Qianzhong Chen

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EDUCATION

Stanford University **Stanford, CA**

Master of Science in Mechanical Engineering *Sept. 2023-June 2025(expected)*

University of Illinois Urbana-Champaign (UIUC) **Champaign, IL**

Zhejiang University (ZJU) **Hangzhou, Zhejiang, China**

Bachelor of Science in Mechanical Engineering (Joint Program) *Sept. 2019-June 2023*

PUBLICATION

- **Q. Chen**, S. Cheng and N. Hovakimyan, "Simultaneous Spatial and Temporal Assignment for Fast UAV Trajectory Optimization Using Bilevel Optimization," in IEEE Robotics and Automation Letters, vol. 8, no. 6, pp. 3860-3867, June 2023, doi: 10.1109/LRA.2023.3273399.
- **Q. Chen**, J. Li, S. Cheng, N. Hovakimyan, Q. Nguyen, "Autotuning Bipedal Locomotion MPC with GRFM-Net for Efficient Sim-to-Real Transfer," in 2025 IEEE International Conference on Robotics & Automation (ICRA), under review, https://arxiv.org/abs/2409.15710.

RESEARCH EXPERIENCE

Research on Autonomous Unmanned Aerial Vehicles (UAV) **Champaign, IL**

Research Assistant, Advanced Controls and Research Laboratory, UIUC *Jan. 2022-Apr. 2023*
Supervisor: Dr. Naira Hovakimyan, Professor of Mechanical Science and Engineering Department, UIUC

- Developed a collision-free bilevel trajectory optimization system with optimal waypoints' temporal and spatial assignment for autonomous quadrotor's motion planning based on convex optimization, increasing the computational efficiency by 150%. The work has been published on IEEE RA-L and presented on IROS 2023
- Deployed the trajectory optimization program together with path planning system on Nvidia TX2 onboard computer

Neural Radiance Fields (NeRF) Based end-to-end Ground Robot Navigation and Control Research **Stanford, CA**

Research Assistant, Multi-Robot Systems Lab, Stanford University *Nov. 2023-Now*
Supervisor: Dr. Mac Schwager, Associate Professor of Aeronautics and Astronautics Department, Stanford University

- Developed a framework that combines NeRF with differentiable simulator to train end-to-end autonomous robot visual navigation policy
- Trained an end-to-end autonomous robot navigation and control policy with differentiable RL algorithm by leveraging NeRF's detailed 3D spatial information and differentiability, improving the absolute trajectory error by 8% compared with major vision-slam algorithms.

Auto-tuning Bipedal Robot MPC Controller under Challenge Terrian with DiffTune **Champaign, IL**

Research Assistant, Advanced Controls and Research Laboratory, UIUC *Feb. 2024-Sept. 2024*
Supervisor: Dr. Naira Hovakimyan, Professor of Mechanical Science and Engineering Department, UIUC & Dr. Quan Nguyen, Assistant Professor of Aerospace and Mechanical Engineering, USC

- Developed a legged robot MPC controller auto-tuning framework that conducts sensitivity analysis on bipedal robot's stance force over MPC parameters. Auto-tuning MPC decreased the control smooth loss and tracking loss up to 40% compared to hand-tunned MPC.
- Trained a ground reaction force & moment network with real sensor data that maps MPC solution to real ground reactions to decrease sim-to-real error.

COURSES

- Robot Autonomy, Machine Learning, Advanced Feedback Control, Artificial Intelligent, Deep Neural Networks for Computer Vision, Introduction to Robotics, Haptics Design and Control

PROFESSIONAL EXPERIENCE

Unitree Robotics **Hangzhou, Zhejiang, China**

Robot Control Engineer Intern *May 2023-Aug. 2023*

- Designed and developed the novel data-driven quadrupedal robot locomotion and controls framework using C++ and Python that increases the robot payload by 15% compared with traditional model-based control framework:
  - Built the deep reinforcement learning robot locomotion and controls policy in Isaac Gym environment with Pytorch
  - Developed an auto deployment tool using C++ including 3 subsystems (communication, state estimation, model inference)
- Developed the quadrupedal robot state estimator based on data-driven Extended Kalman Filter, increasing the estimation accuracy by 23%

Centrillion Technologies **Palo Alto, CA**

Embodied Intelligent Robotics Intern *June 2024-Sept. 2024*

Build embodied intelligent biological experimental robot based on imitation learning and large language model (LLM)

- Use Mobile-ALOHA platform to collect expert trajectories (more than 500 episodes per subtask) to build a dataset with 15+ subtasks.
- Use ACT algorithm to train 15+ biological experiment fine operation subtasks. Single subtask duration 10-20s, success rate of more than 80%, with basic generalization and adaptive ability.
- Built an embodied AI framework using LLM and imitation learning, conducting high-level task planning, estimating the success of the previous subtask, and executing the sequenced subtask under the premise of safety to ensure seamless integration of robot functions in the complex experimental workflow.