HUANG, HEJUN

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EDUCATION

M.Sc. Department of Aerospace Engineering Dec. 2023
GPA: 3.4 | University of Michigan, Ann Arbor, MI

M.Sc. Department of Mechanical and Automation Engineering Nov. 2020
GPA: 3.7 | Chinese University of Hong Kong, HKSAR, China

B.Sc. Department of Mechatronics Engineering Jun. 2019
GPA: 3.2 | North China Electric Power University, Hebei, China

PUBLICATION

Huang, H., et al. (2023). Privacy-Aware Coverage Design and Analysis in Drone Remote Identification Systems. Under review of *Transactions on Intelligent Systems and Technology*.

Li, Z., **Huang, H.**, & Vincent, Tam (2023). Combining Reinforcement Learning and Barrier Functions for Adaptive Risk Management in Portfolio Optimization.

Huang, H., Mazotti, B., Kim, J., & Li, M.Z. (2023). Remote Identification Trajectory Coverage in Urban Air Mobility Applications. *15th Air Traffic Management R&D Seminar* (ATM'23).

Huang, H., Li, Z., & Han, D. (2022). Barrier Certified Safety Learning Control: When Sum-of-Squares Programming Meets Reinforcement Learning. *6th Conference on Control Technology and Applications* (CCTA'22).

Han, D. & **Huang, H.** (2022). Sum-of-Squares Program and Safe Learning On Maximizing the Region of Attraction of Partially Unknown Systems. *13th Asian Control Conference* (ASCC'22).

Huang, H. & Han, D. (2022). On Estimating the Probabilistic Region of Attraction for Partially Unknown Nonlinear Systems: A Sum-of-Squares Approach. *41th Chinese Control and Decision Conference* (CCDC'22).

EMPLOYMENT

Graduate Research Assistant Aug. 2022 - Dec. 2023
LATTICE, University of Michigan

Research Assistant Sept. 2020 - Jul. 2022
Department of Mechanical and Automation Engineering, Chinese University of Hong Kong

Intellectual Property Department Intern Mar. 2019 - Jul. 2019
Daimler Greater China Investment Co., Inc. Beijing

SKILLSET

Programming language: `MATLAB, Python, C++`
Technologies: `Linux, GIT, Docker, Conda, Pytorch, RaiSim, CARLA, WordPress, SOSTOOLS, SOSPT, YALMIP, Mosek, SciPy, NumPy, Matplotlib, Pandas, Gurobi, CVXOPT, JAX`
Language: Mandarin, Cantonese

RESEARCH INTEREST

My research interests lie in the intersection of **control theories**, **reinforcement learning**, **optimization**, **statistical inference**, **robot locomotion**, and **path planning**. I design algorithms for autonomous agents, with the vision to advance their stability, reliability, safety, and privacy.

- **Control and Learning**: Region-of-attraction guided controller meets Reinforcement learning: CCTA'22.
- **Optimization and Statistical inference**: Quadratic programming, Sum-of-squares programming under Gaussian Processes: CCDC'22, ASCC'22.
- **Robot locomotion and Path planning**: Remote Identification systems with drone's surveillance and privacy maintenance: ATM'23.

PROJECT

Maintained the privacy of drone trajectories in urban detection scenarios 2023

- Developed strategies for the deployment of Remote ID in urban settings.
- Devised a novel approach to evaluate privacy scores beyond conventional Remote ID parameters.
- Executed simulations on UAV trajectories to assess Remote ID detection in NYC, LA, and SF.

Combining RL and barrier functions into Portfolio Optimization 2023

- Developed "RiPO", an RL-based portfolio optimization framework for balancing risks and profits.
- Incorporated barrier functions and dynamic modules for adaptability to market shifts and investor preferences.
- Proved RiPO's efficacy in uptrends and its risk mitigation in downtrends.

Integration of Sum-of-Squares programming and Gaussian process (GP) 2022

- Integrated Sum-of-Squares programming with GP for barrier certificate calculations.
- Expanded the significantly larger barrier-certified region of attraction for systems with partial knowledge.

Bayesian Inference for Target Sense Center 2022

- Designed and compared different sample policies for best sample efficiency.
- Employed GP regression for target location identification with minimal sampling.

E-Learning Platform for Engineering Faculty's Junior Teaching Staff 2022

- Designed and upheld two demo websites.
- Cataloged engineering pedagogical techniques into concise micro-modules such as flipped classroom, activity design, and online teaching for efficient staff onboarding.

Multi-agent Autopilot Formation Control with RL 2020

- Validated obstacle avoidance using DDPG and MADDPG in 2D highway simulations.

Patent search and intellectual property maintain 2019

- Maintained and updated internal intellectual property database for Daimler's business units
- Updated patent-search formula for business units with related analysis reports
- Assisted in completing Freedom to Operate reports on CN market fuel cells and batteries.

Rehabilitation Exercise Assistant Robot for Cerebral Palsy Patients 2018

- Designed a robotic chassis with a cable-driven manipulator, analyzed stress on key joints. ***Video***.

ReadyGo Maker: Self-service Hot Dog Assembly Machine 2017

- Designed a dual-manipulator technique for hot dog assembly, and conducted 3D modeling. ***Video***.

TEACHING EXPERIENCE

ENGG1910 Demystifying AI 2022
Teaching assistant Hong Kong

Summer Research Project (11 Weeks Program) 2020, 2021
Teaching assistant Hong Kong

HONORS AND AWARDS

Pedagogical Innovation SILVER, and People's Poster Prize 2021
For top 3% projects in 2021 HK Teaching and Learning Innovation EXPO

First Class Scholarship 2016, 2017, 2018
For top 5% students

Hao Peng Mechatronic Scholarship 2016, 2018
For top 10% students

Second Prize, Third Prize 2018, 2017
For top 8%, 15% participants in the National Mechanical Product Digital Design Competition