

YUXIANG MA

PhD Candidate, Department of Mechanical Engineering, Massachusetts Institute of Technology

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🌐 [yuxiang-ma.github.io](https://github.com/yuxiang-ma)

🎓 [Google Scholar](#)

🐙 [Yuxiang-Ma](#)

RESEARCH INTERESTS

Visuo-tactile perception and robot learning for contact-rich manipulation: tactile sensor and gripper design, scalable human and robot data collection, and visuo-tactile world models and foundation-model systems deployed on real robots.

EDUCATION

Massachusetts Institute of Technology, Cambridge, MA

Sep. 2021–Present

Ph.D. in Mechanical Engineering. Advisor: Prof. Edward Adelson

S.M. in Mechanical Engineering, 2023. GPA: 5.0/5.0

Tsinghua University, Beijing, China

Aug. 2016–Jul. 2020

B.Eng. in Engineering Mechanics, Tsien Excellence in Engineering Program

GPA: 3.85/4.0 (major 3.89/4.0), ranked 2/28

HONORS AND AWARDS

Outstanding Graduate, Tsinghua University (top 2%)

2020

Outstanding Graduate of Beijing (top 5%)

2020

National Encouragement Scholarship, China (top 10%)

2018, 2019

Second Prize, China Undergraduate Mathematical Contest in Modeling (top 5%)

2018

National Scholarship, China (top 3%)

2017

Xuetang Talent Training Program Scholarship, Tsinghua University

2016–2020

RESEARCH EXPERIENCE

Graduate Researcher, GelSight Lab, MIT

Sep. 2021–Present

Advisor: Prof. Edward Adelson

- Visuo-tactile world models learned from human physical interaction (ACTS).
- Composing LLM/VLM, video world model, and tactile behaviors for complex manipulation (CoStream).
- 6-DoF object pose estimation and tracking from touch (YOTO, InvariantCloud).
- Vision-based tactile sensors and fingers (GlowTact, GelLink, simulation-guided Fin Ray design).

Research Intern, Robotics and AI Institute, Cambridge, MA

Jun. 2025–Aug. 2025

- Built a handheld UMI-style data collection device with force-torque and tactile sensors (Team Capture).
- Wrote the synchronized software that records visuo-tactile manipulation data for robot learning.

Research Assistant, Feng Research Group, Tsinghua University

Sep. 2020–Sep. 2021

Advisor: Prof. Xue Feng

- Origami- and kirigami-inspired flexible electronics.
- Simulated the unfolding of a spiral deployable antenna; the simulation matched experiments.

Visiting Researcher, Sheng Xu Research Group, UC San Diego

Jul. 2019–Jan. 2020

Advisor: Prof. Sheng Xu

- Wearable ultrasonic B-mode imaging and elastography with soft probes [J2, J3].
- Data post-processing and simulation of ultrasonic imaging; designed and ran demonstration experiments.

Undergraduate Researcher, Feng Research Group, Tsinghua University

Oct. 2018–Jun. 2019

Advisor: Prof. Xue Feng

- Built an arterial mechanics model and used FEM to study how vessel deformation affects cuff-based blood pressure measurement [J1].
- Explained how arterial stiffness changes Korotkoff sounds and measurement accuracy.

- Simulated a robot neck mechanism and optimized its parameters for higher speed and flexibility.

PUBLICATIONS (* equal contribution)

Journal Articles

- [J3] Stretchable ultrasonic arrays for the three-dimensional mapping of the modulus of deep tissue
H. Hu*, **Y. Ma***, X. Gao*, D. Song*, M. Li, H. Huang, X. Qian, R. Wu, K. Shi, H. Ding, ..., S. Xu
Nature Biomedical Engineering, 7(10):1321–1334, 2023 [paper]
- [J2] A wearable cardiac ultrasound imager
H. Hu, H. Huang, M. Li, X. Gao, L. Yin, R. Qi, R. S. Wu, X. Chen, **Y. Ma**, K. Shi, ..., S. Xu
Nature, 613(7945):667–675, 2023 [paper]
- [J1] The effect of arterial stiffness on cuff-based blood pressure measurement
Y. Ma, Y. Chen, Y. Ma, X. Feng
Extreme Mechanics Letters, 48:101298, 2021 [paper]

Conference Papers

- [C7] CoStream: Composing Simple Behaviors for Generalizable Complex Manipulation
H. Chen*, **Y. Ma***, S. Tian, X. Han, W. Huang, F. Wu, Y. Li, J. Wu, E. Adelson, Y. Du
Conference on Robot Learning (CoRL), 2026 [website] [arXiv] [code]
- [C6] InvariantCloud: A Globally Invariant, Uniquely Indexed Point Cloud Framework for Robust 6-DoF Tactile Pose Tracking
P. Ye*, **Y. Ma***, Y. Zhou, W. Chen, W. Dong, M. Duan
IEEE International Conference on Robotics and Automation (ICRA), 2026 [arXiv]
- [C5] RichMap: A Reachability Map Balancing Precision, Efficiency, and Flexibility for Rich Robot Manipulation Tasks
Y. Lu, **Y. Ma**, J. Pan
Workshop on the Algorithmic Foundations of Robotics (WAFR), 2026 [arXiv] [code]
- [C4] Transferable Tactile Transformers for Representation Learning Across Diverse Sensors and Tasks
J. Zhao, **Y. Ma**, L. Wang, E. Adelson
Conference on Robot Learning (CoRL), 2024 [website] [arXiv] [code]
- [C3] GelLink: A Compact Multi-phalanx Finger with Vision-based Tactile Sensing and Proprioception
Y. Ma, J. Zhao, E. Adelson
IEEE International Conference on Robotics and Automation (ICRA), 2024 [arXiv] [video]
- [C2] Scalable, Simulation-Guided Compliant Tactile Finger Design
Y. Ma*, A. Agarwal*, S. Q. Liu*, W. Yuan, E. Adelson
IEEE International Conference on Soft Robotics (RoboSoft), 2024 [arXiv] [video]
- [C1] GelSight Baby Fin Ray: A Compact, Compliant, Flexible Finger with High-Resolution Tactile Sensing
S. Q. Liu, **Y. Ma**, E. Adelson
IEEE International Conference on Soft Robotics (RoboSoft), 2023 [arXiv] [video]

Preprints

- [P6] ACTS: Learning Visuo-Tactile World Models from Human Physical Interaction
Y. Ma*, W. Xu*, P. Ye, A. Mei, Y. R. Song, T. Li, H. Chen, E. Adelson
arXiv:2610.24285, 2026 [arXiv]
- [P5] Robot Learning with Visual Predicted Force
H. Chen*, F. Wu*, **Y. Ma**, M. Mete, P. Ye, J. Shen, C. Zhu, A. Ruggeri, K. Cheung, J. Mao, E. Adelson, J. Wu, R. D. Howe, Y. Du
arXiv:2610.04741, 2026 [website] [arXiv] [code]
- [P4] GlowTact: Simple and Compact Vision-Based Tactile Sensing with High Sensitivity and Spatial Resolution
Y. Ma*, M. Tippur*, P. Ye, S. Q. Liu, H. Chen, F. R. Cottrell, E. Adelson
arXiv:2609.32471, 2026 [website] [arXiv]

- [P3] A Brain-inspired Hierarchical Framework for Zero-Shot Robot Task Reasoning and Execution
G. Wang, P. Ye, Q. Ying, Y. Jing, **Y. Ma**, H. Chen, H. Wu, O. Wysocki, M. Duan, B. Sheil
arXiv:2609.05985, 2026 [arXiv]
- [P2] RoboEdit: Turning Human Manipulation Videos into Scalable Robot Experience
Y. Guo, Z. Tao, Y. Jiang, Y. Chen, Z. Dou, **Y. Ma**, Y. Yang, D. Terzopoulos, Y. Jiang, C. Jiang
arXiv:2608.18948, 2026 [website] [arXiv]
- [P1] You Only Touch Once: 6-DoF Object Pose Estimation from Single Tactile Contact
P. Ye*, **Y. Ma***, H. Chen, G. Wang, Y. Jing, B. Sheil, Y. Du, E. Adelson
arXiv:2606.28899, 2026 [arXiv]

Workshop Papers

- [W2] Dynamic Regrasping with Asynchronous Vision Feedback using a Minimalist Robotic System
Y. Ma, E. Adelson
ICRA 2025 Workshop: RoboLetics 2.0 [paper]
- [W1] Object Recognition and Force Estimation with the GelSight Baby Fin Ray
S. Q. Liu, **Y. Ma**, E. Adelson
CoRL 2023 Workshop on Learning for Soft Robots [arXiv]

TALKS AND PRESENTATIONS

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|---|------------------|
| Tactile foundation models for robotic manipulation
Ant Group | <i>Feb. 2026</i> |
| Dynamic regrasping with asynchronous vision feedback
ICRA 2025 Workshop: RoboLetics 2.0 | <i>May 2025</i> |

TEACHING

Teaching Assistant, Structural Mechanics, Massachusetts Institute of Technology

PROFESSIONAL SERVICE

Journal reviewer: IEEE Transactions on Robotics (T-RO), IEEE Robotics and Automation Letters
Conference reviewer: RSS, ICRA, IROS, ICLR

TECHNICAL SKILLS

Programming: Python, C/C++, ROS
Learning: video world models, tactile representation learning, LoRA fine-tuning
Hardware/simulation: SolidWorks, Onshape, ABAQUS, Mitsuba, Blender, Unity, machine shop