Rayhaneh Behravesh

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Education

Johns Hopkins University – Robotics MSE *2025 - 2026*
Master of Science in Engineering in Robotics - Perception and Cognitive Systems

University of Toronto – Engineering Science (Robotics) *2020 - 2025*
Bachelor of Applied Science in Engineering Science with Honors

Relevant Courses: Computer Vision, Artificial Intelligence, Linear Control Theory, Mobile Robotics and Perception, Optimization in Machine Learning, Microcontrollers and Embedded Systems, Robot Modelling and Control, Machine Perception

Technical Skills

- **Programming Languages:** Python, C/C++, MATLAB
- **Tools & Platforms:** Git, ROS2, Unity, Linux, CAD

Experience

Robotics Research Student *Sept 2024 - May 2025*
SickKids Hospital

- Built a Unity-based **digital twin** of a surgical robot to mirror real-time joint movements and simulate motion constraints, enabling safe validation of trajectories prior to physical execution.
- Integrated a **ROS2**-based bidirectional communication system for real-time data exchange between physical and virtual robots, supporting movement inhibition based on simulated collision or safety checks.
- Leveraged **Docker** for consistent development and deployment across platforms, ensuring reproducibility of the ROS-Unity communication framework.

Embedded Systems Developer Intern *May 2023 - Sep 2024*
Geotab

- Developed and optimized embedded **firmware** in **C/C++** for IoT technologies in **RTOS** within a **Linux** environment, including **IMU firmware** for sensor data acquisition and processing.
- Developed and implemented the service layer and driver layer, ensuring seamless integration between hardware drivers and higher-level application services for data handling and real-time communication.
- Developed and implemented **HIL development** frameworks integrated with **CI/CD** pipeline, enabling automated testing of IMU-based algorithms and resulting in improved accuracy of movement detection algorithms.

Student Researcher – Computational Analyst *May 2022 - Nov 2022*
Diamandis Computational Neuropathology Lab – University Health Network

- Modeled large-scale neural networks collected across **26,000** electrodes using MATLAB.
- Optimized data analysis tools, improving efficiency **5×** and reducing manual processing.

Projects - Refer to Portfolio

Autonomous Wildfire Surveying Drone

- Developed a wildfire response drone integrating PX4 autopilot, Jetson Nano, and **ROS2**, enabling autonomous flight, onboard perception, and **real-time mapping** under simulated emergency conditions.
- Enabled dynamic waypoint navigation using real-time detection input and pose feedback, executing a two-phase mission with **autonomous** area coverage and revisit behavior.

Mail Delivery Robot

- Developed Bayesian filtering-based **localization** for a mail delivery robot. Designed **PID control** for motion using **ROS2** on a Turtlebot 3 Waffle Pi in a Linux environment.
- Employed **MATLAB** and **Simulink** to model and analyze complex robot behaviors before testing, optimizing the system's ability to navigate varied environments.

Autonomous Mini-Car with IR and Ultrasonic Navigation

- Developed an Arduino-based **autonomous system**, implementing a **controller** to integrate IR sensors for line tracking and ultrasonic sensors for obstacle avoidance.
- Achieved precise navigation and real-time obstacle detection with an efficient, low-cost design.