JUSHAN (RANDY) CHEN

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RESEARCH INTERESTS

Multi-Agent Trajectory Planning, Optimal Control, Deep Learning-Based Visual SLAM

EDUCATION

Master of Science in Aerospace Engineering, University of Illinois Urbana-Champaign   2022 - 2024
GPA: 3.74/4.00
Thesis: *Improved pose estimation accuracy of monocular deep visual odometry against dynamic entities via adversarial training*

Bachelor of Science in Aerospace Engineering, University of Illinois Urbana-Champaign   2019 - 2022
GPA: 3.77/4.00 (Honors) | Fall 2019 & Fall 2020 Dean's List

PUBLICATIONS

Z. Williams, **J. Chen**, N. Mehr. "Distributed Potential ILQR: Scalable Game-Theoretic Trajectory Planning for Multi-Agent Interactions". In Proc. of the *IEEE ICRA*, 2023. [20 Citations]

ACADEMIC EXPERIENCE

Graduate Research Assistant   Aug 2022 - May 2024
UIUC Intelligent Control (ICON) Lab, University of Illinois Urbana-Champaign   *Urbana, IL*
Advisor: Dr. Negar Mehr

- Led a thesis research project that collaborates with students at UT Austin on the robustification of deep learning-based visual odometry algorithm by leveraging adversarial training;
- Developed a novel distributed trajectory planning algorithm for multi-robot systems by leveraging potential dynamic games that achieved over 40% decrease in computation times compared to a state-of-the-art centralized baseline

Graduate Teaching Assistant   Aug 2023 - May 2024
Dept. of Aerospace Engineering, University of Illinois Urbana-Champaign   *Urbana, IL*

- Provided guidance and support for undergraduate students in numerical anlysis class (AE370)
- Coordinated group dynamics within the class of 150 students (AE460) such that minimal conflicts arise due to unequal distribution of workload within each group;
- Assisted students in wind tunnel experiments (AE460) for analyzing the airflow properties in incompressible and compressible flow regimes
- Provided technical feedback on students' lab reports

Course Assistant for AE353: Control Systems   Spring 2022
Dept. of Aerospace Engineering, University of Illinois Urbana-Champaign   *Urbana, IL*

- Provided feedback for students' design projects such as applying LQR to balance a Segway robot on an inclined track, and helped two students score a final project grade 20% higher than the class average

HIGHLIGHTED PROJECTS

Multi-Robot Trajectory Generation via Consensus ADMM: Convex vs. Non-Convex   Fall 2023
"Multi-agent Systems Control", Instructed by Prof. Negar Mehr

- Proposed a scalable distributed trajectory planning algorithm by leveraging consensus ADMM and buffered Voronoi cells
- Performed a case study that compares the performance of convex ADMM and a non-convex ADMM variant. Verified that convex ADMM yielded a superior convergence rate

Proximal Policy Optimization for Stock Portfolio Optimization   Spring 2023
"Reinforcement Learning", Instructed by Prof. Huy Trong Tran

- Implemented a PPO algorithm for optimization of stock portfolio based on the DJI constituent stocks and achieved over 10 % higher returns than the DJI index on backtesting

Quadrotor Trajectory Tracking and Control via Sequential Convex Programming   Spring 2023
"Autonomous Systems and Robots", Instructed by Prof. Girish Chowdhary

- Designed a receding-horizon controller for 12-DOF nonlinear quadrotor fleets using sequential convex programming
- Empirically analyzed the computational complexity and constraint satisfaction of the receding-horizon controller in simulations

Minimum Snap Trajectory Generation   Spring 2022
Independent Project at Advanced Controls Laboratory, UIUC

- Wrote a MATLAB code to simulate and reproduce the work proposed in the seminal paper *Minimum snap trajectory generation and control for quadrotors*

White-Box System Identification of A Crazyflie Drone   Fall 2021
"Aerospace Autonomous Controls Laboratory", Instructed by Prof. Timothy Bretl

- Performed system identification using real sensor data collected from a Crazyflie drone
- Utilized the SysID toolbox in MATLAB to recover the exact parameters of a 2nd-order transfer function approximating the vertical motion of a Crazyflie drone

WORK EXPERIENCE

Project Contractor   July 2024 - Present
Shandong Electric Power Engineering Consulting Institute, Corp., Ltd   *Remote*

- Generated high-fidelity synthetic voltage and current data in Simulink
- Developed a novel deep learning-based approach for fault localization in 35kV power transmission lines connecting offshore wind farms based on the generated synthetic data
- Achieved 99% accuracy in fault region detection

UAV Research Intern   Summer 2021
TSINGAERO ARMAMENT Co., Ltd   *Beijing, China*

- Developed a MATLAB code that conducts verification of design constraints for the intermeshing rotor UAV (prototype JZ-150)
- Analyzed state-of-the-art academic research related to the design and control of intermeshing rotor UAVs

CAE Design Research Intern   Spring 2021
Chang'An Automobile Global R&D Headquarter   *Chongqing, China*

- Improved exterior design that achieved a 3% decrease in aerodynamic drag in ANSYS fluid simulation for the UNI-K model that has now successfully deployed in the consumer market in mainland China

SKILLS

Languages: Python, Bash, MATLAB, C
Tools/Frameworks: Git, LaTeX, CVXPY, Casadi, ROS, PyTorch, Tensorflow
Hardware Platform: Crazyflie drone 2.0

RELEVANT COURSES

- Linear Systems & Control; Reinforcement Learning; Multi-Agent Systems & Control; Optimal Control; Numerical Analysis

AWARDS

- Illinois Engineering Achievement Scholarship recipient (1000$, Spring 2021)
- James Scholar, Grainger College of Engineering (2019-2020)