Ryan Barry

ryanbarry.me | github.com/ryan-barry-99 | ryanbarry.engineering@gmail.com | (315) 596-0754

Education

Rochester Institute of Technology, Rochester, NY
Master of Science in Electrical Engineering — Cumulative GPA: 3.92
Specialization in Robotics and AI/ML

Rochester Institute of Technology, Rochester, NY
Bachelor of Science in Electrical Engineering, *Summa Cum Laude* — Cumulative GPA: 3.86
Tau Beta Pi Engineering Honor Society

Technical Skills

Languages: Assembly, C/C++, HTML/CSS, JavaScript, PLC Ladder Logic, Python
Libraries & Tools: CUDA, Git, Jupyter, Keras, NumPy, OpenCV, Pandas, PyTorch, ROS/ROS2, 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*
- Designed fault-tolerant robotic manipulators for microgravity environments, emphasizing modularity and resilience to extreme temperature shifts and radiation.
- Designed custom PCBs in Altium for testing and spaceflight applications.
- Built a Python SDK atop an existing ROS2 wrapper to expose a joint-indexed API for real-time telemetry and multi-mode actuator control. Auto-parses Xacro files to map joint ids and actuator specific information, and structure incoming telemetry into clean, queryable dictionaries. Fully abstracts ROS2, enabling intuitive scripting for prototyping and environmental testing, and reducing setup time by hours across the lab.
- Built real-time data acquisition tools using embedded C++ and Python, enabling reliable telemetry streaming from microcontrollers to host machines for diagnostic logging, fault response validation, and system 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.
- Built a custom PPO reinforcement learner in PyTorch with LSTM-based policy and value networks; integrated the full pipeline into ROS for trajectory planning.

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*
- Led architecture and full-stack ROS software development for an autonomous planetary rover; managed subsystem integration and testing across a 5-person team.
- Integrated a Python ROS application with embedded C++ microcontrollers via CAN to control distributed subsystems.
- 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.
- Engineered and documented gate driver + control architecture for a 3-phase BLDC motor from first principles, enabling powertrain control for brushless coolant pump; mentored junior team members in implementing the full motor controller in Altium as a foundation for future high-power traction systems.

Machine Learning R&D Intern, *Penn State ARL*, University Park, PA — *May 2023 – August 2023*
- Built synthetic data generation pipeline for active acoustic ML models in unmanned undersea vehicles (UUVs), reducing dependency on scarce labeled datasets.
- 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.

Projects

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 system with handcrafted reward shaping and dense feature vectors to coordinate offensive and defensive roles in a 2v2 Capture the Flag game.
- Built a shared memory mechanism for real-time inter-agent communication, enabling emergent ambush and retreat behaviors.
- Implemented all learning and inference logic from scratch in a single script without external ML libraries; stored and updated network weights in script-local dictionaries.
- Trained agents via self-play and curriculum learning against rotating baseline opponents across randomized maps.
- Reached tournament finals; a late-stage regression bug in retreat logic impacted final match performance.

Air Hockey Robot *October 2023 – December 2023*

- Engineered a full-stack robotic system with a 3-DOF planar arm, overhead camera, and real-time closed-loop inference.
- Collected and labeled 26,627 training images to train a YOLOv8 model from scratch for puck and keypoint detection; validated with PR curves and batch predictions.
- Predicted puck trajectories using a physics model and an LSTM trained on bidirectional crossing sequences via data augmentation; tuned for end-effector interception within a 4-inch spatial margin.
- Deployed a safety-bounded inverse kinematics controller with joint angle lookup at 57 FPS inference throughput, bottlenecked only by the 60 FPS camera.

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.

Additional Projects

- **Personal Portfolio Website *(Ongoing)*:** Designed and developed a custom HTML/CSS website hosted on GitHub Pages to showcase engineering projects, complete with interactive documentation, videos, and embedded reports.
- **Wheelchair Attachment Prototype *(In Progress)*:** Prototyping a non-invasive, low-drag wheelchair add-on with hybrid manual and powered control.
- **Speed Reader Web App (Summer 2024)**: Built a fully functional, state-driven single-page reading tool in vanilla JS/HTML/CSS; implemented real-time control logic (WPM, font, UI flow) without front-end libraries.
- **Underwater Robot Motherboard PCB *(Spring 2023)*:** Designed and integrated a PCB with a 7-sensor perception suite, power distribution, and propulsion control.
- **EMG Gesture Classification Pipeline *(Spring 2023)*:** Built a real-time gesture classifier using a custom-trained neural network on self-collected EMG biosignals.
- **Baxter Robot Interactive Game *(Fall 2022)*:** Developed a ball-and-cup pick-and-place game using object tracking and occlusion-aware ID persistence.
- **Autonomous Nerf Sentry *(Fall 2021)*:** Designed a mobile robot with onboard targeting, tracking, and automated firing system.