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.
  – Validated the functionality of robotic arms by controlling them manually and through programmatic software.

PROJECTS

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

  – Conceptualized the end objective and system design of the research project based on research of simulation tools, drone hardware, and practical algorithms for real-time MPC and reinforcement learning.
  – Formulated nonlinear quadcopter dynamics and interfaced with Acados's SQP approximation of nonlinear optimal control problems to engineer an efficient real-time multiple-direct-shooting MPC.
  – Leveraged PyTorch's automatic differentiation in the development of nonlinear and neural network dynamics to implement adaptive gradient-based (as opposed to sampling-based) MPC.

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

  – Designed an online path planning system utilizing ROS nodes and MAVLink 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 optimized its calculations to decrease runtime by 90%.
  – Applied point cloud processing algorithms for use with RealSense RGBD cameras, integrated them with obstacle avoidance, and optimized their parameters to decrease runtime by 50%.
  – Improved the drone's performance by tuning its sensor/extended Kalman filter parameters and PID controller, bringing stable control to all 3 types of its orientations.

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

  – Implemented a linear quadratic regulator (LQR) velocity controller for optimal trajectory tracking.
  – Deployed a scalable OptiTrack server client that sends position feedback to a distributed network via ROS nodes.
  – Introduced multiprocessing to the server client to parallelize position feedback visuals 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