Yuhan **Hu**

Robot Engineer · Interaction Designer

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Education

Cornell University, Ph.D.
Ithaca, US

Major in Mechanical and Aerospace Engineering, Minor in Computer Science
Sept. 2017 - May. 2023 (Expected)

- Human-Robot Collaboration and Companionship group (advisor: Guy Hoffman)
- Human-Computer Interaction (HCI), Robotics, Conceptual Design, Prototyping

Massachusetts Institute of Technology, Visiting Student
Boston, US

MIT Media Lab
Oct. 2016 - May. 2017

- Fluid Interfaces Group (advisor: Pattie Maes)
- Human-computer Interaction, Wearable Robots, Biomechanics, User Interface

Zhejiang University, B.S.
Hangzhou, China

Chu Kochen Honors College, Department of Mechatronic Engineering
Sept. 2013 - May. 2017

- Minor in Advanced Class of Engineering Education (admission rate 40/5400)
- GPA: 3.97/4.0 (91.23/100) Ranking: 2%
- Laboratory of Soft Machines and Smart Devices (advisor: Tiefeng Li)

Publications

2023	**Hu, Yuhan**, , et al. "Nudging or Waiting? Automatically Synthesized Robot Strategies for Evacuating Noncompliant Users in an Emergency Situation." In Proceedings of the 2023 ACM/IEEE International Conference on Human-Robot Interaction (HRI '23)" (To appear)
2022	**Hu, Yuhan**, , et al. "Touchibo: Multimodal Texture-Changing Robotic Platform for Shared Human Experiences." Adjunct Proceedings of the 35th Annual ACM Symposium on User Interface Software and Technology. 2022.
2022	**Hu, Yuhan**, and Guy Hoffman. "What Can a Robot's Skin Be? Designing Texture-Changing Skin for Human-Robot Social Interaction." ACM Transactions on Human-Robot Interaction (2022).
2020	**Hu, Yuhan**, Sara Maria Bejarano, and Guy Hoffman. "ShadowSense: Detecting Human Touch in a Social Robot Using Shadow Image Classification." Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies 4.4 (2020): 1-24.
2019	**Hu, Yuhan**, Guy Hoffman. "Using skin texture change to design emotion expression in social robots." 2019 14th ACM/IEEE International Conference on Human-Robot Interaction (HRI). IEEE, 2019 *Best Paper Award*
2018	**Hu, Yuhan**, Zhengnan Zhao, Abheek Vimal, and Guy Hoffman. "Soft skin texture modulation for social robotics." In 2018 IEEE International Conference on Soft Robotics (RoboSoft), pp. 182-187. IEEE, 2018.
2017	**Hu, Yuhan**, Sang-won Leigh, and Pattie Maes. "Hand development kit: Soft robotic fingers as prosthetic augmentation of the hand." Adjunct Publication of the 30th Annual ACM Symposium on User Interface Software and Technology (UIST). 2017.

Projects

Ad-hoc Human-Robot Collaborative Team
Cornell University (NSF Award)

HRI Research Scientist
Oct. 2018 - Present

- Experimented human behaviors in an emergency situation when being guided by automatically synthesized robots
- Developed a virtual evacuation scenario in Unity simulator and conducted qualitative and quantitative user research
- Augmented human decision making under stressful situations with AI and intelligent robot

Touchibo for Shared Human Experiences
Cornell University (with TECNICO LISBOA and MIT Media Lab)

Research Scientist
April. 2022 - Present

- Designed and engineered a multi-sensory robotic platform for promoting inclusion among mixed visual abilities
- Designed for visually-impaired children to share physical sensations using a robot as a storyteller and conversation companion

Privacy-Protected Human-Machine Interaction

Cornell University

RESEARCH SCIENTIST

Sept. 2022 - Present

- Designed a privacy-protected alternative for camera-based robots using occluding glasses and computer vision techniques
- Implemented convolutional neural networks to infer human behaviors from blurry images in daily scenarios

Robotic Skin - Goosebumps

Cornell University

PRINCIPAL INVESTIGATOR

Oct. 2017 - Dec. 2019

- Designed and evaluated bio-inspired soft texture-changing robotic skin for human-robot social interaction
- Conducted user-centric research with robots' emotional expressive behaviors through tactile interaction

ShadowSense

Cornell University

PRINCIPAL INVESTIGATOR

May. 2019 - Aug. 2020

- Developed a tactile method to detect human touches in a social robot using shadow image processing
- Used deep learning to recognize touch gestures and performed shadow tracking under different lighting conditions

Hand Development Kit

MIT Media Lab

RESEARCH ASSISTANT

Oct. 2016 - May. 2017

- Developed supernumerary soft robotic fingers as prosthetic augmentation of the hand.
- Controlled a wearable robotic device using EMG signals driving under-actuated soft fingers

Featured Press

2022	**National Geographic**, The audacious science pushing the boundaries of human touch	
2021	**The Engineer**, Shadows help robot AI gauge human touch	
2021	**New Scientist**, Robot that looks like a bin bag can understand what a hug is	
2021	**Cornell Chronicle**, Soft robots use camera and shadows to sense human touch	
2018	**CNET**, This robotic skin gets 'goosebumps'	
2018	**NBC News**, This robot gets goosebumps when it's happy	
2018	**Cornell Chronicle**, Robot prototype will let you feel how it's 'feeling'	
2018	**TechCrunch**, This jolly little robot gets goosebumps	
2018	**TechBriefs**, Is It Important to Know How a Robot is 'Feeling?'	
2018	**IEEE Spectrum**, Feel What This Robot Feels Through Tactile Expressions	

Honors & Awards

2019	**Best Paper Award**, ACM/IEEE International Conference on Human-Robot Interaction (HRI)	*Daegu, South Korea*
2017	**Graduate Student Fellowship**, Cornell University	*Ithaca, US*
2016	**National Innovation Patent**, Soft Crawling Robot Supporting the Smart Devices	*China*
2016	**National Utility Patent**, Fish Robot Autonomously Herding the Fish Swarm	*China*
2016	**2nd Runner-up**, International Robot Design Competition	*Bangkok, Thailand*
2014-16	**First-class Scholarship**, Zhejiang University (top 3%)	*Hangzhou, China*
2015	**First Prize Winner**, "Zhongkong Cup" Robot Competition of Zhejiang University	*Hangzhou, China*
2015	**Outstanding Award**, "Zhou Peiyuan" National Mechanics Contest	*Zhejiang, China*
2014	**First Prize**, Physics Innovation Contest of Zhejiang Province	*Zhejiang, China*

Professional Skills

Rapid Prototyping, 2D/3D CAD (SolidWorks, AutoCad, Fusion360), 3D printer, Laser cutter, CNC, Micro-controller, Electronics, Fabrication

Robot Learning, Machine Learning / Deep Learning (PyTorch), Reinforcement Learning, Computer Vision

Programming, Python (7 years), Java (4 years), C (4 years), Matlab (2 years), ROS, Linux and macOS, Labview

Soft Robotics, Soft Material Modeling and Manufacturing, Tactile Sensing, Electro-pneumatic Control

Design Research, Sketches, Storyboard, Qualitative and Quantitative User Research, Statistical Analysis and Data Visualization