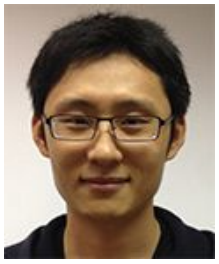

Haimo ZHANG

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SUMMARY

I am currently a research fellow in Singapore University of Technology and Design. In the past, I have worked as a data scientist with a Singapore-based edu-tech startup company, visited Chalmers University of Technology (Gothenburg, Sweden) as an exchange researcher, and have interned with Microsoft Research Asia (Beijing, China) and Google Research (Mountainview, US). In 2015, I obtained a PhD degree in computer science, from School of Computing, National University of Singapore. My research interest is human-computer interaction (HCI), and I am advised by Dr. Shengdong Zhao. My PhD research investigates novel binocular visualizations using stereoscopic 3D displays, and in particular, their application in color blind relief and the underlying psychophysical characteristics. My current interests in the HCI field include wearables, 3D interactions, and haptics. I am skilled in scientific research, statistical analysis, interaction design, and software development. I am also familiar with hardware prototyping, gesture recognition, and machine learning. My overall vision is to enable human to interact with the physical and digital environment in more powerful ways, by mediating the interaction between them.

WORK EXPERIENCE

Research Fellow, Singapore University of Technology and Design

Singapore, July 2016 ~ present

I am working in the Augmented Human Lab, directed by Dr. Suranga Nanayakkara. Together with several graduate students and research engineers, we are creating and implementing several research projects spanning various areas in HCI, under the lab's theme of augmenting human capabilities.

Data Scientist, 3ELogic Consultancy Pte. Ltd.

Singapore, September 2015 ~ June 2016

As a data scientist, I am responsible for building the data collection and analytics infrastructure for our product. I also design and implement algorithms to support various product features.

Visiting Postdoctoral Researcher, Chalmers University of Technology

Gothenburg, Sweden, June 2015 ~ July 2015

Representing the NUS-HCI lab, I was invited by Professor Morten Fjeld to the t2i lab in the Chalmers University

of Technology for a one-month visit. During the visit, I collaborated with the t2i lab members and contributed to several academic research projects, by forming early plans, exploring technical options, creating prototypes, and sharing experiences to early-stage PhD students.

Research Assistant, National University of Singapore

Singapore, November, 2013 ~ December, 2014

I researched on a visual phenomenon known as 'binocular luster', and have been able to use it for potential applications in human-computer interaction, such as color blind relief.

Accomplishments:

- Self-studied basics in psychology and psychophysics in preparation for the investigation of binocular luster.
- Implemented several algorithms in psychophysics research (simple staircase threshold search, stochastic staircase threshold search, maximum-likelihood threshold search).
- Designed and conducted psychophysical experiments using Oculus Rift head-mounted display.
- Performed statistical analysis on the experimental data and empirically modeled the perception of binocular luster.
- Designed generic and specific algorithms to create binocular images that look differently depending on how they are viewed with a 3D stereoscopic display.
- Used the algorithms to create images illustrating potential application scenarios in human-computer interaction.

Software Engineering Intern, Google Inc.

Mountain View, California, United States, May ~ August, 2013

I was involved in the following two projects, mentored by Dr. Yang Li.

***GestKeyboard* project — as main investigator**

This project enables detection and recognition of shape gestures on ordinary physical keyboards. The research is published as a full technical paper in the 2014 ACM annual conference on Human Factors in Computing Machinery (CHI), Toronto, Canada.

Accomplishments:

- Conducted a comprehensive literature review to validate the novelty and contribution of the research idea.
- Learnt to use machine learning tools and workflows for the research.
- Designed and conducted user study for data collection for the project.
- Added a new feature (sequence-invariant gesture recognition) to existing Google codebase related to the research project.
- Used the developed algorithm to create two prototypical working demo programs of keyboard gestures: GestEdit, a text editor that changes text and paragraph styles using keyboard gestures; and GestRun, a system-wide application launcher that runs different commands based on the gestures detected and recognized.
- Prepared the materials for academic publication, including writing of the paper and making of a 5-minute video figure.
- Authored a full paper published at the CHI 2014 conference.

***Touch* project — as contributor**

This project aimed to develop a framework, as an Eclipse IDE plugin, to support complex multi-touch gestural interactions on touch-sensitive devices, without requiring developers to craft ad-hoc gesture recognizers. I am enlisted as the third author of the paper for this project, which is published at the ACM Transactions on Computer-Human Interaction, a premier archival journal in human-computer interaction.

Accomplishments:

- Implemented the XML support that translates between the internal representation of a multi-touch gesture object and its plain-text representation in XML syntax.
- Implemented the hit test that determines whether a point is inside or outside of an arbitrary polygon in 2D space, using the winding number algorithm.
- Implemented a search function to filter gestures by their XML attributes.
- Implemented a visualization panel that is integrated to the Eclipse IDE plugin, to provide intuitive visualization of the similarities between the multi-touch gestures.
- Co-authored a paper published at the TOCHI journal.

Teaching Assistant, National University of Singapore

Singapore, January ~ April, 2013

Helped with various aspects of the module CS3240: Interaction Design, offered by the department of computer science, School of Computing.

Accomplishments

- Ensured student satisfaction by replying to various enquiries regarding assignment details and administrative chores.
- Conducted in-class contextual inquiry and qualitative evaluation workshops to help student deepen understanding of the subject.
- Helped students debugging Arduino issues during the hardware prototyping workshop.
- Guided student groups during their class project cycle to help them apply the learning and focus on the project topic.
- Graded various assignments and provided face-to-face feedback on the project ideas during the project pitch session.
- Evaluated student presentations on prior work related to their projects.
- Helped the design of exercises and questions for the examination.

Research Intern, HCI group, Microsoft Research Asia

Beijing, China, May ~ October, 2011

I was involved in the two following projects, mentored by Dr. Xiang Cao.

***Beyond Stereo* project — as main investigator**

This project used 3D stereoscopic display devices to create novel binocular visual experiences that are mainly suitable for the entertainment domain.

Accomplishments

- Systematically explored the space for novel binocular visual experiences using stereoscopic 3D

technologies.

- Conducted user study to investigate the subjective user experience related to the various binocular visual effects.
- Proposed a simple taxonomy that suggests the potential applications of the discovered effects.
- Authored one short paper as the first author. The paper is published at the CHI 2012 conference, with a honorable mention award (top 5% of the technical proceedings).
- Listed as the co-inventor of the relevant patent application.

***Concurrent Dual-View* project — as contributor**

This project leverages the inherent view-dependent color distortion of TN-type LCD panels to facilitate two independent full-color views from two different viewing angles.

Accomplishments

- Identified the problem at first and initiated the initial brainstorming.
- Helped brainstorming applications of the concurrent dual-view technology.
- Helped with conceptualizing the specific solution to information hiding, by using a random-dot pattern that only disappear within a narrow range of view angle, which would in turn unmask the intended information.
- Co-authored a full paper as the third author. The paper is published at the CHI 2012 conference.
- Listed as the co-inventor of the relevant patent application.

Software Engineering Intern, IBM

Singapore, May ~ July, 2008

I worked with the driver team in the POS department in IBM Singapore. My main role is to provide Python binding and GUI for convenient testing of a native Windows printer bulk driver.

Accomplishments

- Established the Python bindings for a native Windows printer driver, through the Python ctypes module.
- Created graphical user interface for easy testing, through the Python tkinter module.
- Learnt and shared the knowledge of Python to the whole driver team members and test engineers.
- Taught testing engineers how to use the developed binding and GUI for testing of the drivers.

EDUCATION

School of Computing, National University of Singapore

PhD, August, 2009 ~ November, 2014

I finished doctorate degree in computer science, with an interest on human-computer interactions. My dissertation is titled “Applying Binocular Luster in Human-Computer Interaction”.

Accomplishments

- Several publications in various conferences and journals in the human-computer interaction field, see publications section.
- Recipient of Dean’s Graduate Research Excellence Award (academic year 2011-2012, semester 2),

which is awarded to a selected few senior PhD students with sustained research achievement. This award is given only once in a PhD student's candidature.

Faculty of Engineering, National University of Singapore

Bachelor of Computer Engineering (B.Comp.Eng), 2005-2009

Accomplishments

- Graduated with honors (2nd upper division).
- Recipient of Dean's List (top 5%) award for academic year 2006-2007, semester 1.

SKILLS

Communication Skills

- Fluent in Mandarin (native speaker) and English language.
- Strong presentation skills: have given three 10~25 min talks at the CHI conference; have given guest lectures and conducted workshops for university-level interaction design classes; have given demonstrations at various exhibition venues, including the CHI interactivity session (2012) and Sunday Showcases (2013, 2014) at the Singapore ArtScience Museum.
- Wrote the complete papers for three publications as the first author. Received positive feedback on the quality of writing.
- Proficiency in Word, Excel, PowerPoint, LaTeX, vector graphics (InkScape), and basic video editing (TechSmith's Camtasia) for efficient oral, written, and graphical communication and documentation.

Technical Skills

- C, C++, Matlab, Python, Java.
- OpenGL, OpenCV, Microsoft WPF, XNA Game Studio, Java Swing UI Toolkit.
- Experience in development under Windows and Linux environments.
- Deploying and programming Stereo 3D systems such as NVidia 3D vision kit, Samsung 3DTV with NVidia 3DTV Play software, Vuzix VR920, and Oculus Rift.
- Experience with optical tracking systems, including VICON motion-capturing devices, TrackIR 5 head tracker, and Microsoft Kinect sensors.
- Image processing and computational photography algorithms, including filtering, edge detection, 2D FFT, image sharpening, thresholding, color theory, focus stacking, and dual photography.
- The WEKA machine learning software.
- Statistics analysis in R, SPSS, and Microsoft Excel.
- Designing controlled experiments for human-computer interaction, and conducting various user studies.
- Psychophysics experiments to investigate human sensory limits and performance, for determining parameters of user interfaces.
- Hardware prototyping using Arduino kits.

ACADEMIC SERVICES

- Reviewer for various conferences:
  CHI, UIST, CSCW, MobileHCI, AVI, ITS, DIS, Chinese CHI, SIGGRAPH Asia, TOMCCAP, and APCHI

- Associate chair for CHI 2015 Work-in-Progress session.
- Associate chair for AH2017 (Augmented Human) conference.

PUBLICATIONS

Technical Papers

1. Roger Boldu, **Haimo Zhang**, Juan Pablo Forero Cortés, Sachith Muthukumarana, Suranga Nanayakkara. InSight: A Systematic Approach to Create Dynamic Human-Controller-Interactions. to appear in proceedings of *Augmented Human* 2017.
   Received *Best Short Paper Award*

2. Soon Hau Chua, **Haimo Zhang**, Muhammad Hammad, Sahil Goyal, Karan Singh, Shengdong Zhao. ColorBless: Augmenting Visual Information for Colorblind People with Binocular Luster Effect. in *TOCHI Special Issue on Physiological Computing*, 21 (6), No. 32, January 2015, ACM.

3. Yang Li, Hao Lu, **Haimo Zhang**. Optimistic Programming of Touch Interaction. in *TOCHI: ACM Transactions on Computer-Human Interaction*, 21 (4), No. 24, August 2014, ACM.

4. **Haimo Zhang**, Yang Li. GestKeyboard: Enabling Gesture-Based Interaction on Ordinary Physical Keyboard. in proceedings of *CHI* 2014.

5. Xiaole Kuang, **Haimo Zhang**, Shengdong Zhao, Michael J. McGuffin. Tracing Tuples Across Dimensions: A Comparison of Scatterplots and Parallel Coordinate Plots. in proceedings of *EuroVis* 2012.

6. **Haimo Zhang**, Xiang Cao, Shengdong Zhao. Beyond Stereo: An Exploration of Unconventional Binocular Presentation for Novel Visual Experience. in proceedings of *CHI* 2012.
   Received Honorary Mention Award for the top 5% of the proceedings

7. Seokhwan Kim, Xiang Cao, **Haimo Zhang**, Desney Tan. Enabling Concurrent Dual Views on Common LCD Screens. in proceedings of *CHI* 2012.

8. **Haimo Zhang**, Shengdong Zhao. Measuring Web Page Revisitation in Tabbed Browsing. in proceedings of *CHI* 2011.

Others

1. *Da Vinci: Shaping the Future*, Exhibition at Singapore ArtScience Museum, 15 November, 2014 - May, 2015.

2. *Sunday Showcase* Exhibition at Singapore ArtScience Museum, 2013 & 2014.

3. **Haimo Zhang**, Yang Li. *GestKeyboard: Enabling Gesture-Based Interaction on Ordinary Physical Keyboard.* CHI EA (Video Showcase) 2014.

4. **Haimo Zhang**, Xiang Cao, Shengdong Zhao. *Beyond Stereo: An Exploration of Unconventional Binocular Presentation for Novel Visual Experience*. CHI EA (Interactivity) 2012.

5. Seokhwan Kim, Xiang Cao, **Haimo Zhang**, Desney Tan. *Enabling Concurrent Dual Views on Common LCD Screens*. CHI EA (Interactivity) 2012.

PATENTS

1. Xiang Cao, Seokhwan Kim, **Haimo Zhang**, Desney S. Tan. (2012). Simultaneous display of multiple content items. U.S. patent application filed on 22 June 2012. Pending.
2. Xiang Cao, **Haimo Zhang**. (2012). User perception of visual effects. U.S. patent application filed on 1 May 2012. Pending.

ONLINE PROFILES

Personal webpage:
http://www.haimozhang.net/

Google Scholar Profile:
http://scholar.google.com/citations?user=vWahr7UAAAAJ

REFERENCES

- Dr. Suranga Nanayakkara, <suranga@ahlab.org>, Assistant Professor at Singapore University of Technology and Design, director of Augmented Human Lab, supervisor for my postdoctoral research.
- Dr. Shengdong Zhao, <zhaosd@comp.nus.edu.sg>, Associate Professor at National University of Singapore, director of NUS-HCI lab, adviser of my PhD research.
- Dr. Morten Fjeld, <fjeld@chalmers.se>, Professor at Chalmers University of Technology, Sweden, director of the T2I lab, host of my research visit.
- Dr. Yang Li, <yangli@acm.org>, Staff Research Scientist at Google, my internship mentor.
- Dr. Xiang Cao, <xiangcao@acm.org>, founder and CEO of Xiaoxiaoniu Creative Technologies, my internship mentor at Microsoft Research Asia.

Reference letters available upon request.