Cedric Hollande

Robotics Software & Autonomy Engineer | Planning, Controls, Sim-to-Real, ROS 2

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EDUCATION

University of Pennsylvania - School of Engineering and Applied Science | Philadelphia, PA

- Master of Science in Engineering — Robotic and Mechatronic Systems; *GPA*: **3.6**/4.0 May 2026
- Bachelor of Science in Engineering — Mechanical Engineering and Applied Mechanics; *cum laude* May 2025

TECHNICAL SKILLSET

- **Robotics Software:** ROS 2, Nav2, MoveIt, ros2_control, TF2, lifecycle nodes, RViz, Foxglove
- **Planning & Controls:** MPPI, MPC, Pure Pursuit, RL (PPO), ARA*, RRT*, PID, trajectory optimization, IK
- **State Estimation & Perception:** Particle filters, EKF/UKF, LiDAR, RealSense, NeRF, Computer Vision
- **Programming & Systems:** C++17, Python, JAX, Linux/Ubuntu, Git, DDS/QoS, Docker
- **Simulation & Hardware:** Gazebo, URDF/Xacro, Jetson Orin, VESC, F1TENTH, quadrotors, Pixhawk, Franka Panda arms

ROBOTICS EXPERIENCE

UPenn GRASP – ModLab, Prof. Mark Yim | *Graduate Researcher*; Philadelphia, PA Jun 2025 – Jun 2026

- Built ROS 2 simulation and control stack for an off-road holonomic robot with rocker suspension and 3-DoF stabilized gimbal
- Developed sim-to-real traversability pipeline using Intel RealSense point clouds, grid_map terrain layers, Gazebo heightmaps
- Integrated traversability-aware ARA* global planning with MPC local control for safe navigation over uneven terrain
- Led cross-university collaboration with George Mason University; research submitted to IEEE IROS 2026

UPenn xLab – F1TENTH Autonomous Racing | *ICRA 2026 Competition*; Vienna, Austria Jan 2026 – Jun 2026

- Built JAX-based MPPI controller for autonomous racing, sampling 8,192 rollouts × 8-step horizon at 40 Hz on Jetson Orin Nano
- Integrated CUDA-accelerated LiDAR particle-filter localization: 8,000 particles at 50 Hz on isolated cores alongside MPPI control
- Developed C++ opponent-prediction node using LiDAR clustering and raceline-arclength Kalman filtering
- Debugged real-time ROS 2 timing freezes; fixed with BEST_EFFORT QoS, rate-gated visualization, and pose-driven callbacks

NASA Goddard Space Flight Center | *Software Development Intern*; Greenbelt, MD Jun 2023 – May 2025

- Led development of a rocker-bogie Mars Rover mockup based on NASA JPL designs – testbed for Telemetry and Telecommand
- Bridged ROS 2 and Flight Software Communication Systems (cFS), oversaw mechanical assembly, wiring, and PCB soldering
- Reduced communication-error from 10^{-6} to 10^{-16} bits through advanced space-communication encoding/decoding systems in C

UPenn Rapid Prototyping Laboratory Space | *Supervisor / Lab Manager*; Philadelphia, PA Sep 2022 – May 2025

- Managed makerspace operations and trained students across 3D printing, laser cutting, CNC, and design-for-manufacturing

RELEVANT PROJECTS

Learning in Robotics | State Estimation, SLAM, RL/Controls Jan 2026 – May 2026

- Implemented particle-filter SLAM, quaternion UKF for IMU orientation tracking, HMM inference, policy iteration, and PPO
- Built MuJoCo control/RL experiments and NeRF reconstruction pipeline, applying modern estimation, perception, and learning

LiBot Autonomous Library Robot | SICK $10K Challenge Sep 2025 – Apr 2026

- Built autonomous library robot using SICK LiDAR, SLAM, CBFs, shelf-scanning OCR, and LLM-based user interaction
- Integrated LiDAR-based navigation and perception workflows for book search, checkout/drop-off, and library automation demos

Geometric Computer Vision | SfM, Bundle Adjustment, Optical Flow Aug 2025 – Dec 2025

- Implemented SfM pipeline using SIFT feature matching, epipolar geometry, triangulation, bundle adjustment, and optical flow

Forest Fire Quadrotor LPV-MPC | Controls & Optimization Project Nov 2024 – May 2025

- Developed an LPV-MPC quadcopter controller for real-time operation in cluttered forest firefighting environments
- Formulated and solved LPV-MPC in PyDrake with path-tracking, obstacle-avoidance, and actuator-limit constraints