YUXIANG MA

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EDUCATION

Massachusetts Institute of Technology, Cambridge *Sep. 2023-Present*
PhD, Mechanical Engineering
GPA: 5.0/5.0 (Up to now)

Massachusetts Institute of Technology, Cambridge *Sep. 2021-Aug. 2023*
Master of Science, Mechanical Engineering
GPA: 5.0/5.0

Tsinghua University, Beijing *Aug. 2016-Jul. 2020*
B.Eng., Engineering Mechanics Tsien Excellence in Engineering Program
Major GPA: 3.89/4.0, Overall GPA: 3.85/4.0, Top 2/28

EXPERIENCE

Tsinghua University, Beijing *Sep. 2020-Sep. 2021*
Feng Research Group, Engineering Mechanics
I did research in Feng Lab as a research assistant. I investigated origami-inspired and kirigami-inspired flexible electronics. Other than that, I simulated the unfolding of a spiral deployable antenna, which accord with experiments.

UC San Diego, San Diego *Jul. 2019-Jan. 2020*
Sheng Xu Research Group, Nanoengineering
As a key member, I researched wearable ultrasonic B-mode imaging and elastography based on soft probes, focusing on data post-processing and simulation of ultrasonic imaging as well as designing and conducting demonstrative experiments

Purdue University, West Lafayett *Jul. 2018-Sep. 2018*
Collaborative Robotics Lab, Polytechnic Institue
I simulated the neck mechanism of a robot and visualized the simulated movement of the mechanism. Then I optimized some parameters of the neck mechanism based on simulation and derived a better mechanism with both higher speed and flexibility.

RESEARCH

TacLink: A Compact Multi-phalanx Robotic Finger with Tactile Sensing and Proprioception
MIT, Cambridge *Mar. 2022-Present*

- Built a three-phalanx robotic finger with only one motor by employing underactuated linkage transmission and only one camera by adopting a mirror-camera sensing strategy.
- Optimized the linkage transmission with a planar linkage mechanism simulator and simplified the tactile sensing hardware with a planar reflection simulator.
- Implemented high-resolution tactile sensing and high-accuracy proprioception by analyzing raw tactile images.

Yuxiang Ma, Jialiang (Alan) Zhao, Edward H Adelson. TacLink: A Compact Multi-phalanx Finger with Vision-based Tactile Sensing and Proprioception. **Under Review**

Tactile Fin Ray-Inspired Gripper
MIT, Cambridge *Oct. 2021-Present*

- Improved the conformability of the Fin Ray finger based on results of finite element simulation.
- Implemented optomechanical simulation based on ABAQUS and MITSUBA to further improve the illumination of the vision-based tactile sensor under deformation.
- Characterized fluorescent paints to obtain high-quality re-radiation models for optical simulation.

Yuxiang Ma*, Arpit Agarwal*, Sandra Q Liu*, Wenzhen Yuan, Edward H Adelson. Scalable, Simulation-Guided Compliant Tactile Finger Design. **Under Review**
Sandra Q Liu, **Yuxiang Ma**, Edward H Adelson. Object Recognition and Force Estimation with the GelSight Baby Fin Ray. **2023 CORL Workshop**-Learning for Soft Robots: Hard Challenges for Soft Systems
Sandra Q Liu, **Yuxiang Ma**, Edward H Adelson. GelSight Baby Fin Ray: A Compact, Compliant, Flexible Finger with High-Resolution Tactile Sensing. **2023 RoboSoft**

Wearable ultrasonic elastography and B-mode imaging based on soft probe
San Diego, US *Jul. 2019-Jan. 2020*

- Established a post-processing protocol for B-mode imaging and elastography and improved its computational efficiency by optimizing the algorithms and employing a multi-language programming strategy with C and MATLAB.
- Conducted acoustic simulation based on the fundamental theory of ultrasonic phased array to guide fabrication.
- Gained knowledge and experience in fabrication, including clean room.

Honejie Hu*, **Yuxiang Ma***, Xiaoxiang Gao*, Dawei Song*, ... Sheng Xu. Three-dimensional mapping of deep tissue modulus by stretchable ultrasonic arrays. **Nature Biomedical Engineering**

Hongjie Hu, Hao Huang, Mohan Li, Xiaoxiang Gao, Lu Yin, Ruixiang Qi, Ray S Wu, Xiangjun Chen,**Yuxiang Ma**, ... Joseph Wang, Sheng Xu. A wearable cardiac ultrasound imager. **Nature**

Xiaoxiang Gao, Xiangjun Chen, Honejie Hu, ..., **Yuxiang Ma**, Aditya Mishra, Sheng Xu. Three-dimensional mapping of deep tissue modulus by stretchable ultrasonic arrays. **Nature Communication**

The effect of arterial stiffness on the accuracy of cuff-based BP measurement
Beijing, China *Oct. 2018-Jun. 2019*

- Proposed a mechanical model to study the impact of the arterial wall on the measured blood pressure and simplified the 3D model into a 2D model based on some mechanical assumptions in order to reduce the complexity of computation.
- Computed the compliance curve of the arterial wall with ABAQUS and used this curve to represent the buckling property of the arterial wall, which is a critical part in the whole model.

- Simulated the vibration of arterial wall and the oscillation of blood pressure when measuring blood pressure, further explained the origin of Krotkoff sound, and discussed some possible effects of arterial rigidity on the accuracy of measured blood pressure. members.

Yuxiang Ma, Ying Chen, Yinji Ma, Xue Feng. The effect of arterial stiffness on cuff-based blood pressure measurement. **Extreme Mechanics Letters**.

ACTIVITIES

Secretary, Publicity department in student government *Feb. 2018 - Feb. 2019*
Officer, Publicity department in student government *Feb. 2017 - Feb. 2018*

SKILLS

Programming Languages and Frameworks: Python, MATLAB, C/C++, ROS, linux.
Engineering Software: Solidworks, Autocad, Abaqus.
Fabrication and manufacturing: Machine shop, Clean room.
Languages: Mandarin Chinese, English.
My research interest includes tactile sensing, robotic manipulation, and robotic simulation. I also have a good grasp of mechanics and numerical simulation, including dynamics, solid Mechanics, fluid mechanics, and numerical computation. I am experienced in FEM simulation, especially with Abaqus.

AWARDS AND SCHOLARSHIPS

Outstanding Graduate of Tsinghua University, Tsinghua University [*top 2%*] *Jun. 2020*
Outstanding Graduate of Beijing, Beijing [*top 5%*] *Jun. 2020*
National Encouragement scholarship for Undergraduate Students, China [*top 10%*] *Oct. 2019*
Secondary Prize in Chinese Undergraduate Mathematical Contest in Modeling, China [*top 5%*] *Nov. 2018*
National Encouragement scholarship for Undergraduate Students, China [*top 10%*] *Oct. 2018*
National Scholarship for Undergraduate Students, China [*top 3%*] *Oct. 2017*
Scholarship for Xuetang Talent Training Program, Tsinghua University *2016-2020*