YUXIANG MA

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ABOUT ME

My research focuses on the intersection of visuo-tactile perception and embodied AI. I am particularly interested in overcoming the robotic data bottleneck by building scalable, interactive data-collection frameworks with more sensing modalities. I am a full-stack roboticist with hands-on experience across hardware and software, from engineering high-resolution tactile grippers and ROS-based control architectures to deploying transformer-based policies for complex, real-world physical interaction.

WORK EXPERIENCE

Research Intern
Robotics and AI Institute, Cambridge, MA   *Jun. 2025-Aug. 2025*
Worked with Team Capture to advance portable, multimodal data collection for robot learning by designing and prototyping a handheld UMI-style device that integrates force-torque and tactile sensors. Built synchronized software for capturing high-quality visuo-tactile manipulation data.

EDUCATION

Massachusetts Institute of Technology, Cambridge   *Sep. 2023-Present*
PhD, Mechanical Engineering
GPA: 5.0/5.0

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

RESEARCH

Compositional Multi-Stream Framework for Multi-Modal Manipulation
GelSight lab, MIT & Embodied Minds Lab, Harvard, Cambridge, MA   *Sep. 2025-Feb. 2026*
Built a composable foundation model with VLM, world model, and high-frequency reactive policy based on tactile/ft. We propose a multi-stream foundation model structure, where high level planning and fine-grain manipulation skills are solved at different levels. The model can solve long-horizon tasks with reactive correction behavior.

Under submission to RSS

Dynamic Regrasping with Parallel Gripper
GelSight lab, MIT, Cambridge, MA   *Sep. 2024-May 2025*
Developed a minimalist dynamic regrasping approach by throwing an object into a ballistic trajectory and regrasping with computed-torque control. Refined throws using asynchronous visual feedback, demonstrating successful mid-air regrasping without high-speed vision or complex hardware.

Yuxiang Ma, Edward H Adelson. Dynamic Regrasping with Asynchronous Vision Feedback using a Minimalist Robotic System. **2025 ICRA RoboLetics 2.0 Workshop**

Foundation Model for Robotic Vision-based Tactile Sensing

GelSight lab, MIT, Cambridge, MA   *Feb. 2024-Apr. 2024*

Developed a unified tactile representation learned across diverse sensors and manipulation tasks, supported by assembling the 3M+ point Foundation Tactile (FoTa) dataset from open-source sources. Built a scalable data-collection pipeline for vision-based tactile sensors using a desktop 3-axis CNC platform.

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Jialiang (Alan) Zhao, **Yuxiang Ma**, Lirui Wang, Edward H Adelson. Transferable Tactile Transformers for Representation Learning Across Diverse Sensors and Tasks. **2024 CoRL**

Underactuated Linkage Finger with Embedded Tactile Sensing

GelSight lab, MIT, Cambridge, MA   *Mar. 2022-Jul. 2023*

Designed a three-phalange underactuated robotic finger with single-motor actuation and a single-camera tactile sensing system. Enabled high-resolution tactile perception and accurate proprioception from raw tactile images, and deployed a two-finger TacLink gripper fully integrated on Franka Panda.

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Yuxiang Ma, Jialiang (Alan) Zhao, Edward Adelson. TacLink: A Compact Multi-phalanx Finger with Vision-based Tactile Sensing and Proprioception. **2024 ICRA**

Tactile Fin Ray-Inspired Gripper

GelSight lab, MIT, Cambridge, MA   *Oct. 2021-Jan. 2024*

Integrated GelSight sensors with compliant Fin Ray fingers and enhanced their conformability through finite-element design iterations. Built an optomechanical simulation framework using ABAQUS and MITSUBA, characterized fluorescent coatings for accurate optical modeling, and developed learning-based methods for force estimation.

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Yuxiang Ma*, Arpit Agarwal*, Sandra Liu*, Wenzhen Yuan, Edward Adelson. Scalable, Simulation-Guided Compliant Tactile Finger Design. **2024 Robosoft**

Sandra Liu, **Yuxiang Ma**, Edward 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

Xu Group, San Diego, CA   *Jul. 2019-Jan. 2020*

Optimized B-mode ultrasound and elastography post-processing with high-performance C++ implementations, supported phased-array transducer design through acoustic simulations, and established reliable verification and experimental protocols to improve elastography consistency and overall system performance.

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Hongjie 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**