Zeyuan Feng

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EDUCATION

University of Pennsylvania   Sep. 2021-Present
Candidate for Master of Science in Systems Engineering   *GPA: 3.96 / 4.00*
- Relevant Coursework: Model Predictive Control, Learning in Robotics, Mechatronics, Deep Learning.

The Chinese University of Hong Kong, Shenzhen   Aug. 2017-Jun. 2021
Bachelor of Engineering in Electronic Information Engineering   *GPA: 3.40 / 4.00.*
- Relevant Coursework: Advanced Linear Algebra, Optimization, Ordinary Differential Equation, Probability and Statistics, Robotics, Reinforcement learning, Machine Learning, Algorithms and Data Structures.

PUBLICATIONS

(* indicates co-first authors)

- J. Diego Caporale*, **Zeyuan Feng***, Shane Rozen-Levy, Aja Mia Carter, Daniel E. Koditschek. *"Twisting Spine or Rigid Torso: Exploring Quadrupedal Morphology via Trajectory Optimization."* Accepted by 2023 IEEE International Conference on Robotics and Automation (ICRA 2023). [Link]

- **Zeyuan Feng**, Jiayi Qiu, Hengli Liu, Qinbo Sun, Ning Ding, Zhenglong Sun, Tin Lun Lam, and Huihuan Qian. *"An Adaptive Position Keeping Algorithm For Autonomous Sailboats."* In 2019 IEEE International Conference on Robotics and Biomimetics (ROBIO), pp. 527-532. IEEE, 2019. [Link]

TECHNICAL SKILLS

Languages: Python, C/C++, MATLAB/Simulink, html, VHDL
Developer Tools and Framework: ROS, DRAKE, Gazebo, SolidWorks, Pytorch, Vivado
Hardware: STM32, Raspberry Pi, Arduino

RESEARCH EXPERIENCE

University of Pennsylvania   *May. 2022 – Sep.2022*
Quadrupedal robots morphology study via nonlinear optimization   [code] [Link]
- Set up optimization problems for generating optimized trajectories of steady-state and transitional spatial maneuvers using Drake and Dairlib.
- Developed a robust automated pipeline for generating diverse local optimal trajectories throughout a range of parameters for each behavior.
- Contributed to data analysis to explore the effect of an axially twisting spinal joint compared with the conventional rigid torso for quadrupedal robots.

Carnegie Mellon University   *June. 2020 – Sep. 2020*
Shield AI [code] [link]   Position: Robotics Institute Summer Scholar
- Develop a real-time algorithm for blocking flying objects in the air using a seven-DOF manipulator by leveraging pre-generated offline experience.
- Demonstrated the algorithm's real-time performance via simulation in ROS and drafted a paper manuscript.

The Chinese University of Hong Kong, Shenzhen   *Nov. 2018 – Aug. 2019*
Led a three-student group to on a Sailboat Position Keeping project.   [code]
- Built an integrated autonomous sailboat system with the team, and individually wrote a visualized simulation program in Python.
- Proposed a high-performance algorithm as well as a model predictive control approach (which works under certain conditions) for the task.

PROJECTS

University of Pennsylvania

Refactored the code of quadruped locomotion behavior optimization   Nov. 2021 – Feb. 2022
- Redesigned the original C++ project using Object-Oriented Programming paradigm.
- Individually coded a refactored version of the previous project and further improved the code reusability by creating useful subroutines and keeping a decoupled hierarchical structure.

Selected course projects
- Improved image fidelity and feature preservation of a text-to-image synthesis model—DreamBooth by incorporating a variational autoencoder into diffusion models. [link]
- Implemented a simultaneous localization and mapping (SLAM) algorithm using particle filters and tested it with the data collected from a humanoid in indoor environment. [link]
- Implemented an Unscented Kalman Filter (UKF) for estimating the trajectories of euler angles given raw data from an inertial measurement unit (IMU). [link]

The Chinese University of Hong Kong, Shenzhen   *Mar. 2018 – Aug. 2021*

A Data Driven Distributed Adaptive Controller for Heterogeneous Surface Robots Jul. 2021 – Aug. 2021
- Comprehended the formation controller derived by Xiaoqiang and turned it into Python programs.
- Implemented simulation using usv_sim in ROS and built the whole system from scratch to conduct real-world experiment.

Developed an Easy-to-Use USV Simulator for educational use [code]   Jul. 2021 – Aug. 2021
- The simulator was written in Python with only numpy and pyopengl library. Users can easily use the simulator to test their control methods, visualize how they work, and record data, without having much programming experience. The simulator also supports multi-vehicle scenarios and can be easily integrated to real-world experiment.

Worked on some robot demos using ROS   Aug. 2019 – Nov. 2019
- Learned rigid body kinematics and dynamics, and used Moveit and ros control to create a demo of impedance control of a 7-link manipulator.
- Utilized a leader-follower formation controller, integrated with face detection and a depth camera, to enable a mobile robot to track a random person.

Contributed to sailboat autonomous navigation and obstacle avoidance projects.   Jul. 2018 – Oct. 2018
- Learned several classical control algorithms including fuzzy control, model predictive control and sliding-mode control, and applied to control RC sailboats.

Worked in a four-member team to work on unmanned ground vehicles   Aug. 2018 – Sep. 2018
- Well communicated with other members to develop a trajectory planning algorithm using convex optimization.

Enabled a remote-control sailboat to be controlled by computer   Mar. 2018 – May 2018
- Teamed with three sophomores to retrofit a remote-control sailboat into a computer-control sailboat by an Arduino Nano carrying an IMU, a current sensor, a voltage regulator module and a communication module.
- Implemented sensing, motors control and communication between PC and Arduino. Contributed in building a GUI for manual control.

LEADERSHIP

Headed Student Robotics Association as the first student leader   Sep. 2019 – Sep. 2020
- Student Robotics Association was held by Professor Huihuan Qian in Robotics and Artificial Intelligent Laboratory of CUHKSZ. It offers robotic training and trail projects for incoming undergrad students to get prepared for research activities before joining the laboratory.
- I coordinated a four-student management team to deliver organization courses, design trail projects, and mentor new members to finish the projects. We successfully recruited more than thirty members and over a half of them decided and managed to start working at the lab.