has not been done at the allegation or Preliminary Inquiry stages, the Investigation Committee shall take all reasonable and practical steps to obtain custody of all the research records and evidence needed to conduct the research misconduct proceeding, inventory the records and evidence, and sequester them in a secure manner, except that where the research records or evidence encompass scientific instruments shared by a number of users, custody may be limited to copies of the data or evidence on such instruments, so long as those copies are substantially equivalent to the evidentiary value of the instruments themselves. Whenever possible, the Investigation Committee must take custody of the records either before or at the time the university notifies the subject of the allegations, or whenever additional items become known or relevant to the Investigation.

The Committee should interview any individuals who have been reasonably identified as having information regarding any relevant aspects of the Investigation, including both the individual(s) who raised the allegation(s) and the subject of the allegations, if possible. Witnesses should be reminded of the importance of strict confidentiality during the Investigation and the right to privacy for those under Investigation.

For investigations involving HHS-supported research, each interview conducted should be recorded or transcribed. Each such recording or transcription should be provided to the interviewee for correction, and included in the record of the Investigation. The Committee is expected to pursue Investigations diligently, and carry its Investigations through to completion. It is important that the Investigation Committee consider whether the allegations were made in good faith.

The Vice President of Research, the Office of General Counsel and the Office of Compliance are available to provide administrative and legal support to the Investigation Committee. The Vice Provost for Faculty Affairs and the President of the Academic Senate also are available resources if faculty members are involved. The Investigation Committee may also elicit the opinion of third party subject matter experts to assist in its assessment.

### **A.3.3 Rights of the Subject of the Allegation and Complainant.**

Within a reasonable amount of time after determining that an Investigation is warranted, but before the Investigation begins, the Vice President of Research, or his or her designee, shall notify the subject in writing of the allegations against him or her.

The Committee must also give the subject of the allegations written notice of any new allegations of research misconduct within a reasonable amount of time of deciding to pursue allegations not addressed during the Preliminary Inquiry or in the initial notice of Investigation.

During the course of the Investigation, the Committee shall provide the subject(s) with an opportunity to address the Committee. The Committee shall also provide the subject(s) with either copies of, or supervised access to, the data and other evidence supporting the allegation, as well as an opportunity to respond to the allegation and supporting evidence. In addition, the Committee shall make its entire report available for comment by the subject(s) of the allegation prior to its final submission to the Provost. Any comments by the subject(s) must be submitted within 30 days of the date on which the subject(s) received the draft Investigation report. The Investigation Committee will consider and address the comments before issuing its final report.

The person(s) who raised the allegation may be provided with those portions of the report that address their role and opinions in the Investigation, and given the opportunity to submit comments. If a draft copy of the report is provided to the complainant, the comments of the complainant, if any, must be submitted within 30 days of the date on which the complainant received the draft investigation report or relevant portions of it.

### **A.3.4 Investigatory Report.**

The Investigation Committee shall prepare a written report of its recommended findings for the Provost. If the Investigation Committee decides to recommend a finding of misconduct, it should also make recommendations concerning:

- The seriousness of the misconduct, including (but not limited to) consideration of the degree to which the misconduct was knowing, intentional or reckless;
- Whether it was an isolated event or part of a pattern; or
- Whether it had significant impact on the research record, research subjects, other researchers, institutions, or the public welfare.

The final report shall:

- Describe the nature of the allegations of misconduct, as well as the specific allegations of misconduct that were considered in the investigation;
- Describe and document any federal support for the research at issue, including, for example, any grant numbers, grant applications, contracts, and publications listing federal support;
- To the extent not provided with the Preliminary Inquiry report, include the institutional policies and procedures under which the Investigation was conducted;
- Identify and summarize the research records and evidence reviewed, and identify any evidence taken into custody but not reviewed;
- For each separate allegation of research misconduct identified during the Investigation, provide a finding as to whether research misconduct did or did not occur, and if so:
  - Identify whether research misconduct was falsification, fabrication, or plagiarism, and if it was intentional, knowing, or in reckless disregard;
  - Summarize the facts and the analysis which support the conclusion and consider the merits of any reasonable explanation by the respondent;
  - Identify the specific federal support, if any;
  - Identify whether any publications need correction or retraction;
  - Identify the person(s) responsible for the misconduct; and
  - List any current support or known applications or proposals for support that the respondent has pending;
- Include and consider any comments made by the respondent and complainant on the draft Investigation report.

The Investigation Committee may also consider whether the allegations were made in good faith and may include its recommended findings on that issue in its report.

### **A.3.5 Completion of Investigation.**

Completion of the Investigation includes conducting the Investigation, preparing the report of findings, obtaining comments, and sending the final Investigation report to ORI if the possible research misconduct relates to federally supported research. If the Committee determines that it will not be able to complete the Investigation in 120 calendar days of its initiation or within the relevant federal agency's time frame if federal funding is involved, the Investigation Committee must notify the Provost as soon as possible and request a reasonable extension.

When federal funding is involved, and the Provost deems an extension necessary, he/she will submit:

- A written request to the relevant federal agency (or agencies) for an extension as appropriate;
- An explanation for the delay; and
- An estimate for the date of completion of the report and other necessary steps.

The Provost will notify ORI in advance if he or she plans to close a case at the Preliminary Inquiry or Investigation stage on the basis that the subject of the allegations has admitted guilt, a settlement with the subject has been reached, or for any other reason, except the closing of a case at the Preliminary Inquiry stage on the basis that an Investigation is not warranted or a finding of no misconduct at the Investigation stage. As to findings of no misconduct at the Investigation stage, the university will notify ORI within the required time frame after making such a finding.

The Office of the Provost shall secure the records of the Investigation for a period of at least seven years after termination of the Investigation.

## **Appendix 4: Formal Actions and Proceedings for Employee Scientific Misconduct**

### **A.4.1 Faculty.**

In the case of a faculty member with tenure or whose contract or appointment has not expired, if the Provost determines that formal proceedings for dismissal should commence, the Provost will make a formal statement of charges and a Hearing by the University Committee on Faculty Tenure and Privileges Appeals will be held as provided in the Faculty Handbook. The burden of proof on dismissal shall be as stated in the Faculty Handbook. If the Provost determines that discipline short of dismissal should be imposed, the subject of the allegation may obtain a review through the grievance procedures of the University Committee on Faculty Tenure and Privileges Appeals under Section 7 of the Faculty Handbook. All reports of the University Committee on Faculty Tenure and Privileges Appeals are recommendations to the President of the university. The President shall retain ultimate decision-making authority and the discretion to accept or reject panel recommendations.



#### **A.4.2 Staff or Other Non-Faculty Employee.**

In the case of a staff member or other non-faculty employee (e.g., postdoctoral research associate) whom the Provost finds following the Investigation to have committed research misconduct, the Provost will refer the findings to the Associate Senior Vice President for Human Resources who will prescribe the remedial or disciplinary action, up to and including termination, and will notify both the department and the non-faculty employee of the prescribed action. Departments are required to implement the remedial or disciplinary action prescribed by the Associate Senior Vice President of Human Resources. A non-faculty employee may file a written appeal with the Senior Vice President for Administration within ten business days of his or her receipt of notice of the disciplinary action. The Senior Vice President for Administration must respond to the employee's appeal within 20 business days.

#### **A.4.3 Postdoctoral Fellow.**

In the case of a postdoctoral fellow who the Provost finds following the Investigation to have committed research misconduct, the Provost will take appropriate disciplinary action, up to and including termination of the postdoctoral appointment. Alternatively, the Provost, at his or her discretion, can refer the matter to the dean for a determination regarding the appropriate disciplinary action.

#### **A.4.4 Students.**

In the event the Provost finds, following the Investigation, that a graduate, professional or other student employee to whom this policy applies has committed research misconduct, the matter shall be referred to the Office of Student Conduct for resolution pursuant to the procedures identified in SCampus. Alternatively, in the case of a graduate or professional student employee, the Provost, at his or her discretion, can refer the matter to the dean for a determination regarding the appropriate disciplinary action.

**From:** [Kristen Grace](#)  
**To:** [Hao Li](#)  
**Cc:** [Randolph W. Hall](#); [Marty Levine](#); [Rob Groome](#); [Alan Hong](#)  
**Subject:** USC Mac Book Pro  
**Date:** Tuesday, July 2, 2019 11:25:43 AM

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Dear Dr. Li,

It has come to my attention that the laptop you dropped off to ITS last week was not, in fact, your ICT machine. We need you to drop off your university MacBook Pro with ICT tag "T06270" and serial of C02SXE11GTF1 to ITS tomorrow morning. Please let me know what time you will be arriving and I will have Alan available to collect and fill out the chain of evidence form.


Sincerely,  
Kristen Grace

**Kristen Grace, M.D., Ph.D.**  
*Research Integrity Officer*  
*Office of Research*

**University of Southern California**  
3720 S Flower Street, Suite 325  
(213) 821 7297  
gracekri@usc.edu

**Michael J. DeNiro**  
**Lawyer in Private Practice**  
**Emeritus Professor of Stable Isotopy, University of California**

April 6, 2020

To: Research Integrity Officer Kristen Grace  
From: Michael J. DeNiro, Hao Li's lawyer   
Re: Response of Associate Prof. Hao Li to the Draft Research Misconduct  
Investigation Report you provided on 3/6/2020

We present the response of Associate Professor Hao Li to the Draft Research Misconduct Investigation Report ("Draft Report") that Prof. Li received from you on 3/6/2020.

#### **EXECUTIVE SUMMARY**

In **Part I**, we raise for the third time the ethical and policy obligation the Investigation Committee ("IC") breached by failing to recuse itself before producing the Draft Report because one of its members, Prof. Nenad Medvidovic, had an undisclosed actual or potential conflict of interest with the forensic firm Quandary Peak Research, which provided key analytical evidence to the IC. This undisclosed conflict of interest is in direct violation of Section ("§") A.3.1 of the USC Scientific Misconduct Policy ("SMP"). Although USC has agreed to have the analysis tainted by conflict of interest re-done by a third party firm with no ties to Prof. Medvidovic, this does not go far enough to resolve the conflict, as Prof. Medvidovic remains on the IC despite his failure to recuse himself.

**Part II** discusses additional material violations of the SMP by the Office of Research in the course of its investigation, and/or by the Investigation Committee in drafting its report. **First**, the duration of this investigation (which is not complete) has more than tripled the 120-day time period required under SMP § A.3.5, without any evidence that an extension was requested and approved as required. **Second**, the Office of Research failed to provide Prof. Li with any of the newly acquired evidence (including Attachments 9-11 and 14 to its Draft Report) during the course of the investigation, depriving him of the opportunity to respond, as required under SMP § A.3.3. **Third**, the IC has improperly rendered an opinion o **REDACTED**

**Michael J. DeNiro**  
**POB 3602**  
**Santa Barbara CA 93130**

**Telephone: (805) 845-8223**  
**Email: mjdeniro@cox.net**

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**Michael J. DeNiro**  
**Lawyer in Private Practice**  
**Emeritus Professor of Stable Isotopy, University of California**

REDACTED<sup>3</sup>. *Fourth*, the IC has improperly and prejudicially issued its Draft Report (mis-labeled Final Report) while the investigation remains ongoing as to two of the four allegations, in violation of SMP § A.3.4, which requires that the Final Report include “a finding to wither research conduct did or did not occur” as to “each separate allegation . . . identified during the investigation.”

**Part III** discusses a further material shortcoming of the IC and Office of Research in failing to meaningfully investigate or seek corroboration of any of the charges against Prof. Li; instead the IC blindly relied almost exclusively on Dr. Iman Sadeghi, the plaintiff in an ongoing litigation against Prof. Li and his startup Pinscreen (that is going very badly for Dr. Sadeghi), and purposefully ignoring contrary evidence submitted by and on behalf of Prof. Li. The failure to account for Dr. Sadeghi’s motives, his own participation in the alleged conduct of which he now complains, or the negative views of Dr. Sadeghi’s integrity and credibility held by executives of SIGGRAPH, and other leading figures in computer graphics, undermines the duty to consider whether the allegations were made in “good faith” and “sufficiently credible,” as required under SMP § A.3.4 and § 4.2 Step 1, respectively.

**Part IV** responds directly to the allegations against Prof. Li and the erroneous conclusions drawn by the IC.<sup>1</sup> *First*, the Committee concludes contrary to the evidence that Pinscreen’s 4/4/2017 abstract should have reflected the state of Pinscreen’s technology at the time of the *submission* rather than at the time of the *presentation*, four months later. It compounds this error by relying on the wording in SIGGRAPH’s RTL marketing materials of July 2017 rather than Pinscreen’s actual submission of 4/4/2017 that explicitly refers to the technology as a “**Proposed System.**” It also ignores corroborating statements that RTL submissions are not “research papers” and that the submissions may describe a proof of concept rather than current capabilities, which is precisely what Pinscreen’s submission was.

*Second*, the Committee erroneously concludes the SMP even applies to an entertainment-oriented spectacle such as Real Time Live, despite multiple testimonials – including by a Professor at UT Austin – that RTL is in no way held out to be a scientific venue (otherwise, SIGGRAPH would not be freely offering to “enhance” presentations). Further, even if the SMP did apply to RTL shows (which it does not), the Committee improperly concludes (including by relying on Quandary’s report tainted by conflict of interest) that presenting a “cached” avatar during Pinscreen’s RTL performance constituted research misconduct. In so doing, the Committee ignores evidence that there is no requirement to announce cached images

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<sup>1</sup> However, since the forensic Quandary Peak Research report (Attachment 11 to the Draft Report) will be supplemented by a new report by a second research lab, we do not respond to the Quandary report or to conclusions drawn therefrom but expect that we will have an opportunity do so at such time that the new report is rendered.

**Michael J. DeNiro**  
**Lawyer in Private Practice**  
**Emeritus Professor of Stable Isotopy, University of California**

as such (and that no one at the show would be misled), and that the likelihood of internet connectivity issues was understood to be a sufficient reason to permit caching,

**Third**, as to both the abstract and the RTL presentation, the Committee improperly concludes that Pinscreen did not have the capability to quickly produce avatars from a single image as of August 2017, despite Prof. Li having submitted evidence (which the IC misinterprets) to the contrary.

For these reasons, the investigation should either be dismissed, the draft report withdrawn, or the report amended to determine that the evidence does not support a finding that Prof. Li engaged in scientific misconduct.

## **RESPONSE TO THE DRAFT RESEARCH MISCONDUCT INVESTIGATION REPORT**

### **I. The Investigation Committee Must Recuse Itself Because One of Its Members Had an Undisclosed Actual or Potential Conflict of Interest in Violation of Section A.3.1 of the Scientific Misconduct Policy.**

USC *Scientific Misconduct Policy* (<https://policy.usc.edu/scientific-misconduct/>) at § A.3.1. requires “[t]he Vice President of Research take reasonable steps to confirm that neither he or she nor the members of the Investigation Committee have an actual or potential personal, professional, or financial conflict of interest with the complainant, respondent, *or witnesses*, ...” (Emphasis added.)

Investigation Committee member Nenad Medvidovic had an actual or potential personal and/or professional conflict of interest with a *witness for the Committee*. The author of the Quandary Peak Research Consulting Report (“Attachment 11” to the Draft Report) is George Edwards, Ph.D. George Edwards was Investigation Committee member Medvidovic’s Ph.D. student, per the first page of Dr. Medvidovic’s Wikipedia entry as of 4/4/2020 ([https://en.wikipedia.org/wiki/Nenad\\_Medvidovi%C4%87](https://en.wikipedia.org/wiki/Nenad_Medvidovi%C4%87)), which lists on the first page George Edwards as a Ph.D. student of Dr. Medvidovic.

The Vice President of Research (Former Vice President of Research Randolph Hall) did not take reasonable steps to confirm that one of the members of the Investigation Committee does not have an actual or potential personal and/or professional conflict of interest with a witness.

In response to my protesting to Research Integrity Officer Kristen Grace Investigation Committee member Medvidovic’s actual or potential conflict of interest, The Office of

**Michael J. DeNiro**  
**Lawyer in Private Practice**  
**Emeritus Professor of Stable Isotopy, University of California**

Research decided not to honor my request that it dismiss the Investigation Committee and appoint another Investigation Committee with no undisclosed actual or potential conflict of interest.

The Office of Research did, however, admit the existence of an undisclosed conflict of interest, deciding:

to demonstrate the Office of Research's commitment to the integrity of the process, the University will immediately engage a different third-party consulting firm to carry out the analysis that had initially been completed by Quandary.

Pending the completion of this analysis, the Committee's recommended findings stand as stated in the Draft Investigation Report. Therefore Prof. Li should respond to the committee's report within the 30-day period.

In the event that the new third-party analysis leads the committee to revise its report, Prof. Li would be given a new opportunity to respond to the revised report. If the new analysis does not lead to any revision, there will not be an additional opportunity for Prof. Li to respond.

(See Att. S at p. 4 of the .pdf file.) [Note the Attachments referred to herein ("Att." or plural "Atts.") are in a .pdf portfolio "Attachments A-S re Prof. Li's Response to Draft Report (4.6.2020)" attached to the email to which this document was also attached.)

I pointed out to USC Associate General Counsel Dawn Kennedy, who answered my request to Research Integrity Officer Grace, that the Office of Research decision that "Prof. Li should respond to the committee's report within the 30-day period"

falls short of a fair resolution of what is a serious violation of the USC *Scientific Misconduct Policy* by USC itself.

It is impossible, for example, that a different third-party consulting firm could reach the same conclusion as Quandary Research Consulting did, at any but the most superficial level. Look at the fine-grain analysis in Attachment 11. It is unfair for Prof. Li to have to respond to the fine-grain analysis of the Quandary Research Consulting report when it is a given that the



**Michael J. DeNiro**  
**Lawyer in Private Practice**  
**Emeritus Professor of Stable Isotopy, University of California**

fine-grain analysis of a different third-party consulting firm will differ substantially in the details.

(See Att. S at p. 2 of the .pdf file.)

Thus, even if the Investigation Committee does not recuse itself, it will have to re-do the Draft Report *de novo* if and inevitably when the third-party consulting firm report differs substantially from the Quandary Peak Research Consulting Report.

The Investigation Committee should do what the Office of Research refused to require it to do, and recuse itself because one of its members had an undisclosed actual or potential conflict of interest in violation of Section A.3.1 of the SMP.

## **II. The Office of Research Flouted the *Scientific Misconduct Policy “Procedures and Conditions of an Investigation of Research Misconduct”* in Myriad Substantive Ways that Prejudiced Prof. Li.**

As we have already pointed out, the Investigation Committee and others at USC are abusing their authority by authorizing a conflict of interest between a member of the Investigation Committee and the supposedly “outside, independent consulting firm” that was paid to produce “Attachment 11” to the Draft Report, that Attachment authored by a Ph.D. student of a member of the Investigation Committee. But this is not the only abuse in a process rife with violations of the *Scientific Misconduct Policy*.

**First**, the *Scientific Misconduct Policy* states the following:

If the Committee determines that it will not be able to complete the Investigation ***in 120 calendar days of its initiation*** or within the relevant federal agency’s time frame<sup>2</sup> if federal funding is involved, ***the Investigation Committee must notify the Provost as soon as possible and request a reasonable extension.***

(SMP § A.3.5) (Emphasis added.)

Here, the Draft Report was circulated on 3/6/2020, which is at least **374 calendar days** after the Investigation Committee was charged on or before 2/26/2019. As to the two allegations

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<sup>2</sup> With respect to grant funding from the Office of Naval Research, the most recent R&D General Terms and Conditions (available at <https://www.onr.navy.mil/-/media/Files/Contracts-Grants/docs/DoD-Research-General-Terms-and-Conditions-July-2018.ashx?la=en>) refer to the Federal Research Misconduct Policy (available at <https://ori.hhs.gov/federal-research-misconduct-policy> and <https://ori.hhs.gov/federal-research-misconduct-policy>), which in turn generally defer to the time limits of the particular institution.

**Michael J. DeNiro**

**Lawyer in Private Practice**

**Emeritus Professor of Stable Isotopy, University of California**

that continue to be researched, **404 calendar days** will have elapsed by the date Prof. Li is providing this response, with no end in sight. Absent one or more timely extension requests – of which Prof. Li was never informed and which were not included with or referenced in the Draft Report – the Investigation has proceeded at least 254 days longer than permitted under the *Scientific Misconduct Policy*. Be on notice that the extension request under the *Scientific Misconduct Policy* is not optional.

Moreover, there is no evidence that the Provost ever submitted “a written request to the relevant federal agency . . . for an extension,” “an explanation for the delay,” and “an estimate for the date of completion,” all required under SMP § A.3.5. Prof. Li is entitled to proof that extensions were requested and granted in accordance with the policy and, if they were not requested and granted, the Investigation must be terminated and the allegations dismissed.

**Second**, the *Scientific Misconduct Policy* provides:

***During the course of the Investigation***, the Committee shall provide the subject(s) with an opportunity to address the Committee” and “shall also provide the subject(s) with either ***copies of, or supervised access to, the data and other evidence supporting the allegation, as well as an opportunity to respond*** to the allegation and supporting evidence.”

(SMP§ A.3.3.) (Emphasis added.)

Here, however, much of the evidence relied upon was never disclosed to Prof. Li – particularly the aforementioned Quandary Peak Research Report dated 11/21/2019 (Attachment 11); the Information Security Summaries dated 7/8/2019 and 7/29/2019 (Attachments 9 & 10); and the email chain between Dr. Grace and Dr. Sadeghi dated 12/9/2019 (Attachment 14) – until RIO Grace provided him access to them on March 6, 2020. The “opportunity to respond” to this data should have been provided during the Investigation process, not once the investigation had already been completed and the Investigation Committee already having decided that Prof. Li committed research misconduct.

This critical failure is a subversion of the investigatory process and deprived Prof. Li of the ability to respond to these erroneous findings, and conclusions based on them, *before* the IC rendered its determination.

**Third**, the *Scientific Misconduct Policy* provides:

The Committee must also give the subject of the allegations ***written notice of any new allegations of research misconduct*** within a reasonable amount of time of ***deciding to pursue***

**Michael J. DeNiro**  
**Lawyer in Private Practice**  
**Emeritus Professor of Stable Isotopy, University of California**

*allegations not addressed during the Preliminary Inquiry* or in  
the initial notice of Investigation.

(SMP § A.3.3.) (Emphasis added.)

Here, the Investigation Committee, after rendering its findings, suddenly switched gears and rendered a conclusion on a subject that was not even part of the Inquiry or Notice: REDACTED

(Draft Report at p. 13.)

REDACTED

The Draft Report contends that Prof. Li REDACTED

outside the scope of this Investigation, REDACTED

**Fourth**, it is unfair and prejudicial to require a response to an incomplete Investigation, in which only two of the four allegations have been investigated. (The Investigation Committee states “This interim report of the committee refers only to allegations 3 and 4. The committee continues to review allegations 1 and 2.” at p. 3 of the Draft Report.) However, SMP § A.3.4 requires that the “final report” include “a finding to whether research conduct did or did not occur” as to “each separate allegation . . . identified during the investigation.” What Prof. Li

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<sup>3</sup> Note that the University conducted a separate REDACTED

**Michael J. DeNiro**  
**Lawyer in Private Practice**  
**Emeritus Professor of Stable Isotopy, University of California**

was forwarded on 3/6/2020 is thus best described as an “interim report,” which is a stark deviation from the actual requirements of the SMP. The reasonable resolution of this issue would either be that Prof. Li’s response deadline be delayed until all four allegations are investigated (assuming that the IC itself has requested the proper extensions), or that the 1st and 2nd allegations be dismissed outright. As it stands, the implication is that Prof. Li will be expected to expend his time and resources to respond at least one if not two additional times, when the Investigation Committee deems it has completed another portion of its task. This is in no way contemplated by the SMP itself nor does due process contemplate such a result.

**III. The Committee Improperly Relies, Often Exclusively, on the Statements of Dr. Sadeghi, Including Those in His Stricken First Amended Complaint, Even Though Dr. Sadeghi Has a Substantial Motive to Present Only Selected Facts or to Not Tell the Truth..**

Section A.3.4 of the SMP authorizes the IC to “consider whether the allegations were made in good faith.” Although this is (surprisingly) not an affirmative obligation, the thrust of any investigation must be to evaluate any potential motivations behind the complaint and to render a credibility determination regarding the complainant himself or herself (see, e.g., SMP § 4.1 (allegation must be “sufficiently credible”). This was not done here.

As you know, on 6/11/2018, a month before Dr. Sadeghi came to USC, he had filed a 160-page lawsuit entitled *Dr. Iman Sadeghi v. Pinscreen, Inc. and Dr. Hao Li*. On 10/5/2018, after Defendants’ counsel informed Dr. Sadeghi’s attorneys of the numerous defects in his Complaint, he filed a 274-page First Amended Complaint (the FAC, erroneously referred to in the Draft Report as the “Second Amended Complaint”<sup>4</sup>), asserting 15 causes of action against five defendants, three of them newly named. It is the FAC, attached as Exhibit 1 to the Draft Report, that is the Committee’s source for the bulk of the allegations and evidence.<sup>5</sup> Most of that evidence is uncorroborated and, particularly such crucial points as internet connectivity at RTL 2017 and the state of Pinscreen’s technology leading up to RTL 2017, Dr. Sadeghi is the *only* source of information. (Report at ¶¶ 32-1(c), 28-2.)

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<sup>4</sup> See Dr. Li’s Attachment A (the Superior Court docket for the matter of *Sadeghi v. Pinscreen, et al.*) The docket is a public document accessible by anyone. Thus, referring to an “Amended Complaint” as a “Second Amended Complaint,” and consistently misrepresenting or ignoring the actual procedural posture of the case as discussed, is inexcusable and epitomizes the lack of care displayed generally throughout the report. That lack of care is further illustrated by duplicative numbering of paragraphs 28-32 (see pp. 9-11). These will be referred to here as paragraph 28-1 vs. paragraph 28-2, etc.

<sup>5</sup> See, e.g., paragraphs 29-1 – 32-1, 28-2 – 32-2.

**Michael J. DeNiro**  
**Lawyer in Private Practice**  
**Emeritus Professor of Stable Isotopy, University of California**

Dr. Sadeghi is a litigant with a direct pecuniary interest in USC rendering an adverse finding. Yet there is nothing to suggest that Dr. Sadeghi's integrity or the veracity of the FAC have ever been questioned. This is a major problem because the very FAC that the IC relies upon extensively **was stricken in its entirety by the Court on its own motion nearly a year ago.** (See Att. B.) On 4/11/2019, after reviewing the FAC's 15 causes of action spread over 439 paragraphs and 274 pages, including 200 pages of exhibits, the Court held that "[t]he complaint does not comply with the letter or spirit" of the law, and "the court strikes the complaint as not drawn in conformity with the laws of the state and rules of court and contains irrelevant and improper material." (Att. C) For a court to strike an entire pleading (rather than just portions) because it is so poorly drafted is extraordinary. And for this key development to be suppressed in an official report is shocking.

Nor is that the end of the story. On 5/1/2019, Dr. Sadeghi filed the actual Second Amended Complaint ("SAC"). It was far shorter than the FAC but its fate was even worse. In two hearings on 11/20 and 11/21/2019, **Judge Martin sustained Defendants' demurrers and dismissed as to all but one<sup>6</sup> of Dr. Sadeghi's 15 causes of action.** The dismissed claims included the claims of "fraud, violation of employment law and contracts, wrongful termination, assault and battery, and research misconduct" referenced on page 2 of the Draft Report. (See Atts. C and D.) For each of these claims, the Court agreed with Prof. Li, Pinscreen, and their co-defendants that the SAC does not state facts sufficient to constitute a cause of action and, as to several claims, no amendment could save it.

- As to his fraudulent misrepresentation claim (based on alleged "academic misconduct" and "data fabrication"), the Court held, "There is no allegation of a [false] representation that Pinscreen made" and "plaintiff has not pleaded any cognizable damages."
- As to his fraudulent concealment claim, the Court held that "there is no sufficient description of representations that Pinscreen made" and again Dr. Sadeghi had not pled any cognizable damages.
- As to the whistleblower and wrongful termination claims (alleging a retaliatory termination for objecting to "academic misconduct," "data fabrication," etc.), the Court held that "Plaintiff has not specified the protected activity in which plaintiff was engaged or adequately alleged the nexus between the protected activity and the adverse action the company took against him." (Att. C, p. 3.)

Although Judge Martin gave Sadeghi a final chance to see if he could "fix" his fraud, wrongful termination, and whistleblower claims, she denied leave to amend the assault, battery,

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<sup>6</sup> The sole exception was alleged negligence in its post-termination handling of his Mickey Mouse sculpture. (See Att. C, pp. 5-6 (13th cause of action).)

**Michael J. DeNiro**  
**Lawyer in Private Practice**  
**Emeritus Professor of Stable Isotopy, University of California**

infliction of emotional distress, invasion of privacy, Labor Code §§ 203 and 2802, and Unfair Business Practices claims. She was especially harsh in her criticism of the battery claim, which she excoriated as a **“sham pleading”** and criticized Sadeghi for cynically changing the “time and location” of the alleged battery between one version of the complaint. (Att. C, pp. 6-7 [Pinscreen]; Att. D, p. 6 [Prof. Li and individual defendants].)

But even that is not the end. On 12/6/2019, Dr. Sadeghi filed his **Third** Amended Complaint (“TAC”), which with 30 pages, 135 paragraphs, and 6 causes of action (two fraud claims, whistleblowing, breach of contract, wrongful termination, and negligence, the only claims Judge Martin gave him a chance to try to “fix”) is a shell of the FAC and SAC. (Att. E.) The three new defendants have been dismissed. Prof. Li and Pinscreen have again filed demurrers, arguing that Sadeghi’s newest “changes” have done nothing to help him state a cause of action and that the entire case (save the Mickey Mouse claim) should be dismissed. (Att. F.) The demurrer will be heard on 10/2/2020. Meanwhile the three former defendants who have been dismissed from the case, including Pinscreen employees and USC students Liwen Hu and Han-Wei Kung, intend to seek a judgment and recovery of costs against Dr. Sadeghi.

Thus, as it stands, despite four bites at the apple, and after two years of litigation, Dr. Sadeghi has yet to pass through the initial threshold of filing a viable lawsuit. Yet the allegations in his long-stricken FAC are inexplicably relied upon as gospel in the Draft Report, even though there are others who directly question Dr. Sadeghi’s veracity and integrity. For example, Dr. Etienne Vouga, Assistant Professor in Computer Science at the University of Texas at Austin, and a member of the papers committee of SIGGRAPH, in a detailed responsa directed to the USC Misconduct Inquiry Committee in January 2019, noted that **“Iman’s actions over the past year have struck me as very unusual, out of line with standards of professional conduct in our research community, and more characteristic of a retaliation campaign than of a well-intentioned whistleblower shining a light on scientific misconduct.”** (Att. L, at p. 5.)

Dr. Vouga noted that Dr. Sadeghi’s smear campaign included “sen[ding] copies of his lawsuit, unsolicited, to me and a large number of other prominent members of the computer graphics community”; “post[ing] sensationalist comments and articles on his web site and social media, including a ‘Truth Challenge’ to Hao and Pinscreen”; “publicizing his lawsuit and his ‘Truth Challenge to attendees’ of SIGGRAPH events; and that his lawsuit “contains unnecessary, sensationalist elements ... **whose purpose seem to be solely to embarrass Hao, rather than to advance any valid concerns** about Hao’s scientific conduct.” (Att. L, at p. 5.) Similarly, Ken Anjyo, Conference Chair of SIGGRAPH Asia 2018, noted that Dr. Sadeghi’s antics and threats required SIGGRAPH to **“provide[] additional security guards** for Hao and his team’s presentations to reduce the possibility of a situation arising.” (Att. H, at p. 1.) Mike Seymour (Chair of Real Time Live 2019 Brisbane) stated point-blank that Dr. Sadeghi was engaged in



**Michael J. DeNiro**  
**Lawyer in Private Practice**  
**Emeritus Professor of Stable Isotopy, University of California**

a “*campaign of harassment*” that is “grossly unfair and insulting to your researchers and our organization.” (Att. K, at p. 5.)

Dr. Sadeghi’s communicating with USC should be viewed in their proper context as simply a means to leverage (extort would be a better word) a windfall settlement against Prof. Li and Pinscreen, or alternatively to ruin Prof. Li’s career in revenge for terminating him. And in fact on 1/8/2018, six months before he came to USC, Dr. Sadeghi sent an 80-page “demand” letter to counsel for Pinscreen and Prof. Li. (Att. G.) In that letter, he demanded three immediate monetary payments, that Pinscreen and Prof. Li sign a “mutual non-disclosure agreement,” and that Pinscreen provide a “meaningful response” to his letter. (*Id.* at pp. 79-80.)<sup>7</sup>

And, if Pinscreen and Prof. Li did not comply with all of Dr. Sadeghi’s demands, he threatened to file a lawsuit and only at that point tell USC about it:

**If Dr. Sadeghi’s counsel does not receive [the demanded payments, etc.], [he] will proceed with filing the lawsuit. [¶] Dr. Sadeghi will also contact University of Southern California (USC), USC Viterbi Department of Computer Science, USC Institute for Creative Technologies (ICT), Pinscreen’s investors (Softbank Ventures Korea, Colopl Next, and Lux Capital), the SIGGRAPH community, ETH Zurich Computer Science Department and the tech news media outlets and share the content of the lawsuit. (Att. G, p. 80 (emphasis added).)**

We understand that USC has an obligation to conduct an investigation into Dr. Sadeghi’s allegations. But that does **not** mean that Dr. Sadeghi and his lawsuit should be the **only** source of information, or that his uncorroborated statements given a level of credence denied to Prof. Li and those who wrote letters of support. Yet we note a disturbing level of credulity in connection with Dr. Sadeghi’s assertions, reflecting the IC’s own bias toward a predetermined result.

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<sup>7</sup> He also provided an extravagant and frequently bizarre wish-list for a negotiated settlement. Of special interest is his request to “keep the unlawful termination of Dr. Sadeghi fully confidential and **to list Dr. Sadeghi as the VP of Engineering in all representations.**” (*Id.* at pp. 78, 79.) In other words, he wanted Pinscreen – the company who he claims defrauded himself and others and whose CEO engaged in academic misconduct – to continue holding him out to the world as its **current** VP of Engineering, five months after his termination.

He also complained that Dr. Li’s “unfriending” and “blocking” him on Facebook and **not tagging Dr. Sadeghi’s picture** on a post stating “Great Job to the entire team” for SIGGRAPH Asia 2017. (*Id.* at p. 79.) In other words, although he complained to USC about purported “academic misconduct” in association with SIGGRAPH Asia 2017, he was upset that Dr. Li did not publicly hold him out as a member of the SIGGRAPH Asia team. Not to mention that he also demanded compensation for betrayal of his “polar bear heart,” reflecting a questionable grip on reality. (Att. G, p. 78.)

**Michael J. DeNiro**  
**Lawyer in Private Practice**  
**Emeritus Professor of Stable Isotopy, University of California**

Thus, on 12/9/2019, the investigator states to Dr. Sadeghi, **“I’m just trying to counter Li’s argument that it is acceptable to present a non-realtime presentation based on problems with connectivity.”** This is the role of an advocate, not an investigator. Similarly, when Dr. Sadeghi refused to explain the contradiction between his complain of fabrication and his own failure to “as the presenter to run a non-cached {sic} code, nor did [to] inform the audience that [he was] presenting an illustration of the technology,” the investigator failed to follow up.

In providing undeserved credence to Dr. Sadeghi, while painting Prof. Li in the worst possible light, the Office of Research and the Committee fail in their mandate to conduct “a thorough, competent, objective, and fair research misconduct proceeding.” (SLP § 4.1.)

**IV. There Is No Scientific Misconduct Associated with Either the RTL Abstract or the RTL Performance.**

**A. The Committee’s allegations are predicated on a document that is not even the RTL abstract submitted by Pinscreen, which describes the technology as a “Proposed System” rather than as existing technology.**

In connection with the purported RTL Abstract, the Committee concluded the following:

The Committee finds that Dr. Hao Li falsely presented his research in an abstract submitted to . . . SIGGRAPH Real-Time-Live 2017. Specifically, **Dr. Li:** [¶] Knowingly and intentionally submitted an abstract falsely claiming that he and his colleagues **had developed software** to automatically generate an avatar from a head shot in seconds and that it **would be demonstrating such software** at the SIGGRAPH Real-Time-Live show on August 1, 2017. (Draft Report at p. 12 (emphases added).)

There are two aspects to this. First, the report asserts Prof. Li claimed back on 4/4/2017 that he “had developed software to automatically generate an avatar . . . in seconds.” Second, the report asserts that Prof. Li claimed that this precise software “would be demonstrat[ed]” at the 2017 RTL. Both of these are gross misrepresentations.

First, the document is not an abstract at all – rather, it is Pinscreen’s submission statement “used for marketing” on the SIGGRAPH website and compiled by SIGGRAPH in or around July 2017, shortly in advance of the event itself. (Exhibits P, R.) The pdf is a composite document that introduces each of the Real Time Live presenters. It was produced The pamphlet was produced contemporaneously with RTL to act as a companion for the 8/01/2017 show. Thus, on page 16, the introduction by RTL Chair Cristobal Cheng states, “On behalf of ACM SIGGRAPH and my team, welcome to SIGGRAPH 2017 Real-Time Live! [¶ . . . ¶] My committee and I sincerely hope that you enjoy the show.”

**Michael J. DeNiro**  
**Lawyer in Private Practice**  
**Emeritus Professor of Stable Isotopy, University of California**

Pinscreen’s actual abstract from 4/4/2017 is a completely different document that the Draft Report does not attach as an exhibit, even though Dr. Li provided it as evidence prior to the completion of the Preliminary Inquiry. It is attached again hereto as Attachment Q. In the actual abstract, Pinscreen stated the following in relevant part:

A simple web interface allows us to upload any photograph and a high-quality head model, including animation-friendly blendshapes and joint-based rigs, is reconstructed *within seconds* . . . . The *proposed system* integrates state-of-the-art advances in facial shape modeling, appearance interface, and a new pipeline for single-view hair generation based on hairstyle retrieval from a massive database, followed by a strand-to-hair-strip conversion method. (Att. Q.)

Thus, although much of the language reads as present tense, it can only reasonably be read as a description of the “*proposed system*.” Yet the Draft Report ignores Pinscreen’s actual submission and instead quoting from the version of the abstract altered and published by SIGGRAPH four months later as though this were the original language. (See Draft Report ¶¶ 6(i)–6(iii).<sup>8</sup>) Indeed, the video that accompanied the submission (<https://www.youtube.com/watch?v=OZ2O3SXF0tE>) reflects a wait time of at least 18 seconds (and in fact there is no representation that the wait time from 0:20 to 0:38 was the entire elapsed time).

In describing a “proposed system,” rather than a completed system, Pinscreen was indeed operating within the guidelines of the RTL submission process. Per USC’s policy, a claim of scientific misconduct requires, *a priori*, that there be misconduct connection with “**research**,” as defined. Yet SIGGRAPH’s own administrators are adamant in their testimonials that the abstracts and video submissions connected with the RTL Show are not themselves research. Moreover, the abstracts/submissions are entitled to demonstrate proof of a concept, rather than a “research output.” Thus, Ken Anjyo, Conference Chair of SIGGRAPH Asia 2018, succinctly described this distinction in his letter of 1/24/2019:

RTL! in SIGGRAPH (North America) selects the live performances through a review process similar to the papers program. However, **RTL! does not**

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<sup>8</sup> The Draft Report also states that the RTL **abstract** was “based on work described in a paper entitled ‘Avatar Digitization From a Single Image For Real-time Rendering’ submitted to SIGGRAPH Asia on May 23, 2017.” (Draft Report ¶ 7.) But that cannot be the case considering that the abstract preceded the paper by nearly two months, a contradiction that is never explained by the Committee (nor is the relevance clear). Equally erroneous is the statement that “[o]n May 17, 2017, Dr. Li received reviewer comments regarding the SIGGRAPH RTL 2017 **abstract**.” (Draft Report ¶ 10 & Att. 13.) But the reviewers were not commenting on the abstract itself. Rather, they were commenting on the video “Creating Performance-Driven Avatars in Seconds” (linked above), and the mixed nature of the reviews accurately reflects the developmental stage of the technology.

**Michael J. DeNiro**

**Lawyer in Private Practice**

**Emeritus Professor of Stable Isotopy, University of California**

**necessarily have to be a research output...** Unlike a SIGGRAPH paper, **an RTL! submission video may contain material that are proof of concept**, rather than technical/theoretical evidences. In particular, **illustrations of the submission do not need to be final outputs of the submitted** technology, but need to depict the intended outcome in a reasonable way. **Then it will be accepted, if the committee can be convinced by the authors that they can demonstrate their high-quality content by the day of their live performance.**

(Att. H, p. 2 (emphases added).) Similarly, speaking specifically about the 2017 RTL, Dr. Vouga, himself an academic researcher, stated, “Real-time Live! is not a publication venue for academic research” and “[t]here are *no academic papers associated with Real-time Live* presentations,” which are not peer-reviewed. (Att. L, pp. 1-2 (emphasis added).)

For the same reason, SIGGRAPH'S letter to Pinscreen dated 6/1/2017 advising that its submission had been accepted (after it was initially rejected), Real Time Live! Chair Cristobal Cheng wrote that, Pinscreen (just like all other RTL presenters) could make “Changes to Your Submission” and to “upload a new version of your abstract.” (Att. R.) This shows that the “abstract” and the submissions themselves were very fluid and changes could be made to both into June. Thus, it would be doubly unfair to critique the abstract submitted in April (which nevertheless announced the technology as a “Proposed System”) as though it were set in stone – RTL clearly envisioned a fluid, dynamic process.

For these reasons, (1) the RTL submission process is not a scientific presentation of “research” and thus the abstract and video fall outside the Scientific Misconduct Policy; and (2) even if they fell within the policy, Pinscreen’s submission did not falsify, fabricate, or mislead as to the actual state of technology because it described a “proposed system,” and the submission video constituted a “proof of concept,” all of which is explicitly in line with RTL standards.

**B. There Is No Scientific Misconduct Associated with the RTL Show.**

In connection with Pinscreen’s RTL 2017 presentation of 8/1/2017, the IC determined the following:

Dr. Li ... [k]nowingly and intentionally presented a *falsified demonstration of his software* at the SIGGRAPH Real-Time-Live show on August 1, 2017 with the *intention to mislead* the audience into believing that they were viewing a real-time demonstration of the automatic avatar-generating software that he and his team claimed to have developed, when in fact, Dr.

**Michael J. DeNiro**  
**Lawyer in Private Practice**  
**Emeritus Professor of Stable Isotopy, University of California**

Li and his team presented *pre-programmed, manually produced avatar generation*.

(Draft Report, p. 12.) The conclusions underpinning this determination are (1) that Prof. Li was “performing research” or “reporting research results” at RTL; (2) that “caching” the avatar of Dr. Sadeghi was improper absent actual evidence of technology issues; (3) that not informing the audience that the avatar was cached was misleading. These conclusions are all wrong.

1. Prof. Li Was Not “Performing Research” or “Reporting Research Results” at RTL.

Similar to the abstract submission process, the RTL performance is neither expected nor intended to constitute “research” or the “reporting of research,” the threshold requirement of SMP § 3.2. Prof. Li has testified to this fact, and indeed not even Dr. Sadeghi explains why RTL performances should be held to scientific research standards. Most significantly, *all* of the statements submitted in support of Prof. Li by respected SIGGRAPH conference organizers, chairs, and committee members, emphasize this fact:

- Ken Anjyo: “The technical papers program at SIGGRAPH (and SIGGRAPH Asia) provides leading technical research papers . . . under a double-blind, peer review process. On the other hand, *RTL! presents cutting-edge realtime technologies and/or entertainment though live performances.*” (Att. H.)
- Isamu Hasegawa: “Real-Time Live *does not necessarily present presenter’s ‘research outputs’* as is.” (Att. I.)
- J.P. Lewis: “From the point of view of someone questioning Pinscreen's work, this allegation is at best a grey area. SIGGRAPH is part scientific conference and part trade show, and the *RTL event has an entertainment aspect* to it.” (Att. J.)
- Mike Seymour: “This is not a traditional academic double blind process” and that “RTL is not a benchmarking technical event but a *joyous celebration of the latest advances in technology.*” (Att. K.)
- Etienne Vouga, Ph.D, Assistant Professor at UT Austin: “Real-time Live! is not a publication venue for academic research. There are no academic papers associated with Real-time Live! presentations, and though they are selected by a jury, they are not peer-reviewed. The event is a *pageant/celebration* of cutting edge technology (contributed

**Michael J. DeNiro**

**Lawyer in Private Practice**

**Emeritus Professor of Stable Isotopy, University of California**

by both academia and industry) *and neither the conference organizers, attendees, nor the computer graphics research community consider contributions to this event as constituting computer graphics academic literature.*" (Att. L.)<sup>9</sup>

Moreover, in the 6/1/2020 acceptance letter by RTL Chair Cristobal Cheng, Mr. Cheng writes that in connection with the "Virtual Rehearsal" in June, "***The Real-Time Live! committee will aid you in enhancing your presentation to make it even more impressive and energetic.***" (Att. R.) If RTL was a truly scientific venue, the RTL staff itself would never interfere by offering to "enhance" the presentation or make it "more impressive and energetic." Are we to assume that RTL is actively conspiring to suborn academic misconduct by offering to "enhance" or make "more impressive" the empirical results of scientific research? Of course not. But since RTL is an entertainment spectacle, such an offer makes perfect sense.

Since all of the above state with absolute certainty that RTL performances are not academic presentations, why does USC seek to shoehorn a non-academic performance into an academic misconduct inquiry? If the answer is that USC believes some work performed for RTL may have derived from grants to USC or been assisted by USC students, that is a separate question that Prof. Li is fully capable of responding to, but that fact itself does not convert RTL into something it is not. Nor does Prof. Li's or RTL's organizers' truthful representations of his affiliation with USC constitute any sort of misrepresentation or confer an academic status on RTL. Prof. Li is a USC professor. If USC would like to prohibit any of its faculty members from identifying themselves as such in any non-research conduct (presumably including off-topic Facebook posts or tweets), USC should make that position clear. But it is a vital error to attribute the same expectations to a live RTL performance (and "performance" is the operative word) as to a research paper. Yet this is precisely what the Investigation Committee has done.

## 2. Caching Images Is Acceptable at RTL.

Using charged and terms such as "planned" and "premeditated" (usually reserved for first degree murder), the Draft Report claims that Pinscreen's use of a "cached" avatar of Dr. Sadeghi during a live show, without announcing that fact to the audience, constitutes academic misconduct. There are two questions which the Draft Report does a poor job of separating: first, whether using a cached image is inherently problematic; and second, whether using a cached image without informing the audience is inherently problematic.

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<sup>9</sup> There is no indication that the Office of Research ever reached out to any of the individuals who wrote letters supportive of Prof. Li, although though each provided their contact information and openly invited such a dialogue.



**Michael J. DeNiro**  
**Lawyer in Private Practice**  
**Emeritus Professor of Stable Isotopy, University of California**

As to both questions, as discussed above, RTL is not a “research output,” so whether the avatar was cached or created live is immaterial. There is no need to announce such, and the claim that anyone in the audience was deluded but the failure to announce ignores the reality of RTL’s role as a “pageant” or “celebration” of technology, where the audience comes to be entertained. Moreover, there is no question that, once rendered, the “tracking” of the avatar was live, and this tracking was indeed a major aspect of the show.

Even if we were to accept the premise that an RTL show implicates the SMP, there is still no misconduct. Even the Investigative Committee concedes that it would be acceptable to have used caching as a “fallback plan,” but only if there were “internet connectivity issues.” (See Draft Report ¶ 22.) It concludes that in the absence of such issues, caching was prohibited even under RTL’s guidelines. It is incorrect.

According to the committee, RTL 2018 chair Isamu Hasegawa states “that it is valid for presenters to prepare ‘cache’ as a fallback plan, and to **perform their cache with explanation** in case of some troubles.” (Draft Report ¶ 32-1; see Att. I.) This is virtually the only acknowledgment of any letter supporting Prof. Li, since the IC bends over backwards to suppress Prof. Li’s corroborating evidence. And the committee *misquotes* Mr. Hasegawa, whose letter actually states that in RTL 2018, presenters were permitted “to **perform their cache with their explanation** in case of some troubles.” (*Id.*) The IC omitted the word “their” to distort Mr. Hasegawa’s meaning. But in context, “perform their cache with **their** explanation,” simply means, perform their cached image with their explanation of the technology (i.e., the same explanation that would be used in the absence of caching). Mr. Hasegawa goes on to state that caching was acceptable, “**since we . . . already confirmed that each presenter[’s technology is suitable for SA18 RTL at the point of our curation, and unreliability of the WiFi is not presenter’s fault.]**” Indeed, Mr. Hasegawa reports warning the presenters during rehearsal that “wireless network connection . . . might be unreliable.”

Therefore, the expectation for RTL 2018 was that there *would* likely be connectivity issues, and it is not at all clear that Mr. Hasegawa meant that the presenters would only be able to use cached images if they themselves experienced problems during the presentation. Rather, the guidance was, “We can’t guarantee connectivity so you should just go with your fallback.”<sup>10</sup> This is confirmed even more forcefully by Ken Anjyo, Conference Chair of SIGGRAPH Asia 2018, who Anjyo states that “While RTL! presents live performances, **caching is acceptable and there is no obligation to disclose during the show.** Rather we encourage the presenters to do caching in case the event does not run smoothly.” (Att. I.) Mike Seymour stated, “The committee wants the demonstrations to not be adversely affected by internet problems or Wifi

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<sup>10</sup> Pinscreen’s RTL 2018 performance is available at <https://www.youtube.com/watch?v=rPam5CHFQMQ> (starting at approximately 1:15:53).

**Michael J. DeNiro**  
**Lawyer in Private Practice**  
**Emeritus Professor of Stable Isotopy, University of California**

connections given the vast audience (many of whom are on their devices during the event). **As such it is not uncommon for the organisers to encourage backups at rehearsals so the event does run smoothly.**” (Att. K) In other words, once the actual technology is demonstrated to SIGGRAPH, it is preferable to use the backup at the actual show because it is possible or even likely that there would be connectivity issues.

Most convincing is Professor Vouga’s statement that for purposes of RTL, the key is

The main concern of Real-Time Live! organizers and contributors is ensuring the demos are entertaining and compelling and that the event runs smoothly. To that end, **precomputing some results offline, or even recording videos beforehand and playing back those videos during the event, is acceptable and expected practice for mitigating against embarrassing failures during the live presentation** (due to hardware or software faults, problems with the notoriously poor conference Internet connection, etc.).

(Att. L.) Whatever the situation, it is clear that none of the chairs or organizers of SIGGRAPH – who set and apply the rules policies – express any concern that Pinscreen cached Dr. Sadeghi’s avatar (just as Dr. Sadeghi himself would have expressed no concern had Prof. Li and Pinscreen paid him off). While each of these statements is slightly different, the thread running through each of these is that SIGGRAPH did not want anything to go awry during RTL, and caching was acceptable if there was any chance that internet connectivity could be a problem.

The email correspondence between Pinscreen’s team and the SIGGRAPH committee, reveals how noncommittal the committee was on the ability to guarantee reliable connectivity. In Justin Stimatze’s email dated June 15, 2017, after advising on a fall-back option, he states the following, after Pinscreen had requested a bandwidth of 50 MBps for downloads and 20 MBps for uploads (Att. Q):

In years past, we have paid many tens of thousands of dollars for 18Mbit/s shared across the whole conference. **We have been unable to guarantee even 1 Mbit/s to contributors . . .**, which has caused some challenges with presentations and frustration for all involved. Fortunately, things are looking more flexible this year but I hope that explains the concern! We want you to have a fantastic and successful presentation with as little stress as possible about networking risks.

(Att. M; see also Att. N (June 27, 2017 organizer email stating, “I am cautiously optimistic **but cannot guarantee 20Mbit/s.**” (although 50 MBps had originally been requested).) “More

**Michael J. DeNiro**  
**Lawyer in Private Practice**  
**Emeritus Professor of Stable Isotopy, University of California**

flexible” does not mean that bandwidth is guaranteed, and “as little stress as possible about networking risks” means for presenters to fashion their presentations so as **not** to rely on networking. These same points were reiterated in the run-up to the 2018 RTL, when the organizers warned Prof. Li that “there are other **risks introduced by establishing a temporary connection** to external corporation and making sure is reliable and sorting out last minute connection issue **due to the unknown unknowns** that can come up.” (Att. O.)

Dr. Grace never bothered to contact Mr. Stimatze, or anyone else involved with RTL 2017 (or RTL 2018), to discuss these points, yet the Committee concluded that connectivity was not a problem, or that caching was only permissible in the event of a technical disaster. The record simply does not bear that out, and since Pinscreen could not be assured of stable bandwidth, the only viable – and reasonable – option was to rely on a cached image. This is not the stuff that scientific misconduct is made of.

3. Prof. Li’s Technology Was Capable of Producing Avatars in the Speed and Quality of the Sadeghi Avatar.

The **only** person who claims that Pinscreen’s technology was not capable of producing high-quality avatars as of the time of the show is Dr. Sadeghi himself. The IC claims that Prof. Li’s technology took five minutes to create an avatar, but as Prof. Li discussed, the technology being prepared for SIGGRAPH Asia was far more robust than that used for RTL, as the RTL show utilized a scaled-down version of the technology.

Prof. Li has consistently argued that the avatars displayed at SIGGRAPH accurately reflected Pinscreen’s technology. **In fact, before the RTL show began, Pinscreen invited curious attendees to sample the actual technology for themselves.** The technology successfully created realistic avatars for these random audience members, the results of which Pinscreen still maintains and which it has provided to the Committee. (See Draft Report, Attach. 3 (“We have also demonstrated the non-cached pipeline on stage before the show for various people. I have provided these evidences, including time stamped reconstructions on the day of the event.”).) Prof. Li has already shared time-stamped results of these contemporaneous demonstrations, which is ignored by the Committee. Indeed, Prof. Li is also authorized by Pinscreen to share its Amazon Web Services (“AWS”) password for USC to be able to recreate the results itself. Please advise.

Finally, the assertion that Prof. Li should have somehow announced (or demanded that Dr. Sadeghi announce) that Dr. Sadeghi’s avatar image was cached, or that the status bar would be inappropriate and bizarre during an entertainment-oriented show. Prof. Li would have no expectation that USC would hold RTL itself to the same standard as research paper. And having watched the RTL performances of all presenters, it is clear that all viewed it as

**Michael J. DeNiro**  
**Lawyer in Private Practice**  
**Emeritus Professor of Stable Isotopy, University of California**

spectacle, as a celebration of their technology rather than a scientific demonstration of that technology.

The only question is whether the cached technology presented approximated Pinscreen’s capabilities at the time, and to that question SIGGRAPH’s executives have answered affirmatively, because Prof. Li was required to demonstrate the technology before being permitted to participate in the presentation, and he previously produced evidence of the avatars created from live audience members before the show. Relying on Dr. Sadeghi’s allegations, the Committee incorrectly insists that this is not the case, and also that the technology took 5 minutes to create the avatar, as (accurately) described in Prof. Li’s SIGGRAPH Asia paper.<sup>11</sup> However, it refuses to accept that the avatar technology for purposes of SIGGRAPH Asia – several months down the road – was intended to be, and was, far more robust and complex than that used for RTL. The most hardware-intensive processes involving approximately 97% of the computing time were not part of the RTL framework. Thus:

SIGGRAPH RTL 2017	SIGGRAPH Asia 2017
SIGGRAPH 2017 RTL: 1/ face model fitting: <1-2 sec 2/ secondary component fitting and facial rigging: 1 sec 3/ hair digitization: * retrieving closest exemplar: < 5 sec	1/ face model fitting (fine tuned): 0.5 sec 2/ secondary component fitting and facial rigging: 1 sec 3/ hair digitization: * hair polystrip reconstruction: 1 sec * retrieving closest exemplar (accelerated datastructure): 1 sec * deformation of hairstyle: 10 sec * collision handling: 5 sec * polystrip patching optimization: 1 min 4/ neural facial texture synthesis: * feture correlation extraction: 75 sec * convex blending weight: 14 sec * final synthesis: 172 sec

<sup>11</sup> Finally, the Committee also improperly concludes that Prof. Li engaged in some type of malfeasance by imaging the electronic devices he submitted in connection with the investigation, thus “aggravating” the severity of the alleged violation. There is nothing untoward in creating a backup of hardware submitted for an investigation. Creating a backup is not “tampering” with a device, and even if some dates became inadvertently altered in the process, the investigator should still determine what the technology actually does. Moreover, the fact that Prof. Li did not use his USC-issued computer is not evidence of malfeasance. He simply did not use his USC laptop – why should he have submitted it in the first instance? He was only asked to submit relevant evidence, which in connection with the RTL show was on Pinscreen devices. However, Prof. Li will fully address this issue after the results of a new forensic are completed, as the IC’s determination is largely influenced by the conflict-compromised report of Quandary Peak Research.

**Michael J. DeNiro**  
**Lawyer in Private Practice**  
**Emeritus Professor of Stable Isotopy, University of California**

Total: 7-8 seconds	Total: Approx. 4.7 minutes (280.5 seconds)

Once again, as the question of *how much time* it took to create the avatar (rather than whether it was cached) was not a central point of the inquiry, Dr. Li will provide his AWS password so that the IC can replicate the actual computation time as of August 2017.

**V. Conclusion.**

This investigation is a tempest in a teapot. It seeks to punish an esteemed, tenured university professor whose reputation has been built on creating cutting-edge technology because his company allegedly did not apply empirical research methodologies to an entertainment-driven trade show. The investigators have found no actual evidence of malfeasance, and their conclusions are based purely on uncorroborated testimony and ignore contrary evidence that is highly corroborated. The only person it will benefit is a single self-interested litigant, who *himself was the presenter of the technology that he claims was fabricated*, and who for nearly three years has sought to leverage his “whistleblowing” to extract a windfall settlement. This is a monumental waste of resources, at a time where the University should prioritize matters of greater significance, and in multiple respects the Committee has violated the Scientific Misconduct Policy’s investigatory and reporting requirements. These violations themselves warrant dismissal of part or all of the complaint, the dissolution of the current committee, and/or extensions in time to respond to newly disclosed evidence. However, the most straightforward resolution would be for the Committee to acknowledge that none of the allegations are substantiated and to dismiss the matter on the merits, which is what the facts warrant.