Derek Fan

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🔗 Personal Website
in LinkedIn Profile
○ GitHub Profile

EDUCATION

- **University of California, Irvine – Irvine, CA** *Sept. 2020 – Present*
  Bachelor of Science in Mechanical Engineering GPA: 3.6/4

TECHNICAL SKILLS

Languages and Frameworks: Python, MATLAB, C++, ROS
Developer Tools and Platforms: Git, Linux, Windows
Engineering Software: SolidWorks, EC-Engineer
Additional Relevant Skills:

EXPERIENCE

- **Johnson & Johnson Robotics and Digital Solutions** *June 2023 – Present*
  Systems Integration Engineering Intern Santa Clara, CA

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- **3D Infotech** *Oct. 2022 – Jan. 2023*
  Automation Engineering Intern Irvine, CA

  – Integrated various sensors, 3D reconstruction software, robotic arms, and controller into their robotic systems.
  – Troubleshooted individual components and assembled them into robot systems used for metrology inspection.
  – Controlled and interfaced with collaborative robot arms manually and through programmatic software.

PROJECTS

- **Neural Network & MPC Research – Multirotor Multi-Payload Trajectory Tracking** *June 2023 – Present*
  Undergraduate Researcher

  – Designed the system and end objective of the research project based on informed choices of simulation tools, drone hardware, and practical algorithms for real-time learning and model predictive control.
  – Derived nonlinear quadcopter dynamics and interfaced with Acados's SQP approximation of nonlinear optimal control to implement a real-time multiple-direct-shooting model predictive controller.
  – Currently developing nonlinear and neural network dynamics in PyTorch to utilize its automatic differentation and implement adaptable gradient-based (as opposed to sampling-based) MPC.

- **Autonomous Drone Team (SUAS Competition)** *Oct. 2021 – Present*
  Lead GN&C Engineer

  – Utilized ROS nodes with MAVLink messages to design and implement an online path planning system for the first time in the team's history, effectively increasing the team's relevance in the competition by 200%.
  – Developed a linear obstacle avoidance algorithm to be used with 3D point clouds, integrated it into online path planning, and fully vectorized its calculations to decrease runtime by 90%.
  – Researched and implemented point cloud processing algorithms to be used with RealSense RGBD cameras, integrated it into the obstacle avoidance pipeline, and tuned its parameters to decrease runtime by 50%.
  – Tuned the drone's sensor/extended kalman filter parameters and PID controller, bringing the drone from an unflyable configuration to stable flight.

- **Motion Planning and Control Testbed** *Apr. 2022 – Oct.2022*
  Undergraduate Research Assistant

  – Implemented a linear quadratic regulator (LQR) velocity controller for optimal trajectory tracking.
  – Developed a scalable OptiTrack server client that sends position feedback to a distributed network via ROS nodes.
  – Utilized multiprocessing to parallelize the visualization of localization information with ROS communication.

RELEVANT COURSEWORK

- Introduction to Control Systems, Robotic Motion Planning and Algorithms, Machines and Mechanisms

- Computer-Aided Design (SolidWorks), Introduction to Engineering Computations (MATLAB)

- Dynamics, Statics, Differential Equations, Multivariable Calculus, Linear Algebra