Yulun Zhuang

// Ph.D. Candidate in Robotics, University of Michigan

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01 Education

University of Michigan 2024.08 – 2028.05 (expected)
Ph.D. in Robotics, GPA 4.00/4.00 Ann Arbor, MI

University of Michigan 2022.08 – 2024.05
M.S. in Robotics, GPA 4.00/4.00 Ann Arbor, MI

Southern University of Science and Technology 2018.09 – 2022.06
B.Eng. in Robotics Engineering, GPA 3.77/4.00 Shenzhen, China

02 Research Experience

ARCAD Lab, University of Michigan 2024.05 – present
Graduate Student Research Assistant, advised by Prof. Yanran Ding Ann Arbor, MI

>> **Humanoid Whole-Body Learning from a Single Reference Motion** [6]

+ Augmented one level-ground reference motion into a dynamically feasible dataset over box mass and ramp slope via sampling-based trajectory optimization, then distilled it into one policy that raises simulated push success from 57.8% to 88.8%, cuts the arms' cost of push by 22%, and pushes boxes up to 19 kg on treadmill inclines up to 12.6° with a Unitree G1.

>> **Co-Design of Legged Robots with Parallel Elasticity** [5]

+ Injected surrogate gradients from a differentiable kinodynamic model and a design-aware policy into CMA-ES, reaching 6× lower cross-seed standard deviation than vanilla CMA-ES and cutting the motor Joule heating loss of a hand-tuned hopping robot design by 53% on hardware.

>> **Model Predictive Control for Efficient Locomotion and Loco-Manipulation** [3], [4]

+ Developed a kinodynamic MPC that exploits unidirectional parallel springs, cutting motor Joule heating loss by 20% on hardware.
+ Co-developed hierarchical NMPC and trajectory optimization for pedipulation on a wheeled bipedal robot, which slides a 4 kg object and retrieves a 1 kg object from under a desk.

CLEAR Lab, Southern University of Science and Technology 2021.10 – 2022.05
Undergraduate Research Assistant, advised by Prof. Wei Zhang Shenzhen, China

+ Trained an RL policy (PPO, Isaac Gym) that tunes convex MPC weights, improving quadruped tracking by 20% over MPC alone with sim-to-real on a Unitree Aliengo. Released as `rl-mpc-locomotion` (1k+ GitHub stars).

03 Industry Experience

PlusAI, Inc. 2023.05 – 2023.08
Software Engineer Intern, Motion Planning Santa Clara, CA

+ Built an online trapezoidal velocity planner in the distance domain that regulates target speed through map speed-limit changes for autonomous trucks, validated against edge cases from road-test data.
+ Merged 15 pull requests into the motion planning codebase and closed 5 road-test issues together with the planning and localization teams.

04 Skills

Research Areas	Reinforcement Learning, Imitation Learning, Sim-to-Real Transfer, Model Predictive Control, Trajectory Optimization, Robot Co-Design
Programming	Python, C++, MATLAB, LaTeX
Frameworks	PyTorch, JAX, CasADi, Isaac Lab, MuJoCo, Pinocchio, ROS 2, Git
Robots	Unitree G1, Unitree Go2, LimX Tron1, MUPS hopper, UR5

05 Publications

[6] **PushMimic: Learning Adaptive Humanoid Box Pushing via Dynamic Motion Augmentation and Reference Distillation**
Yulun Zhuang, Hanyu Zhang, Jingyu Liu, Yanran Ding
Under review, IEEE International Conference on Robotics and Automation (**ICRA**), 2027.

[5] **SurGE: Surrogate Gradient-guided Evolution for Co-design of Legged Robots with Parallel Elasticity**
Yulun Zhuang, Yue Qin, Justin Lu, Zelin Shen, Yichen Wang, Sicheng He, Yanran Ding
IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS**), 2026.

[4] **Mobile Pedipulation for Object Sliding via Hierarchical Control on a Wheeled Bipedal Robot**
Yue Qin, **Yulun Zhuang**, Zelin Shen, Yanran Ding
IEEE Robotics and Automation Letters (**RA-L**), vol. 11, no. 8, 2026.

[3] **Kinodynamic Model Predictive Control for Energy Efficient Locomotion of Legged Robots with Parallel Elasticity**
Yulun Zhuang, Yichen Wang, Yanran Ding
IEEE International Conference on Robotics and Automation (**ICRA**), 2025.

[2] **Multimodal Model-Based Reinforcement Learning for Autonomous Racing**
Elena Shrestha, Hanxi Wan, Chetan Reddy, **Yulun Zhuang**, Ram Vasudevan
Deployable RL Workshop, Reinforcement Learning Conference (**RLC**), 2024.

[1] **Height Control and Optimal Torque Planning for Jumping With Wheeled-Bipedal Robots**
Yulun Zhuang, Yuan Xu, Binxin Huang, Mandan Chao, Guowei Shi, Xin Yang, Kuangen Zhang, Chenglong Fu
IEEE International Conference on Advanced Robotics and Mechatronics (**ICARM**), 2021.

06 Teaching

Graduate Student Instructor, ROB 550 Robotic Systems Laboratory, University of Michigan — Fall 2026
+ Built a MuJoCo digital twin of the lab station, with the arm, gripper, camera, and blocks, so all 92 students can debug their code on their own laptops and run it unchanged on the real arm.

Graduate Student Instructor, ROB 498/599 Legged Robot Control, University of Michigan — Fall 2025
+ Co-developed the course codebase and homework from scratch, gave a guest lecture on RL for legged robots, and led two workshops, one on MuJoCo simulation with the lab's `arc-bridge`.

07 Service

Reviewer: RSS, ICRA, IROS, Humanoids, ACC, T-MECH — 2024 – present
Robotics Outreach Ambassador, Robotics Department, University of Michigan — 2024, 2025

08 Mentoring

M.S. Students: Eli Fox (now at Novateur), Maaz Hussain (now at SpaceX)
Undergraduate Students: Eric Chen (now at Saronic), Jingyu Liu

09 Honors & Awards

Outstanding Undergraduate Thesis, Southern University of Science and Technology — 2022
Outstanding Graduate, Southern University of Science and Technology — 2022
First Class Merit Student Scholarship (top 5%), Southern University of Science and Technology — 2020, 2021