# Shaoxiong Wang

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Google Scholar

## EDUCATION

June 2019 – July 2022 **Massachusetts Institute of Technology**, Cambridge, MA
- Ph.D. in Computer Science
- Major: Robot Learning, Tactile Perception & Manipulation, Computer Vision, Machine Learning
- Minor: Computational Fabrication
- Computer Science and Artificial Intelligence Laboratory (CSAIL)
- Advisor: Edward H. Adelson

Aug. 2017 – June 2019 **Massachusetts Institute of Technology**, Cambridge, MA
- M.S. in Computer Science
- Computer Science and Artificial Intelligence Laboratory (CSAIL)
- GPA: **5.0/5.0**
- Advisor: Edward H. Adelson

Aug. 2013 – July 2017 **Tsinghua University**, Beijing, China
- B.E. in Computer Science & Technology
- GPA: **91/100** Ranking: **13$^{th}$/127**
- Advisor: Jie Tang

## WORK EXPERIENCE

Aug. 2022 – Present **Dexterity, Inc.**, *Robotics Engineer*

**Project: Contact-Rich Robotic Manipulation**
- Designed and implemented a type of reactive robotic manipulation skill with real-time force feedback control, which was **deployed in two major product lines** and **received outstanding feedback from customers.**
- Developed data, visualization, and analytics pipelines for long-term support and continuous learning.
- Developed self-supervised learning methods for manipulation skills from real-world Quality Assurance (QA).
- Integrated contact simulation for development and testing.
- Collaborated with the motion planning and control team to ensure safe and robust robot behaviors under environmental constraints.

**Project: Autonomous Driving in Structured Environments**
- Developed a lightweight autonomous driving system for mobile manipulators in well-structured environments.
- Developed and deployed localization and feedback control for autonomous driving in daily product operation.
- Implemented coordinated control between mobile bases and third-party conveyor systems at customer sites.

Sep. 2017 – Jul. 2022 **MIT**, *Perceptual Science (PerSci) Group*, Research Assistant, Advisor: Prof. Edward H. Adelson
- Developed compact vision-based tactile sensor GelSight Wedge **(ICRA'21)**, which transformed touch signals into images, and provided high-resolution contact geometry and force.
- Worked on robotic manipulation with tactile feedback, e.g. Cable Manipulation **(RSS'20 Best Paper Finalist)**, and Dynamic Swing-Up Manipulation **(IROS'20 Best Paper)**.
- Studied multimodal learning using vision and touch, e.g. 3D Shape Reconstruction **(IROS'18)**, and Material Perception **(CVPR'17 Oral)**.

May 2020 – Aug. 2020 **Facebook AI Research**, *Research Intern*, Mentor: Dr. Roberto Calandra
- Developed fast optical simulation of vision-based tactile sensors for robotic tasks, open-sourced at https://github.com/facebookresearch/tacto
- Learned grasp stability from vision and touch using 1 million simulated data, and achieved 96% accuracy with ResNet.

Feb 2016 – Oct. 2016 **Tencent, Inc.**, *Research Intern*, Mentor: Prof. Xiao Liu
- Studied user financial situation based on Wechat red envelope bahaviours.
- Collaborated on anonymized feature extraction, for user behaviours in sampled Wechat groups.
- Predicted the behaviour of credit card binding, using extract features and random forest models.

Sep. 2015 – June 2016 **Tsinghua University**, *State Key Laboratory of Intelligent Technology and Systems*, Research Assistant, Advisor: Prof. Xiaolin Hu
- Developed a music generation system "DeepMusic" based on Long-short Term Memory (LSTM), embedded with music principles.
- Analyzed and cleaned the musical notes extracted from GTP (Guitar Pro) files.
- Conducted music Turing test, where the system "fooled" about 30% of the subjects.

July 2014 – Sep. 2014 **Sogou, Inc.**, *Research Intern*, Mentor: Feng Shi
- Extracted user monthly statistics features by Hadoop distributed system.
- Selected useful features to achieve the best F1-score using liblinear.
- Published a service to predict whether a user will pay in e-book shop.

Jan. 2014 – June 2016 **Tsinghua University**, *Knowledge Engineering Group (KEG)*, Research Assistant, Advisor: Prof. Jie Tang
- Developed conference analysis for academic network mining https://www.aminer.org
- Analyzed and visualized the most-cited papers/authors for each conference, and the distribution of authors' country, sex, language.
- Extracted the keywords of each conference and visualized them by tag cloud.

## HONORS

Sep 2020 **Best Paper Award**, IROS'20
SwingBot: Learning Physical Features from In-hand Tactile Exploration for Dynamic Swing-up Manipulation
Top 1 out of 2996 paper submissions

July 2020 **Best Paper Award Finalist**, RSS'20
Cable Manipulation with a Tactile-Reactive Gripper
Top 3 out of 321 paper submissions

May 2017 **Grand Prize of Challenge Cup**, Tsinghua University
Ranking top 6 out of 381 teams; Award for the project *DeepMusic*.

Aug. 2016 **1st Place in Microsoft Campus Elite Competition**, Microsoft Research Asia
Ranking 1st out of 280 teams; Award for the project *DeepMusic*.

Oct. 2016 **Sohu Scholarship**, Sohu Inc.

Oct. 2016 **Outstanding Academic Scholarship**, Tsinghua University

Oct. 2014 **Technological Innovation Scholarship**, Tsinghua University

July 2011 **Gold Medal in National Olympiad in Informatics (NOI)**, China Computer Federation (CCF)
Ranking 27th out of 57000.

## SKILLS

Languages Python, C/C++, Matlab, Java

Frameworks PyTorch, Keras, Flask, Qt

Tools git, shell, LaTeX, Final Cut Pro, Adobe {Ps, Pr, Ae}, SolidWorks/Onshape, Eagle

Fabrication 3D Printing, Laser Cutting, Molding, Waterjet, PCB Milling

## TEACHING

Spring 2021 6.819/6.869, Advances in Computer Vision, MIT, Teaching Assistant

Fall 2019 6.819/6.869, Advances in Computer Vision, MIT, Teaching Assistant

## PATENTS

Sep 2022 **Enhanced Depth Estimation Using Deep Learning**
**Shaoxiong Wang**, Yu She, Branden Romero, Edward H. Adelson
Patent Number: WO2022191910A1

Apr 2022 **Learning Physical Features from Tactile Robotic Exploration**
Edward H. Adelson, Branden Romero, Filipe Veiga, **Shaoxiong Wang**, Chen Wang
Patent Number: WO2022087360A1

## PUBLICATIONS

Jan 2023 **DTact: A Vision-Based Tactile Sensor that Measures High-Resolution 3D Geometry Directly from Darkness**
Changyi Lin, Ziqi Lin, **Shaoxiong Wang**, Huazhe Xu
*IEEE International Conference on Robotics and Automation (ICRA'23)* [Project]

Dec 2022 **Visuotactile Affordances for Cloth Manipulation with Local Control**
Neha Sunil*, **Shaoxiong Wang***, Yu She, Edward Adelson, Alberto Rodriguez
(* indicates equal contribution)
*Conference on Robot Learning (CoRL22)* [Project]

Dec 2022 **See, Hear, and Feel: Smart Sensory Fusion for Robotic Manipulation**
Hao Li*, Yizhi Zhang*, Junzhe Zhu, **Shaoxiong Wang**, Michelle A Lee, Huazhe Xu, Edward Adelson, Li Fei-Fei, Ruohan Gao, Jiajun Wu
(* indicates equal contribution)
*Conference on Robot Learning (CoRL22)* [Project]

Aug 2022 **Towards Learning to Play Piano with Dexterous Hands and Touch**
Huazhe Xu, Yuping Luo, **Shaoxiong Wang**, Trevor Darrell, Roberto Calandra
*IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS'22)*

May 2022 **TACTO: A Fast, Flexible and Open-source Simulator for High-Resolution Vision-based Tactile Sensors**
**Shaoxiong Wang**, Michael Lambeta, Po-Wei Chou, Roberto Calandra
IEEE Robotics and Automation Letters (RA-L) and ICRA'22 [Code]

May 2021 **GelSight Wedge: Measuring High-Resolution 3D Contact Geometry with a Compact Robot Finger**
**Shaoxiong Wang**, Yu She, Branden Romero, Edward H. Adelson
*IEEE International Conference on Robotics and Automation (ICRA'21)*. [Project]

May 2021 **PyTouch: A Machine Learning Library for Touch Processing**
Michael Lambeta, Huazhe Xu, Jingwei Xu, Po-Wei Chou, **Shaoxiong Wang**, Trevor Darrell, Roberto Calandra
*IEEE International Conference on Robotics and Automation (ICRA'21)*. [Code]

Oct. 2020 **SwingBot: Learning Physical Features from In-hand Tactile Exploration for Dynamic Swing-up Manipulation**
Chen Wang*, **Shaoxiong Wang***, Branden Romero, Filipe Veiga, Edward H. Adelson
(* indicates equal contribution)
*IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS'20* ***Best Paper Award****)*.
[Project]

July 2020 **Cable Manipulation with a Tactile-Reactive Gripper**
Yu She*, **Shaoxiong Wang***, Siyuan Dong*, Neha Sunil, Alberto Rodriguez, Edward H. Adelson
(* indicates equal contribution)
*The International Journal of Robotics Research (IJRR'21)*
*Robotics: Science and Systems (RSS'20* ***Best Paper Award Finalist****).* [Project]

Oct. 2018 **3D Shape Perception from Monocular Vision, Touch, and Shape Priors**
**Shaoxiong Wang***, Jiajun Wu*, Xingyuan Sun, Wenzhen Yuan, William T. Freeman, Joshua B. Tenenbaum, Edward H. Adelson
(* indicates equal contribution)
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS'18) [Project]

May 2018 **Active Clothing Material Perception using Tactile Sensing and Machine Learning**
Wenzhen Yuan, Yuchen Mo, **Shaoxiong Wang**, Edward H. Adelson
IEEE International Conference on Robotics and Automation (ICRA'18) [Project]

July 2017 **Connecting Look and Feel: Associating the visual and tactile properties of physical materials**
Wenzhen Yuan*, **Shaoxiong Wang***, Siyuan Dong, Edward H. Adelson
(* indicates equal contribution)
Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR'17 **Oral**) [Project]

Nov. 2016 **Active Zero-Shot Learning**
Sihong Xie, **Shaoxiong Wang**, Philip S. Yu
Proceedings of the 25th ACM International on Conference on Information and Knowledge Management (CIKM'16)