

Manil Ferr

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Education

McMaster University – GPA: **3.96/4.00**

Sep. 2025 – Apr. 2029

B.Eng. Computer Engineering | Schulich Leader Scholar (\$120K STEM Scholarship, 1 of 50 in Canada)

Experience

Firmware Developer

May. 2026 – present

McMaster Mars Rover Team (MMRT)

Hamilton, ON

- Integrated FreeRTOS into the rover's power-distribution monitor and battery management board, replacing sequential firmware with concurrent tasks so CAN communication and fault checks do not block battery monitoring.
- Integrated the rover's fans with the onboard computer and temperature-sensing board through a Teensy microcontroller, using PWM to control fan speed and flag unresponsive fans.

Robotics Systems Engineer – Co-op

May. 2026 – Aug. 2026

Robotics and Manufacturing Automation Laboratory – McMaster University

Hamilton, ON

- Re-engineered pneumatic-actuator control from discrete valve switching to PWM-based modulation, enabling continuously tunable mass-flow control for precise actuation.
- Developed a real-time nonlinear model predictive controller (NMPC) that used encoder position and pressure-sensor feedback to achieve 2.5 mm position tracking on hardware while maintaining a ~ 0.35 ms average solver time per control step.
- Turned noisy 100 Hz pneumatic valve data into a control-oriented mass-flow model for NMPC, hitting 0.94 held-out R^2 by delay-aligning PWM commands, smoothing pressure dynamics, and fitting MATLAB valve-flow models.

Controls & Embedded Systems Member

Oct. 2025 – Apr. 2026

Mac RoboMaster

Hamilton, ON

- Built a four-motor CAN control and telemetry pipeline; achieved reliable TX/RX communication by implementing broadcast commands, feedback decoding, and real-time monitoring hooks.
- Implemented omni-wheel forward and inverse kinematics; delivered accurate wheel-speed setpoints and chassis-velocity estimates by integrating these transforms into the chassis control loop.

Co-founder & Head of Web Development

Dec. 2024 – Jan. 2026

Hounga Digital Agency

Toronto, ON

- Co-founded a digital marketing agency; scoped, developed and delivered client websites and campaigns, generating over \$10K in revenue by coordinating designers, content creators and schedules.

Mechanical Technician Intern – Co-op

Jul. 2023 – Aug. 2023

Toyota

Scarborough, ON

- Supported certified Toyota technicians across maintenance and light body-repair workflows, completing oil, brake, tire, alignment, and battery-service tasks while developing hands-on diagnostic, inspection, and repair-planning skills.

Projects

Drone Project | *ESP32, C, C++, I2C, Sensor Integration, 3D Printing*

Dec. 2025 – Apr. 2026

- Designed and built a quadcopter with a 3D-printed frame, custom wiring, LiPo power and a handheld controller, creating an affordable platform for embedded-controls experimentation.
- Developed modular C/C++ flight-control firmware with IMU orientation estimation, PID stabilization, motor mixing and telemetry; achieved stable flight at a 2 kHz control loop and implemented a 250 ms failsafe over ESP-NOW wireless links.
- Diagnosed and mitigated noise, vibration and calibration issues through iterative hardware tuning and firmware debugging, culminating in reliable, reproducible flight performance.

Real-Time Controller for a 6-DOF Robot Arm | *C, C++, Python, FreeRTOS*

July. 2026 – present

- Developing a FreeRTOS-based embedded control system for an SO-100 robot arm on STM32, using UART servo communication, feedback, motion limits, and fault detection to execute safe pick-and-place tasks.

Technical

Technical Languages: C, C++, Python, MATLAB.

Embedded Systems: FreeRTOS, STM32, ESP32, real-time firmware, CAN, I2C, PWM control, sensor integration.

Controls & Robotics: Nonlinear model predictive control (NMPC), PID control.

Engineering Tools: Git/GitHub, KiCad, Autodesk Inventor, Arduino.

Test & Lab Equipment: Digital multimeter, oscilloscope, soldering and rework.