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.

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 combine 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 30% 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-Now*
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 by 60% compared to hand-tunned MPC.
- Trained an actuator net with real sensor data that maps MPC solution to real ground reaction force to decrease sim-to-real error. The actuator net is included in the auto-tuning differentiation chain.

Aerial Vision and Dialog Navigation with LLM **Santa Cruz, CA**

Research Assistant, Eric AI Lab, UCSC *June 2024-Now*

Supervisor: Dr. Xin (Eric) Wang, Assistant Professor of Computer Science and Engineering, UCSC

- Developed a drone navigation framework that uses multi-model LLM to process satellite image and human instruction simultaneously, generating a detailed and formal flight plan.
- Developed an image processing pipeline that segment the image and selects the interested area, then convert the image into structure vectors format for better visual understanding.

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%

GEELY Automobile Group **Hangzhou, Zhejiang, China**

Engineer Intern, Chassis Department *Aug. 2021-Sept. 2021*

- Develop control arm, steering knuckle in automobile's suspension system for Geely LEVC TX, 03//2022 go to the market
- Designed and developed an intelligent test and report system using Flask and ReatJS, which supports 10+ test report generation. Built a visualization dashboard for aggregated test metrics and analysis data (e.g. chassis dynamics, structure reliability)