Huaiyuan Rao

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Education

Georgia Institute of Technology 2022-Present
*Master of Science in Electrical and Computer Engineering, GPA: **4.00** / 4.00* *Atlanta, Georgia*

East China Jiaotong University 2018-2022
*Bachelor of Science in Automation, GPA: **3.96** / 5.00 (89.6 / 100)* *Nanchang, Jiangxi*

Experience

Georgia Institute of Technology, CORE Lab (Buzzblimp team) June 2024 – Present
Research Intern, Advisor: Prof. Matthew Hale *Atlanta, Georgia*

- Deploy custom yolov5 model on rk3588 series NPU using multithreading, which run a yolov5 model in 120 fps.
- Using ROS2 to rossify entire detecting framework and integrate with blimp's position and rotation control part.

Georgia Institute of Technology Jan 2024 – May 2023
Research Intern, Advisor: Prof. Kyriakos G. Vamvoudakis *Atlanta, Georgia*

- Leverage RRT^X for global path planning and replanning to produce waypoints for agent.
- Develop RL-CBF-RRT^X, using a critic-only value network to online learn a reasonably larger portion of the actual safe set with user predefined rewards and generate safe controller for navigating in an unknown environment.

Chinese University of Hong Kong (Shenzhen), Robotics & AI Lab May 2023 – Dec 2023
Research Intern, Advisor: Prof. Zhenglong Sun *Shenzhen, Guangdong*

- Using Sparse Identification of nonlinear dynamical systems (SINDy) to approximate continuum robot's model.
- Develop model reference reinforcement learning framework. Using MPC to tracking desired model output and using RL to compensate the disturbance between real world model and reference model.

East China Jiaotong University, Intelligent Driving Team May 2020 – June 2022
Captain & Founder, Advisor: Yun Yang *Nanchang, Jiangxi*

- Develop the Fuzzy Adaptive IMM (FAIMM) target tracking algorithm for vehicle detection on the AWR1843-BOOST (Texas Instruments) platform, designed to operate in harsh environments. This system will provide drivers with real-time updates on the distance and angle to the car ahead.

Publications

- **Huaiyuan Rao**, Yichen Zhao, Qiang Lai. Predicting Chaotic System Behavior using Machine Learning Techniques. *Preprint*

Selected Projects

Predicting Chaotic System Behavior using Machine Learning Techniques. | Georgia Tech March 2024 - August 2024

- Comparing prediction capability of reservoir computing, next-generation reservoir computing and LSTM on chaotic system behavior.

Chaotic image encryption algorithm | *Graduation Design, ECJTU* Dec 2021 - June 2022

- Develop **CMT-ICSM**, an image encryption algorithm that integrates a novel Sine-Henon high dimensional map (ICSM) with the chaotic magic transform (CMT).

Selected Awards and Honors

China National Scholarship 2021
Finalist Prize, COMAP's Mathematical Contest in Modeling (Top 1%) 2022
1st class Academic Scholarship (3 years) 2021
Second Prize, National Undergraduate Electronics Design Contest 2020

Technical Skills

Program: C, C++, Python, MATLAB

Tools: ROS2 and Gazebo, Linux, Git, OpenCV, STM32, LATEX