

Ryan Barry

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Education

Rochester Institute of Technology, Rochester, NY

Master of Science in Electrical Engineering

Specialization in Robotics and AI/ML

Cumulative GPA: 3.92

Rochester Institute of Technology, Rochester, NY

Bachelor of Science in Electrical Engineering, *Summa Cum Laude*

Cumulative GPA: 3.86

Technical Skills

Languages: Assembly, C/C++, PLC Ladder Logic, Python

Libraries & Tools: CUDA, Git, Jupyter, Keras, NumPy, OpenCV, Pandas, PyTorch, ROS, Scikit-Learn, TensorFlow

Software: Altium Designer, AutoCAD, Creo, Inventor, LTSpice, MATLAB, SOLIDWORKS

Hardware: Microcontrollers, Motor/Sensor Control, PCB Design, SMT & TH Soldering, 3D Printing

Professional Experience and Research

Robotics Research Engineer II, *Robotics and Automation Design Lab*, Bryan, TX

March 2025 – Present

- Engineering fault tolerant robotic manipulators for use in contracted space missions, designed for environmental robustness and modularity.
- Designed custom PCBs in Altium for testing and spaceflight applications.
- Developed firmware and software in ROS, C++, and Python for actuator control and status monitoring.
- Built real-time data acquisition tools in C++ and Python for diagnostic logging, fault response validation, and performance analysis.

Researcher, *RIT Adaptive Human-Robot Teaming Lab*, Rochester, NY

August 2023 – May 2024

- Developed a custom reinforcement learning (RL) environment in ROS and Gazebo for terrain-aware velocity control of a quadruped robot in a physics-based simulator.
- Implemented Proximal Policy Optimization (PPO) from scratch in PyTorch with LSTM-based policy and value networks; built a custom trajectory buffer and integrated the full RL pipeline into the ROS-based system.

Robotics Graduate Teaching Assistant, *Rochester Institute of Technology*, Rochester, NY

August 2023 – May 2024

- Facilitated student learning of high-level robotics concepts and ROS through lab work and research projects.

Software Technical Lead, *RIT University Rover Challenge Team*, Rochester, NY

June 2023 – May 2024

- Spearheaded software architecture development for autonomous and remote operation of a robotic rover.
- Directed a team of engineers to develop and test software for all subsystems of RIT's rover.
- Integrated a Python-based ROS application with embedded C++ code for peripheral control via CAN.
- Led cross-functional design reviews to ensure electromechanical subsystems aligned with software architecture requirements.

Electrical Engineer, *RIT Electric Vehicle Team*, Rochester, NY

August 2021 – May 2024

- Designed a CAN interface board for a BeagleBone Black to communicate with the network of custom electric motorcycles.
- Led a team of undergraduate electrical engineers to develop a CAN based IMU board in Altium.
- Derived and documented a full gate driver and control architecture for a 3-phase BLDC motor from first principles; mentored junior team members in implementing the full motor controller in Altium for a brushless coolant pump as a foundation for future high-power traction systems.

Machine Learning R&D Intern, *Penn State ARL*, University Park, PA

May 2023 – August 2023

- Developed proof of concept synthetic data pipeline for active acoustic ML in unmanned undersea vehicles.
- Designed Python application for scenario development and interface with UUV simulation software.
- Developed an acoustic range and angle of arrival regression model to support transfer learning hypothesis.

Product Engineering Co-op, *The Raymond Corporation*, Greene, NY

January 2022 – July 2022

- Programmed PLC-based test fixture with touchscreen UI for reliability testing of forklift control cables.
- Supported CAN system emulation for motor controller validation.

Electrical Engineering Intern, *Davis Standard LLC*, Fulton, NY

May 2021 – August 2021

- Revised schematics and drawings in AutoCAD; developed early prototype for 3D printer-inspired polymer extruder.

Highlighted Projects

Open-Source Universal Kinematic Libraries for Generic Robots

September 2023 – Present

- Developed modular C++ and Python libraries for forward and inverse kinematics of both serial-link manipulators and fixed-wheeled mobile robots.
- Enabled dynamic configuration from DH parameters or wheel layouts to support arbitrary robot topologies without rewriting core math.
- Implemented forward velocity kinematics and inverse kinematics for mobile platforms using wheel geometry
- Solved numerical inverse kinematics using Jacobian pseudo-inverse methods with tolerance-based convergence on joint angles from target end-effector pose for arbitrary robot configurations.

Multi-Agent Reinforcement Learning for Pacman Capture the Flag

November 2023 – December 2023

- Developed a dual-agent Q-Learning RL system with custom reward shaping to coordinate offensive and defensive Pacman agents in a 2v2 Capture the Flag game.
- Engineered a shared memory mechanism for real-time inter-agent communication, enabling cooperative ambush behavior and dynamic role adaptation.
- Implemented custom learning and inference logic without external ML libraries; stored and updated network weights in a script-local dictionary.
- Trained agents via self-play and against external algorithms for generalization; reached tournament finals before final-game regression bug impacted behavior.

Air Hockey Robot

October 2023 – December 2023

- Designed a custom 3D-printed 3-DOF planar robot to play air hockey against a human via an overhead camera.
- Curated a custom dataset of over 26,000 images to train a YOLOv8 model for puck and table keypoint detection.
- Predicted puck trajectory and impact location using a linear physics model and an LSTM-based neural network.
- Generated an IK lookup table via my custom kinematics library to safely constrain interception points, preventing end-effector collisions with the table edge.

Full-Stack Robot for Real-Time Object Interception

February 2023 – April 2023

- Designed and programmed a holonomic robot with real-time YOLOv8-based object tracking and trajectory alignment.
- Designed custom chassis design with 3D-printable omni wheels in SOLIDWORKS.
- Trained a custom YOLOv8 model to detect balloons and calculated their 3D velocity with a stereo camera using weighted difference method over a buffer of frames.
- Developed a ROS network for kinematic motion control and sensor integration.

Other Notable Projects

- In progress design of a non-invasive wheelchair attachment for low drag, hybrid manual and powered control.
- Robot motherboard PCB with 7 sensor perception suite, power distribution, and propulsion control.
- EMG signal live gesture classification pipeline using custom model trained from self-collected bio signals.
- Interactive ball-and-cup game for Baxter robot using object detection and tracking with occlusion aware ID persistence.
- Nerf mobile robot with autonomous targeting and firing system.