

# Zixin Zhang

[Website](#) | [GitHub](#) | [LinkedIn](#) | [Google Scholar](#) | [zixinz@u.northwestern.edu](mailto:zixinz@u.northwestern.edu) | +1 412-759-4120

## RESEARCH INTERESTS

I have a strong interest in sample-efficient robot learning and automated data collection, with a current focus on online reinforcement learning (RL) and physics-based computing. I strive to develop methods that combine strong empirical performance with theoretical guarantees and generality. I also enjoy deploying and tuning algorithms on real hardware, as well as implementing optimization solvers.

## EDUCATION

- **Northwestern University (NU)** Evanston, IL, USA  
*Ph.D. Candidate in Mechanical Engineering* Sep. 2023 – Present
  - Advisor: Prof. Todd D. Murphey
- **Carnegie Mellon University (CMU)** Pittsburgh, PA, USA  
*Master of Science in Mechanical Engineering - Research* Aug. 2021 – May 2023
  - Advisor: Prof. Zachary Manchester
- **Southern University of Science and Technology (SUSTech)** Shenzhen, Guangdong, China  
*Bachelor of Engineering in Robotics Engineering* Aug. 2017 – June 2021

## PUBLICATIONS

- **Zixin Zhang**, James Avtges, Todd D. Murphey, “Sample-Efficient Online Control Policy Learning with Real-Time Recursive Model Updates”, Conference on Robot Learning (CoRL), 2025, [paper](#), [website](#)
- **Zixin Zhang**, John Z. Zhang, Shuo Yang, Zachary Manchester, “Robots with Attitude: Singularity-Free Quaternion-Based Model-Predictive Control for Agile Legged Robots”, IEEE International Conference on Robotics and Automation (ICRA), 2025, [paper](#), [website](#)
- Shuo Yang, **Zixin Zhang**, Benjamin Bokser, Zachary Manchester, “Multi-IMU Proprioceptive Odometry for Legged Robots”, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), **Best Paper Award on Safety, Security, and Rescue Robotics Finalist**, 2023, [paper](#)
- Shuo Yang, **Zixin Zhang**, Zhengyu Fu, Zachary Manchester, “Cerberus: Low-Drift Visual-Inertial-Leg Odometry For Agile Locomotion”, IEEE International Conference on Robotics and Automation (ICRA), 2023, [paper](#)

## EXPERIENCE

- **Robotics and AI Institute (formerly Boston Dynamics AI Institute)** Cambridge, MA, USA  
*Ph.D. Research Intern, HALO Team* Jan. 2026 – June 2026
  - Developed and deployed a highly robust humanoid whole-body controller for loco-manipulation tasks using RL with mjlab and Isaac Lab.
  - Solved a challenging humanoid loco-manipulation task using RL within a hierarchical multi-agent framework.
- **Interactive & Emergent Autonomy Lab, NU** Evanston, IL, USA  
*Graduate Student Researcher* Sep. 2023 – Present
  - Developed a sample-efficient model-based RL method and validated it on a soft-actuated parallel manipulator.
  - Implemented an augmented Lagrangian iLQR solver in JAX for internal lab use.
  - Built an RL training environment in Isaac Gym for training the Unitree G1 and Omnid mocobots on collaborative heavy-object loco-manipulation.
  - Developed a GPU-native ray-tracing and training framework for arbitrarily shaped lenses with CUDA, enabling massively parallel simulation of thousands of independent environments for large-scale learning and optimization.
  - Implemented a type 1 diabetes simulator in JAX for massively parallel patient rollouts; trained student policies via DAGger with an MPPI teacher and conducted ablation studies to identify critical observations for glucose control.
- **Robotic Exploration Lab, CMU** Pittsburgh, PA, USA  
*Graduate Student Researcher* Aug. 2022 – Sep. 2023
  - Engineered and validated the MIPO sensing system, improving legged-robot odometry with foot-mounted IMUs.
  - Developed a singularity-free quaternion-based MPC method for precise and robust attitude control of legged robots.
  - Performed extensive hardware experiments for Cerberus, a state-of-the-art visual-inertial-leg odometry system.
  - Extended the C++ implementation of ALTRO to support quaternion-based trajectory optimization.

- **Biorobotics Lab, CMU** Pittsburgh, PA, USA  
*Graduate Student Researcher* *Oct. 2021 – Aug. 2022*
  - Co-developed an open-source C++ quadruped controller with 800+ stars on GitHub.
  - Designed a hybrid trajectory-optimization method for soft landings and validated it on simulated quadruped drops.
  - Designed an MPC framework that achieved robust dynamic walking in simulation for a semi-wheeled-legged robot.
- **BionicDL Lab, SUSTech** Shenzhen, Guangdong, China  
*Undergraduate Student Researcher* *July 2020 – May 2021*
  - Achieved >90% contact-position accuracy on a soft robotic finger via vision-based tactile sensing and a CNN.
  - Developed DDPG- and TD3-based walking policies in simulation for a quadruped robot with overconstrained legs.
- **Biorobotics Lab, CMU** Pittsburgh, PA, USA  
*Undergraduate Visiting Student* *Aug. 2019 – Dec. 2019*
  - Built a ROS-based software framework to control locomotion for a bipedal robot.
  - Built an Arduino-based testing tool to measure Flyped's body and leg posture and angular velocity.

## OPEN-SOURCE

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- [humanoid-trajopt-playground](#), independent developer, 90 GitHub stars
- [quaternion-mpc](#), independent developer, 78 GitHub stars
- [A1-QP-MPC-Controller](#), key contributor, 833 GitHub stars

## SCHOLARSHIPS & FELLOWSHIPS

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- Northwestern University Walter P. Murphy and Royal E. Cabell Fellowship (2023)
- SUSTech Outstanding Student Scholarship (2018, 2019, 2020)
- SUSTech Freshman Scholarship (2017)

## HONORS & AWARDS

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- Best Paper Award on Safety, Security, and Rescue Robotics Finalist, IROS, 2023
- SUSTech Department of Mechanical and Energy Engineering Outstanding Graduate, 2021
- SUSTech Zhicheng College Outstanding Graduate, 2021
- Third Prize, South Division, RoboMaster University Championship, 2019

## SERVICE

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- **Reviewer**  
*Peer-Reviewed Journals and International Academic Conferences*
  - The International Journal of Robotics Research (IJRR)
  - IEEE Robotics and Automation Letters (RA-L)
  - Conference on Robot Learning (CoRL) (2025, 2026)
  - Conference on Neural Information Processing Systems (NeurIPS) (2026)
  - IEEE International Conference on Robotics and Automation (ICRA) (2024, 2025, 2026)
  - IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) (2024, 2025, 2026)
  - IEEE-RAS International Conference on Humanoid Robots (Humanoids) (2026)
- **Volunteer Museum Presenter**  
*Griffin Museum of Science and Industry*
  - Robot Block Party (2024, 2025)

## TEACHING

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- CMU, 24-760 Robot Dynamics and Analysis, Grader, Fall 2022
- NU, ME 314 Theory of Machines - Dynamics, TA, Fall 2024, Fall 2025, Fall 2026

## SKILLS

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- **Programming:** C/C++, Python, Julia, Java, MATLAB
- **Software:** Gazebo, CoppeliaSim, PyBullet, SOLIDWORKS, Simulink, Adobe Ps/Pr/Br/Lr
- **Other:** Linux, Git, Wandb, Robot Operating System, Docker, MuJoCo, Isaac Gym/Sim, mlab, Isaac Lab, JAX, Arduino/Teensy, Eigen, OSQP, IPOPT, Crocoddyl, Pinocchio, OpenCV, PyTorch, Keras, L<sup>A</sup>T<sub>E</sub>X, Codex, Claude Code