

# Omar Allam

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*Electrical Engineering student passionate about spacecraft systems, control, and autonomy, with growing interest in attitude dynamics and state estimation.*

## Education

Queen's University, Kingston, ON

Expected May 2027

Bachelor of Applied Science, Electrical Engineering — **Dean's Scholar Standing**

Relevant Coursework: Control Systems, Embedded Systems, Artificial Intelligence, Signal Processing, Power Electronics

## Experience

Aptera Motors

San Diego, CA

Engineering Intern – Embedded Controls

Jun 2025 – Sep 2025

- Programmed STM32 MCUs in C and Python to control EV telemetry, power regulation, and feedback loops.
- Designed and tested closed-loop controllers using MATLAB/Simulink to validate dynamic response and timing stability.
- Built modular Python tools for **hardware-in-the-loop (HIL)** simulation and automated fault detection, reducing validation time by 40%.
- Collaborated across controls and firmware teams to tune multi-sensor feedback and ensure deterministic actuation timing.

## Engineering & Research Projects

Autonomous Design Team

Kingston, ON

Co-Captain & Systems Lead

May 2025 – Present

- Lead a 50+ member robotics team developing an **Autonomous Surface Vessel (ASV)** with a focus on real-time navigation, control, and perception.
- Built **Gazebo** simulation environments linking sensor fusion, control, and motion planning modules for field validation.
- Developed and tuned **PID controllers** to maintain course stability in dynamic water, achieving  $<2^\circ$  steady-state error.
- Implemented **EKF-based state estimation** combining LiDAR, and IMU data for drift reduction and path correction.

Electrical & Perception Systems Engineer

Jul 2024 – May 2025

- Designed and deployed **sensor-fusion models** integrating LiDAR, IMU, and camera data with ROS 2 topics for real-time localization.
- Implemented a **YOLO OpenCV** object detection pipeline for buoy detection with 70%+ accuracy under variable lighting.
- Built a MAVLink telemetry network streaming 20 Hz control data for feedback and mission monitoring.

Queen's Formula SAE Electric

Kingston, ON

Electrical Division Member

Sep 2024 – May 2025

- Tested and verified high-voltage control circuitry and embedded logic for shutdown and safety systems.
- Debugged CAN bus communication between the BMS, display, and power modules, improving frame reliability by 15%.
- Contributed to firmware validation for real-time telemetry and fault detection.

## Personal Projects

Autonomous Rover Platform

Jun 2025 – Present

- Built a **Jetson-based rover** running ROS 2 for real-time navigation, perception, and control testing.
- Implemented PID control and path planning algorithms with trajectory visualization and adaptive tuning.
- Integrated OpenCV and PyTorch models for object recognition and tested in dynamic environments.

AC-DC Battery Charger

Jan 2025 – Mar 2025

- Designed and manufactured an AC-DC converter using transformers and MOSFET switching achieving 93% efficiency.
- Conducted transient and thermal tests with oscilloscope validation for closed-loop stability under variable loads.

## Technical Skills

- **Programming:** Python, C++, C, MATLAB/Simulink
- **Robotics:** ROS 2, Gazebo, SLAM, Trajectory Planning, Sensor Fusion, State Estimation, Reactive Control
- **Machine Learning:** PyTorch, OpenCV, NumPy, Pandas, Simulation-to-Real Transfer
- **Embedded Systems:** STM32, Jetson, Linux, RTOS, CAN, SPI, UART, PID control
- **Hardware & Tools:** PCB Design, Oscilloscope, Logic Analyzer, Altium Designer, Power Electronics, Rapid Prototyping
- **Collaboration:** Git, VS Code, Simulation Pipelines, Technical Documentation