

Paul Dreyer

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Portfolio: <https://sites.google.com/andrew.cmu.edu/paul-dreyer/home-portfolio>

EDUCATION

Carnegie Mellon University | Pittsburgh, PA

- Bachelor of Science in Mechanical Engineering, GPA: 3.3/4.0
- Master of Science in Mechanical Engineering, Robotics + Control Systems

(Expected Graduation: Dec. 2025)

WORK EXPERIENCE

ML/Computer Vision Research Engineer - Internship | Ford Motor Company

Sum. 2023

- Developed synthetic image dataset generation software with zero bias auto-labeling for object detection + classification task datasets. Enabled rapid training iterations of CNNs for autonomous inspection tasks in the vehicle assembly line.
- Implemented tunable domain randomization features to guarantee uniform/normal lighting and pose distribution + variance.

Pipe-in-Pipe Trenchless Repair - ARPA-E Research | Carnegie Mellon Biorobotics Lab

Sum. 2022

- R&D mobile robot pipe extrusion nozzle that constructs a new resin pipe inside of decaying legacy natural gas pipe systems throughout city infrastructure, delaying the need for fully trenched replacement.

Soft Robotic Position Sensing - Research | University of Colorado Boulder (Collaboration)

Sum. 2021

- R&D novel print-in-place pneumatic sensor for pose estimation of a soft robotic actuator with PID position control.

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

2014-2020

- Communications team leader for field expeditionary unit. Enabled HF/UHF communications in mountain/jungle environments.

Projects

Suspension Actuated In-Home Mobile Robot Assistant

Spring 2024-present

- Full systems planning + development of an autonomous mobile robot for in-home assistance.
- Developed full ROS stack: TCP comms to remote MCUs + actuators, state estimation, mapping + planning, trajectory generation, kinematics + dynamics simulations, UX/UI, Emotive behavioral response to vision-based hand gesture recognition.
- Developing custom carrier board for Banana Pi compute module to enable edge accelerator integration.

Quadruped Robot Development

Fall 2023-present

- Design + fabrication of dynamic quadruped robot from the ground up, including custom steel chassis, carbon fiber composite legs, backdrivable powertrain, multi-proprioceptive sensor suite, battery module, and control systems.

Autonomous Quadrotor Exploration Module

Fall 2023

- Developed mutual information motion planner for 3D occupancy grid exploration and mapping for quadrotor robot simulation.

“Methods for MechEs” Github Repo Development

Sum. 2023-present

- Developing numerical methods/reinforcement GitHub repo focused on robotics applications to assist peers in learning real-world implementations and system control with copy-pastable code blocks (Python/MATLAB).
- Topics: minimization techniques, linearization, cost function design, automatic differentiation, optimal control theory, etc.

LQR Stability Control

Spring 2022

- Implemented an LQR feedback controller for stabilization of inertial-wheel-based “Cubli”, and linear cart-pole systems

Vehicle Panel Gap Inspection Software

Fall 2022

- Developed algorithm (Python) that utilizes classical computer vision techniques to inspect auto body panel gaps.

Honors

Engineering Student of the Year – Engineering Dept. | Pierce College

Spring 2021

Software Skills

- ROS
- Python
- C++
- MATLAB
- OpenCV
- OnShape (DFMA)
- Auto Differentiation
- Linux/Ubuntu
- Git version control

Hardware Skills

- Mechatronics
- Sensors
- Laser/water cutting
- Mill/Lathe
- MIG/Arc welding
- Soldering
- FDM 3D printing
- Rapid prototyping