Yuhang Zhao

Email: yz769@cornell.edu Phone: +1 (607)3794767
Homepage: https://www.yuhangz.com

RESEARCH INTERESTS

My research interest is human computer interaction, including accessibility, mixed reality (MR), mobile computing, and human-centered AI. I strive to explore how emerging MR and AI technology can empower people with disabilities and promote equity. My PhD thesis focuses on people with low vision, where I explore low vision people's visual perception, and design and build intelligent MR systems to enhance their visual ability in various daily activities. In addition to my PhD thesis, I've also worked on addressing MR accessibility problems and investigating the use and impact of AI technology in the context of accessibility.

EDUCATION

Ph.D. in Information Science, Cornell Tech, Cornell University (2014 – present)
Thesis: Empowering People with Low Vision by Designing Enhanced Perception Systems.
Advisor: Prof. Shiri Azenkot

M.S. in Information Science, Cornell University (2014 – 2017)
Qualifying Exam: A Transformative Vision: Using Direct Visual Augmentations to Provide People with Low Vision Equal Access to Information.
Committee: Prof. Shiri Azenkot, Prof. Serge Belongie, and Prof. Deborah Estrin

M.S. in Computer Science, Tsinghua University (2011 – 2014)
Graduated with Distinction on thesis
Thesis: Enhancing Information Revisitation for Active Reading with a Paper Book.
Advisor: Prof. Yuanchun Shi

B.E. in Computer Science, Tsinghua University (2007-2011)
Graduated with Honors

INDUSTRY & RESEARCH EXPERIENCE

University of Washington. Visiting Researcher. (2019.5 – 2019.8)
Mentor: Leah Findlater
The Effectiveness of Visual and Audio Wayfinding Guidance on Smartglasses for Low Vision.

Microsoft Research, Redmond. Research Intern. (2018.5 – 2018.8)
Mentor: Merrie Ringel Morris
SeeingVR: A Set of Tools to Make Virtual Reality More Accessible to People with Low Vision.
Open Source on GitHub: SeeingVR toolkit https://github.com/microsoft/SeeingVRtoolkit

Microsoft Research, Redmond. Research Intern. (2017.5 – 2017.8)
Mentor: Merrie Ringel Morris and Hrvoje Benko
Canetroller: Enabling People with Visual Impairments to Navigate Virtual Reality with a Haptic and Auditory Cane Simulation.

Facebook Inc. Research Intern. (2016.5 – 2016.8)
Mentor: Shaomei Wu, Core Data Science Team.
Project1: A Face Recognition Application for People with Visual Impairments: Understanding Use Beyond the Lab.
Project2: Accessible Composer, which automatically recognizes local photos in blind users' album and provides intuitive audio descriptions to enable them to share photos on Facebook.
Launched in October 2016 as Facebook Automatic Alt Text on Android.

University of Washington. Visiting Student. (2012.7-2012.9)
"World Lab" Summer Program.
Mentors: James Landay & Yuanchun Shi.
Designing Learning Tools to Increase Parental Involvement in Elementary Education in China.

Microsoft Research Asia. Research Intern. (2010.12 – 2011.5)
Mentor: Xiang Cao, HCI Group.
A "Real World" Digital Pet on a Handheld Projector.
Best Poster and Demo Award in the 4th MSRA Joint Laboratory Symposium

FULL CONFERENCE & JOURNAL PUBLICATIONS

1. **Yuhang Zhao**, Elizabeth Kupferstein, Hathaitorn Rojnirun, Leah Findlater, Shiri Azenkot. 2020. The Effectiveness of Visual and Audio Wayfinding Guidance on Smartglasses for People with Low Vision. In *Proc. of CHI 2020*, the 2020 SIGCHI Conference on Human Factors in Computing Systems. ACM, New York, NY, USA. *To Appear*.

2. Lei Shi, **Yuhang Zhao**, Ricardo Gonzalez Penuela, Elizabeth Kupferstein, Shiri Azenkot. 2020. Molder: An Accessible Design Tool for Tactile Maps. In *Proc. of CHI 2020*, the 2020 SIGCHI Conference on Human Factors in Computing Systems. ACM, New York, NY, USA. *To Appear*.

3. **Yuhang Zhao**, Sarit Szpiro, Lei Shi, and Shiri Azenkot. 2019. Designing and Evaluating a Customizable Head-Mounted Vision Enhancement System for People with Low Vision. ACM *Trans. Access. Comput* 12, 4, Article 15 (November 2019), 46 pages.

4. **Yuhang Zhao**, Elizabeth Kupferstein, Brenda Castro, Steven Feiner, and Shiri Azenkot. 2019. Designing AR Visualizations to Facilitate Stair Navigation for People with Low Vision. In *Proc. of UIST'19*, the 32nd Annual ACM Symposium on User Interface Software and Technology. ACM, New York, NY, USA. 387-402.

5. **Yuhang Zhao**, Edward Cutrell, Christian Holz, Meredith Ringel Morris, Eyal Ofek, and Andrew D. Wilson. 2019. SeeingVR: A Set of Tools to Make Virtual Reality More Accessible to People with Low Vision. In *Proc. of CHI'19*, the 2019 SIGCHI Conference on Human Factors in Computing Systems. ACM, New York, NY, USA, p. 111.

6. **Yuhang Zhao**, Elizabeth Kupferstein, Doron Tal, and Shiri Azenkot. 2018. "It Looks Beautiful but Scary:" How People with Low Vision Navigate Stairs and Other Surface Level Changes. In *Proc. of ASSETS'18*, the 20th International ACM SIGACCESS conference on Computers and Accessibility. ACM, New York, NY, USA, 307-320. ***Best Paper Honorable Mention***

7. **Yuhang Zhao**, Cynthia L. Bennett, Hrvoje Benko, Edward Cutrell, Christian Holz, Meredith Ringel Morris, and Mike Sinclair. 2018. Enabling People with Visual Impairments to Navigate Virtual Reality with a Haptic and Auditory Cane Simulation. In *Proc. of CHI'18*, the 2018 SIGCHI Conference on Human Factors in Computing Systems. ACM, New York, NY, USA, p. 116.

8. **Yuhang Zhao**, Shaomei Wu, Lindsay Reynolds, and Shiri Azenkot. 2018. A Face Recognition Application for People with Visual Impairments: Understanding Use Beyond the Lab. In *Proc. of CHI'18*, the 2018 SIGCHI Conference on Human Factors in Computing Systems. ACM, New York, NY, USA, p. 215.

9. **Yuhang Zhao**, Shaomei Wu, Lindsay Reynolds, and Shiri Azenkot. 2017. The Effect of Computer-Generated Descriptions on Photo-Sharing Experiences of People with Visual Impairments. *Proc. ACM Hum.-Comput. Interact.* 1, CSCW, 121 (November 2017), 22 pages. (CSCW 2018)

10. Lei Shi, **Yuhang Zhao**, and Shiri Azenkot. 2017. Designing Interactions for 3D printed Models with Blind People. In *Proc. of ASSETS'16*, the 19th International ACM SIGACCESS conference on Computers and Accessibility. ACM, New York, NY, USA, 200-209.

11. Lei Shi, **Yuhang Zhao**, and Shiri Azenkot. 2017. Markit and Talkit: A Low-Barrier Toolkit to

Augment 3D Printed Models with Audio Annotations. In *Proc. of UIST'17*, the 30th Annual ACM Symposium on User Interface Software and Technology. ACM, New York, NY, USA, 493-506.

12. **Yuhang Zhao**, Michele Hu, Shafeka Hashash, Shiri Azenkot. 2017. Understanding Low Vision People's Visual Perception on Commercial Augmented Reality Glasses. In *Proc. of CHI'17*, the 2017 SIGCHI Conference on Human Factors in Computing Systems. ACM, New York, NY, USA, 4170-4181.
13. Sarit Szpiro, Shafeka Hashash, **Yuhang Zhao**, Shiri Azenkot. 2016. How People with Low Vision Access Computer Devices: Understanding Challenges and Opportunities. In *Proc. of ASSETS'16*, the 18th International ACM SIGACCESS conference on Computers and Accessibility. ACM, New York, NY, USA, 171-180. ***Best Paper Honorable Mention***
14. **Yuhang Zhao**, Sarit Szpiro, Jonatha Knighten, and Shiri Azenkot. 2016. CueSee: Exploring Visual Cues for People with Low Vision to Facilitate a Visual Search Task. In *Proc. of UbiComp'16*, the 18th International Conference on Ubiquitous Computing. ACM, New York, NY, USA, 73-84.
15. Sarit Szpiro, **Yuhang Zhao**, and Shiri Azenkot. 2016. Finding a Store, Searching for a Product: A Study of Daily Challenges of Low Vision People. In *Proc. of UbiComp'16*, the 18th International Conference on Ubiquitous Computing. ACM, New York, NY, USA, 61-72.
16. **Yuhang Zhao**, Sarit Szpiro, and Shiri Azenkot. 2015. ForeSee: A Customizable Head-Mounted Vision Enhancement System for People with Low Vision. In *Proc. of ASSETS'15*, the 17th International ACM SIGACCESS conference on Computers and Accessibility. ACM, New York, NY, USA, 239-249.
17. **Yuhang Zhao**, Yongqiang Qin, Yang Liu, Siqi Liu, Taoshuai Zhang, and Yuanchun Shi. 2014. QOOK: Enhancing Information Revisitation for Active Reading with a Paper Book. In *Proc. of TEI '14,* the 8th International Conference on Tangible, Embedded and Embodied Interaction. ACM, New York, NY, USA, 125-132.
18. Yuntao Wang, Chun Yu, **Yuhang Zhao**, Jin Huang, and Yuanchun Shi. 2014. Defining and Analyzing a Gesture Set for Interactive TV Remote on Touch screen Phones. In *Proc. UIC'14*, the 11th International Conference on Ubiquitous Intelligence and Computing. IEEE Computer Society, 362-265.
19. Jin Huang, Chun Yu, Yuntao Wang, **Yuhang Zhao**, Siqi Liu, Chou Mo, Jie Liu, Lie Zhang, and Yuanchun Shi. 2014. FOCUS: Enhancing Children's Engagement in Reading by Using Contextual BCI Training Sessions. In *Proc. of CHI'14*, the 2014 SIGCHI Conference on Human Factors in Computing Systems. ACM, New York, NY, USA, 1905-1908.
20. Lixin Shi, **Yuhang Zhao**, and Jie Tang. 2012. Batch Mode Active Learning for Networked Data. ACM Transactions on Intelligent Systems and Technology (TIST), Volume 3, Issue 2, Article 33 (February 2012), 25 pages.
21. Lixin Shi, **Yuhang Zhao**, and Jie Tang. 2010. Combining Link and Content in Collective Active Learning. In *Proc. of CIKM'10,* the 19th ACM International Conference on Information and Knowledge Management. ACM, New York, NY, USA, 1829-1832.

POSTERS AND WORKSHOP PAPERS

1. Lei Shi, **Yuhang Zhao**, Elizabeth Kupferstein, Shiri Azenkot. A Demonstration of Molder: An Accessible Design Tool for Tactile Maps. In *Proc. of ASSETS 2019,* the 21st International ACM SIGACCESS Conference on Computers and Accessibility. ACM, New York, NY, USA, 664-666.
2. Leah Findlater, Steven Goodman, **Yuhang Zhao**, Shiri Azenkot, Margot Hanley. Fairness Issues in AI Systems that Augment Sensory Abilities. In *Proc. of ASSETS'19 Workshop*, the 21st International ACM SIGACCESS conference on Computers and Accessibility. ACM, New York, NY, USA.
3. Ran Sun, Harald Haraldsson, **Yuhang Zhao**, Serge Belongie. Anon-Emoji: An Optical See-Through

Augmented Reality System for Reducing Appearance Bias in Social Interactions. In *Proc. of CVPR'19 Workshop,* 2019 Conference on Computer Vision and Pattern Recognition, IEEE.

4. **Yuhang Zhao**, Edward Cutrell, Christian Holz, Meredith Ringel Morris, Eyal Ofek, and Andrew D. Wilson. 2019. Demonstration of SeeingVR: A Set of Tools to Make Virtual Reality More Accessible to People with Low Vision. In *Proc. of CHI EA'19*, CHI 2019 Extended Abstracts on Human Factors in Computing Systems. ACM, New York, NY, USA, p. INT042.
5. **Yuhang Zhao**, Cynthia L. Bennett, Hrvoje Benko, Edward Cutrell, Christian Holz, Meredith Ringel Morris, and Mike Sinclair. 2018. Demonstration of Enabling People with Visual Impairments to Navigate Virtual Reality with a Haptic and Auditory Cane Simulation. In *Proc. of CHI EA'18*, CHI 2018 Extended Abstracts on Human Factors in Computing Systems. ACM, New York, NY, USA, p. D409.
6. **Yuhang Zhao**. Using Direct Visual Augmentation to Provide People with Low Vision Equal Access to information. ACM SIGACCESS Accessibility and Computing 120 (2018), 38-42.
7. Shiri Azenkot, and **Yuhang Zhao**. 2017. Designing Smartglasses Applications for People with Low Vision. ACM SIGACCESS Accessibility and Computing 119 (2017). ACM, New York, NY, USA, 19-25.
8. Lei Shi, Ross McLanchlan, **Yuhang Zhao**, and Shiri Azenkot. Magic Touch: Interacting with 3D Printed Graphics, In *Proc. of ASSETS 2016,* the 18th International ACM SIGACCESS Conference on Computers and Accessibility. ACM, New York, NY, USA, 329-330.
9. **Yuhang Zhao**, Yongqiang Qin, Yang Liu, Siqi Liu, and Yuanchun Shi. QOOK: A New Physical-Virtual Coupling Experience for Active Reading, In *Proc. of UIST 2013 Adjunct,* the 26th Annual ACM Symposium Adjunct on User Interface Software and Technology. ACM, New York, NY, USA, 5-6.
10. **Yuhang Zhao**, Alexis Hope, Jin Huang, Yoel Sumitro, James Landay, and Yuanchun Shi. Hero: Designing Learning Tools to Increase Parental Involvement in Elementary Education in China, In *Proc. of CHI EA '13*, CHI 2013 Extended Abstracts on Human Factors in Computing Systems. ACM, New York, NY, USA, 637-642.
11. **Yuhang Zhao**, Chao Xue, Xiang Cao, and Yuanchun Shi. PicoPet: A "Real World" Digital Pet on a Handheld Projector, In *Proc. of UIST 2011 Adjunct,* the 24th Annual ACM Symposium Adjunct on User Interface Software and Technology. ACM, New York, NY, USA, 1-2.
12. Yu Zhong, Yue Suo, Wenchang Xu, Chun Yu, Xinwei Guo, **Yuhang Zhao**, and Yuanchun Shi. Smart Home on Smart Phone. In *Proc. of UbiComp 2011,* the 13th International Conference on Ubiquitous Computing. ACM, New York, NY, USA, 467-468.

PATENTS

1. Hrvoje Benko, Edward Cutrell, Christian Holz, Meredith Ringel Morris, Mike Sinclair, **Yuhang Zhao**, and Cynthia L. Bennett. Apparatus for User in a Virtual Reality System. *To Appear*.
2. Alex Dow, Brett Lavalla, Jeffrey Wieland, Shaomei Wu, **Yuhang Zhao**, Lindsay Reynolds, and Matt King. Accessibility System. United States patent application US 15/299,353. 2018 Apr 26.
3. Yuanchun Shi, Chun Yu, Yuntao Wang, Zhouyue Su, and **Yuhang Zhao**. An Eyes-Free Method of TV Remote Control on Touch Screen Phone. CN 201210056881, May 14, 2014.

WORKSHOP ORGANIZED

- **Yuhang Zhao**, Shiri Azenkot, Steven Feiner, Leah Findlater, Meredith Ringel Morris, Holger Regenbrecht, Martez Mott, Yuanchun Shi, and Chun Yu. Mixed Reality and Accessibility Workshop. *ISMAR'19*, the 18th IEEE/ACM International Symposium on Mixed and Augmented Reality.

- Shiri Azenkot, and **Yuhang Zhao**. Making Virtual Reality Accessible to People with All Visual Abilities. Workshop organized at OurCS@UW+AccessComputing 2019.

HONORS AND AWARDS

2019 Selected for Rising Stars in EECS Workshop.

2019 Oath Fellow, Connected Experience Lab, Cornell Tech.

2018 Selected as HCIC 2018 student attendee (two out of all Cornell IS Ph.D. students).

2018 Best Paper Nominee, ACM ASSETS 2018.

2018 Facebook Ph.D. Fellowship Finalist.

2016 Best Paper Nominee, ACM ASSETS 2016.

2016 GHC Scholar – Scholarship to attend Grace Hopper Celebration for Women.

2015 Verizon Connected Futures Research & Prototyping Challenge, won $15000.

2014 Best Graduate Thesis, Computer Science Department, Tsinghua University.

2014 Siebel Scholar – Awarded annually for academic excellence and demonstrated leadership to 85 top students from the world's leading graduate schools, $35,000.

2012 Tsinghua Scholarship for Outstanding Graduate Students.

2011 Best Poster and Demo Award, the Fourth Microsoft Research Asia Joint Laboratory Symposium, September 27, 2011.

2010 Honorable Mention, American Mathematical Contest in Modeling.

2009 Tsinghua Scholarship for Excellent Students (2007-2008, 2008-2009).

2008 Meritorious of Beijing Contest District in Chinese Mathematical Contest in Modeling.

2008 2nd Place, Tsinghua University's Undergraduate Mathematical Modeling Contest.

GRANTS

- Enhancing the Accessibility of Paper Documents for Low Vision People with a Smart Workplace Application. PI: Shiri Azenkot, Co-PI: **Yuhang Zhao**. Innovations in Employment, Workplace Productivity, and Employee Engagement ($75,000). 2016.

INVITED TALKS

University of Michigan, School of Information. November 2019.
Enabling Mixed Reality for People with Low Vision.

Microsoft, Ethics & Emerging Tech: Training, Insights & Applications. September 2019.
Enhanced Perception Systems to Empower People with Low Vision.

Global Innovation Exchange (GIX) Summer Program. August 2019.
Enhanced Perception Systems to Empower People with Low Vision.

XR Access Symposium 2019, Invited Speaker. July 2019.
Designing Technologies to Make Virtual Reality Accessible for People with Low Vision.

University of Washington, DUB seminar. January 2019.
Designing Technologies to Make Virtual Reality Accessible for People with Low Vision.

Tsinghua University, Computer Science Department, HCI Group. January 2019.

Designing Technologies to Make Virtual Reality Accessible for People with Visual Impairments.

Microsoft, Advanced Reading Technologies Team. May 2018.
Using Direct Visual Augmentations to Provide Low Vision People Equal Access to Information.

TEACHING EXPERIENCE

Teaching Assistant, Cornell Tech, 2018 Fall and 2015 Spring
INFO 6410/ CS 5682: Human-Computer Interaction and Design. Graduate level.

Teaching Assistant, Cornell Tech, 2017 Fall
INFO 5340: Virtual and Augmented Reality. Graduate level.

Teaching Assistant, Cornell Tech, 2016 Spring
INFO 5307: Future Interaction Techniques. Graduate level.

Teaching Assistant, Cornell Tech, 2015 Fall – 2016 Spring
Specialization Project for Connective Media and Health Tech Programs. Graduate level.

Teaching Assistant, Cornell University, 2014 Spring
INFO/COMM 3450 Human Computer Interaction. Undergraduate level.

STUDENTS MENTORED

Kuan Wen Wang, Master Student in Computer Science, Cornell Tech, 2019

Yezhou Ma, Master Student in Computer Science, Cornell Tech, 2019

Hathaitorn Rojnirun, Master Student in Connective Media Program, Cornell Tech, 2019

Ran Sun, Master student in Connective Media Program, Cornell Tech, 2019

Brenda Castro, PhD student in Information Science, Cornell Tech, 2018-2019

Jonathan Knighten, PhD student in Information Science, Cornell Tech, 2016

Michele Hu, Undergraduate student, City University of New York, 2015-2016
First Place of Student Research Competition (SRC) at ASSETS 2015

SERVICE

Program Committee Member

- ACM CSCW 2018 Interactive Posters

Student Volunteer

- ACM ASSETS 2018
- ACM UbiComp 2011

Peer Reviewer

- ACM CHI, Conference on Human Factors in Computing
- ACM UIST, Conference on User Interface Software and Technology
- ACM CSCW, Conference on Computer-Supported Cooperative Work and Social Computing
- ACM UbiComp, Conference on Pervasive and Ubiquitous Computing
- ACM ASSETS, Conference on Computers and Accessibility
- ACM TVX, Conference on Interactive Experiences for Television and Online Video
- Virtual Reality, Journal on Virtual Reality, Augmented and Mixed Reality
- TACCESS, Transactions on Accessible Computing