Jingyu Liu

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EDUCATION | SJTU–UM Dual-Degree Program

University of Michigan 2025–2027 (Expected)
Bachelor of Science in Computer Engineering; GPA: 4.0/4.0

Shanghai Jiao Tong University 2023–2027 (Expected)
Bachelor of Science in Mechanical Engineering; GPA: 3.76/4.0

RESEARCH INTERESTS

- Robot Control; Contact and Motion Planning; Model-Based Reinforcement Learning; Legged Robotics

PUBLICATIONS

[C1] **J. Liu**, Y. Qin, C. E. Ramos Chuquire, L. Zhu, A. Makke, R. Vasudevan, and Y. Ding. "Hybrid Model of Actuators with Strain Wave Gearboxes for Robust Humanoid Policy Training." Submitted to ICRA 2027.

[C2] Y. Zhuang, H. Zhang, **J. Liu**, and Y. Ding. "PushMimic: Learning Adaptive Humanoid Box Pushing via Dynamic Motion Augmentation and Reference Distillation." Submitted to ICRA 2027.

[C3] Y. Qin, D. Cheng, **J. Liu**, and Y. Ding. "Agile Monoped Hopping on Complex and Discrete Terrain via Kinodynamic Planning with Distilled MPPI Steering." Submitted to ICRA 2027.

RESEARCH EXPERIENCE

Hybrid Actuator Modeling for Humanoid Control [C1] Apr 2026 – Sep 2026
University of Michigan, ARCaD Lab, Advisor: Prof. Yanran Ding
Joint project with Roahm Lab, in collaboration with Prof. Ram Vasudevan

- Identified torque mismatch in high-torque-density strain-wave actuators as a limit on sim-to-real transfer.
- Developed a hybrid actuator model from dynamometer data, identifying friction and inertia parameters and training a neural network on the residual errors, and integrated it into Isaac Lab to train humanoid locomotion and box-manipulation policies.
- Reduced out-of-range quasi-static torque RMSE by 47% relative to an end-to-end neural model, and improved training efficiency and mean task completion from 67.5% to 85.0% across four MuJoCo sim-to-sim tasks, compared with the strongest domain-randomized ideal-actuator baseline.

PushMimic: Adaptive Humanoid Box Pushing [C2] Jun 2026 – Sep 2026
University of Michigan, ARCaD Lab, Advisor: Prof. Yanran Ding

- Addressed adaptation of a single reference motion to varying box masses and slopes in humanoid pushing.
- Built the motion-imitation baseline and tested policy training with trajectory-optimized motions.
- Improved pushing adaptability with the full PushMimic framework, reaching 93.0% simulation success versus 74.3% for the baseline across 5 to 15 kg boxes and 0 to 18° slopes.

Monoped Hopping on Complex and Discrete Terrain [C3] Jun 2026 – Sep 2026
University of Michigan, ARCaD Lab, Advisor: Prof. Yanran Ding

- Planned long-horizon, dynamically feasible monoped hopping trajectories on complex terrain.
- Developed a general trajectory-tracking policy for diverse Flow-RRT trajectories and a pure-RL terrain-traversal baseline.
- Cut benchmark planning time in simulation from 2 to 3 minutes (MPPI-RRT) to 5 to 6 seconds with Flow-RRT, and achieved over 95% planning success in separate tests on 12 to 15 m stepping-stone terrains.

Custom Biped Development and TO-Based Multi-Skill Policy Learning Oct 2026 – Present
University of Michigan, ARCaD Lab, Advisor: Prof. Yanran Ding | Ongoing

- Developing a custom biped platform for learning and evaluating multi-skill locomotion policies.
- Learning a unified policy conditioned on motion commands, skills, and gait parameters from trajectory-optimized demonstrations, with a high-level planner for skill and parameter selection.

Visual Locomotion for Quadrupeds Oct 2025 – Dec 2025
University of Michigan, Advisor: Prof. Bernadette Bucher

- Integrated depth perception into quadruped locomotion through teacher-student imitation learning, reducing the foot-stumble penalty to near zero in simulation relative to an end-to-end learning baseline.

Energy Efficiency of Mixed-Model Production Systems Jun 2024 – Jun 2025
Shanghai Jiao Tong University, Advisor: Prof. Jing Zou

- Modeled mixed-product production lines and designed machine on/off schedules to reduce idle energy use, keeping non-bottleneck machines off for an average of 42.6% of simulation time.

HONORS AND AWARDS

Silver Award, China International College Students' Innovation Competition (Shanghai) 2025
Honorable Mention, Mathematical Contest in Modeling (MCM) May 2025
Bronze Medal, 2023 University Physics Competition (UPC) Jan 2024

TEACHING, LEADERSHIP AND ACTIVITIES

Teaching Assistant, ECE2150J (Introduction to Circuits), SJTU May – Aug 2025
Director, Integrated Media Center, Joint Institute, SJTU Feb – Jul 2025
Member, Martial Arts Sunshine Team, SJTU Sep 2024 – Jun 2025

SKILLS

Reinforcement Learning; Imitation Learning; Model-Based Control; CAD Modeling; Actuator System Identification