

Paul Dreyer

Robotics, Controls, Systems Engineering | USAF Veteran

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Portfolio: <https://paul-jo-dreyer.github.io/>

EDUCATION

• Carnegie Mellon University | Pittsburgh, PA

2025

Master of Science in Mechanical Engineering, Robotics & Control Systems

Bachelor of Science in Mechanical Engineering

SKILLS & HONORS

Control & Optimization:	Deep RL (PPO, TD3, Imitation Learning), LQR, Model Predictive Control (MPC), System Identification, Robust Control, Direct Collocation, Numerical optimization (IPOPT, CVXPY)
Languages:	Python, C++, Julia
Software:	ROS, OnShape CAD, KiCad, MuJoCo, PyBullet, Ubuntu Linux, Bash, Anaconda, Git
Fabrication & Prototyping:	3D Printing, CNC, Sheet Metal Fabrication, Soldering, PCB Design, Microcontrollers
Honors:	Engineering Student of the Year – Engineering Dept. Pierce College Spring 2020

WORK EXPERIENCE

• Path Planning Algorithms / Backend - Internship | Dirac Inc.

Summer 2024

- Developed a production-deployed trajectory optimization algorithm for autonomously assembling 3D CAD assemblies.
- Replaced manual intervention in all fastener sub-problems with an automated solver now used in over 90% of workflows.

• ML/Computer Vision Data Generation - Internship | Ford Motor Company

Summer 2023

- Developed a reusable, end-to-end synthetic image generation and auto-labeling tool now adopted by Ford's ML department.
- Replaced manual data collection by generating thousands of labeled images per hour from CAD data, enabling rapid CNN training for detecting failed connector installations across arbitrary vehicle components.

• Pipe-in-Pipe Trenchless Repair - ARPAE Research | Carnegie Mellon Biorobotics Lab

Summer 2022

- Conceived, designed, and prototyped a resin extrusion nozzle for a trenchless pipe repair robot, enabling in-situ creation of adaptive pipe linings within aging natural gas pipelines. Delivered as part of CMU's first major research release for an ARPA-E project, the nozzle simplified system architecture by eliminating the need for additional adaptive components.

• Radio Frequency Communication Specialist - Staff Sergeant (E5) | USAF

2014-2020

- Communications team leader for multiple field expedition exercises, enabling long-range communication methods in mountain/jungle environments. Completed 6-month deployment in support of Operation Inherent Resolve. Previously held TS/SCI security clearance.

PROJECTS

• Outlet Inspection Robot

Spring 2025

- Led mechanical design, PCB development, embedded systems integration, and kinematics for a mecanum-wheeled outlet inspection robot built in a Mechatronics course. Delivered a fully tested prototype with onboard voltage validation, wall-following navigation, and a custom PCB integrating 5 motor drivers, power regulation, IMU, encoders, and sensor I/O.

• The Comet Robot

Spring 2024-Present

- Self-directed robotics project exploring underactuated cable-driven locomotion through a parallel suspension system. Designed and fabricated the full mechanical structure of the robot body, actuation system, custom PCBs, and embedded software.
- Developed a deep reinforcement learning-based motion controller and a system identification pipeline for autonomous model calibration. Integrated a real-time GUI with hand-detection-based control and designed an animated character system for personality-driven interaction. The robot combines novel locomotion with expressive feedback, blending technical innovation with user-centered design.