Haobo Fang

+1 734-972-2668 • fanghb@umich.edu • My Homepage

EDUCATION

University of Michigan - Ann Arbor — **Ann Arbor, US**
B.S.Eng. in Computer Engineering, Cumulative GPA: 3.91 / 4.0 — *Feb. 2024 – Apr. 2026*

Shanghai Jiao Tong University — **Shanghai, China**
B.Eng. in Mechanical Engineering, Core GPA: 3.76 / 4.0 — *Sep. 2022 – Aug. 2026*

RESEARCH INTERESTS

I am broadly interested in building scalable, adaptable, and reliable robots that interact with humans in daily activities. My research highlights the following perspectives: 1) Origami-Inspired soft robotic arm. 2) Bio-inspired robot. 3) Advanced control system development. 4) Intelligent manufacturing scenarios enhanced by learning.
Research Areas: Soft robotics, Locomotion, Biomechanics, Wearable devices, Multimodal Sensing

EXPERIENCE

Hybrid Dynamic Robotics Lab — **University of Michigan**
Undergraduate Researcher, Advisor: Prof. Xiaonan Huang — *Sep. 2024 - Present*

Origami-Inspired Modular Soft Robotic Arm

- Developed a modular arm based on **Kresling origami actuators**, achieving a predictable linear relationship between contraction and twist.
- Integrated **CAN-based distributed communication and sensing**, enabling plug-and-play modularity, fault tolerance, and self-perception.
- Applied the **Piecewise Constant Curvature (PCC) model** and a hybrid controller that used a Koopman-based model, model predictive control, and PID loops for dynamics. Achieved sub-millimeter positioning accuracy (**state-of-the-art**), **T-RO** manuscript in prep.

MAGISH: MAGnetically Switched Bistable Swimming for Insect-Scale Robotic Fish

- Leveraged **electromagnetic actuation and bistability** to realize the fin's snap-through motion, enabling untethered high mobility and agility.
- Employed the **Discrete Elastic Rod (DER) framework** to simulate the tail's motion and optimize its geometric configuration for improved performance.
- Achieved 2 body lengths/s swimming (leading design); **first-author RA-L** manuscript in prep.

Data-informed Design and Intelligent Systems Lab — **Shanghai Jiao Tong University**
Undergraduate Researcher, Advisor: Prof. Youyi Bi — *Mar. 2023 - May. 2025*

A Zero-shot Robot Tool Manipulation Framework based on Visual Prompt-Enhanced Keypoint Representation and Multi-modal Constraints

- Developed a zero-shot robotic manipulation framework leveraging Vision-Language Models (VLMs) and Visual Foundation Models (VFMs).
- Integrated keypoint localization, multi-modal primitive inference, and real-time error detection to enable generalizable and precise tool use in complex manufacturing scenarios.

AWARDS

The Jackson and Muriel Lum Scholarship (top 2%) — University of Michigan, 2025, 2024
2025 Robotics Accomplishments recognition — University of Michigan, 2025
Best Poster Award — ICRA 2025 Workshop, 2025
Dean's Honor List — University of Michigan, 2025, 2024
Shanghai Regional Gold Award — China International College Students' Innovation Competition, 2024
Huatai Securities Technology Scholarship (top 1%) — Shanghai Jiao Tong University, 2024
"Student of the Year" (Group Award) (top 0.02%) — Shanghai Jiao Tong University, 2024
Top Student in Morality, Intelligence, and Fitness (top 3%) — Shanghai Jiao Tong University, 2023
C-level Scholarship — Shanghai Jiao Tong University, 2023

PUBLICATIONS

[1] J. Wang, Y. You, X. Zhang, **H. Fang**, J. Wang, and X. Huang, "Origami-Inspired Modular Soft Robotic Arm" *ICRA Workshop on Soft Robotics for Space Applications*, 2025.

[2] J. Wang, Y. You, X. Zhang, **H. Fang**, J. Wang, and X. Huang, "Origami Inspired Soft Robotic Arm: A Modular Platform for Manipulation" *Extended Abstract, RoboSoft*, 2025.

[3] J. Wang, Y. You, X. Zhang, **H. Fang**, J. Wang, and X. Huang, "Lightweight, Proprioceptive, Origami-Inspired Soft Robotic Arm for High Payload, Low-Cost Reconfigurable Manipulation," *U.S Patent*, *Provisional patent in preparation, U-M File 2025-609*, 2025.

SERVICE

[1] **Instructional Assistant**, ECE Division, University of Michigan, Fall 2025.
Served as IA for EECS 216: Introduction to Signals and Systems.

[2] **Volunteer**, IEEE International Conference on Robotics and Automation (ICRA), Atlanta, May 2025.

[3] **Presenter**, ICRA workshop, Atlanta, May 2025.
Shared our work in ICRA Workshop on *Soft Robotics for Space Applications*.

[4] **Captain**, Eighth "Rongchang Chucai" Plan, Shanghai, Spring 2024 – Spring 2025.
Led team activities and coordinated logistics for the eighth cohort.

COURSEWORK PROJECTS

INSIGHT: In-device Navigation and Scene Interpretation Glasses for Human-centered Travel
A wearable system integrating ESP32-S3 smart glasses and a Jetson-based base station, providing a low-cost, privacy-preserving solution for real-time obstacle-aware navigation and scene description for visually impaired users.
Embedded Control Systems: Adaptive Cruise Control with Haptic Interface
Course-long exploration of embedded control using NXP S32K144 microcontroller and haptic wheel interface, culminating in an Adaptive Cruise Control (ACC) system with automatic steering.

SKILLS

Python, C/C++, MATLAB (Simulink), Rust, Numpy, PyTorch, Unity, Solidworks, Wolfram Mathematica, COMSOL Multiphysics, EasyEDA, STM32, Espressif, Arduino, ROS2, freeRTOS