

XINMING HAN

xinmingh@andrew.cmu.edu | (732) 3716763

EDUCATION

Carnegie Mellon University

12/2024

Master of Science in Mechanical Engineering—Research (Robotics and learning-related research)

- **GPA:** 4.0/4.0
- **Courses:** Robot Learning, SLAM, Machine Learning & AI for ENG, Computer Vision for ENG, Modern Control

Rutgers, The State University of New Jersey

05/2023

Bachelor of Science degree in Mechanical Engineering

- **Honor:** Dean's List for 7 out of 8 semesters, **GPA:** 3.8/4.0 (3.65+ is graduating with the highest honor)
- **Courses:** Dynamic System & Control, Internal Combustion Engine, Thermodynamics, Heat Transfer, Mechanisms Design, etc.

PUBLICATIONS

Zhefan Xu, **Xinming Han**, Haoyu Shen, Hanyu Jin, and Kenji Shimada. NavRL: Learning Safe Flight in Dynamic Environments. Submitted to IEEE Robotics and Automation Letters 2024. [\[Video\]](#) [\[DDF\]](#)

Zhefan Xu^{1*}, Hanyu Jin^{2*}, **Xinming Han**, Haoyu Shen, and Kenji Shimada. Intent Prediction-Driven Model Predictive Control for UAV Planning and Navigation in Dynamic Environments. Submitted to IEEE Robotics and Automation Letters 2024. [\[Video\]](#) [\[PDF\]](#)

RESEARCH PROJECTS

UAV Autonomous Navigation & Collision Avoidance in Dynamic Environments

January 2024 – Present

Supervisor: Kenji Shimada, Carnegie Mellon University

- Developed a Reinforcement Learning based framework (NavRL) for navigation and collision avoidance of UAV.
- Built dynamic training environment for UAV on Isaac Sim and finetuned the reward function to get find good training results
- Designed and built quadcopters and conducted flight tests to identify design flaws and make improvements.
- Performed experiments with custom algorithms on the built quadcopters.
- Submitted two papers submitted to RA-L.

Computational dynamics: Modeling the Dynamics of a Car

January 2022 - March 2022

Supervisor: Eric Darve, Stanford University

- Built a Python-based simulation to model the car dynamics, focusing on analyzing and preventing understeer and oversteer.
- Analyzed turning capabilities of M3 and Chevy Cavalier under different turning time and angles.

Flapping Wing Flight Research

June 2022 - January 2023

Supervisor: Mitsunori Denda, Rutgers University

- Studied the flapping wing flight of insects through programmed simulation. Learned the advantage of GPU in computation speed and the improvement in efficiency brought by vectorization.

INTERN EXPERIENCE

Shanghai Shengxiang Automobile Maintenance Service Co., LTD

Shanghai, China

Car Maintenance Intern

June 2021 - August 2021

- Took charge of engine maintenance, oil, air filter and gasoline filter, tire change, etc. Learnt the mechanism of different types of braking systems, the function of the oil in the car, and the structure of different types of cars.

COURSE PROJECTS

Vision-based UAV Collision Avoidance Using Deep Reinforcement Learning (Group project)

February 2024 – May 2024

- Designed simulation in Gazebo, based on UAV research.
- Trained collision-avoidance model using Q-learning algorithms (DQN, DDQN, D3QN) and compared performance.

Carnegie Mellon University, Visual and Tactile SLAM (Group project)

October 2023 - December 2023

- Learned sensor fusion using GelSight tactile and visual sensor, as well as 3D reconstruction.
- Conducted pose optimization using GTSAM and wrote an IEEE format paper as the final report.

Carnegie Mellon University, Tesla Model 3 and DJI Mavic 2 Pro Control

October 2023 - December 2023

- Applied various control methods using PID, full-state feedback, optimal, LQR controller, and A* algorithm and EKF SLAM.
- Conducted simulations using Webots and compared the performance of different control methods.

Rutgers, Donkey Car Autonomous Driving (Group project)

January 2023 - May 2023

- Used RaspberryPi to remote control the donkey car on a small track and collected data.
- Conducted deep-dive explorations about making cars automatically avoiding obstacles using Donkey Car's Deep Learning framework.

Rutgers, Automated Gantry System (Senior Design Group Project)

September 2022 - May 2023

- Designed and assembled a prototype of the system that could use vacuum pumps and a pixy2 camera to automatically pick up cubes and sort them according to colors. It be applied to sorting related to warehouse or manufacturing.

SKILLS

- Coding: MATLAB, Python, C/C++, Machine Learning, Reinforcement Learning.
- Robotics/Mechanical: Ubuntu System, ROS, SLAM, Modern Control, Computer Vision, SOLIDWORKS CAD, COMSOL, Linear Algebra, Logger Pro.
- Simulation: Isaac Sim, Gazebo, Mujoco.