

Juan Pablo Becerra-Padilla

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Profile

Third-year Mechatronics Engineering student with hands-on experience developing embedded systems, designing hardware, and leading automation projects. Skilled in building robust, scalable firmware and integrating hardware/software systems from concept to deployment. Eager to apply hands-on experience and technical knowledge in an embedded systems co-op or internship.

Technical Skills

- **Embedded Systems:** Firmware (TM4C, STM32, ESP32), RTOS, VHDL, FPGA
- **Programming:** Embedded C/C++, Python, MATLAB, **Git**.
- **Circuit Design:** Schematic capture, PCB layout, prototyping, troubleshooting(oscilloscope, logic analyzer, digital multimeter).
- **CAD & Simulation:** SolidWorks, AutoCAD Electrical, Simulink, Automation Studio
- **Languages:** Fluent in French and Spanish.

Education

Bachelor of Engineering – Mechatronics Engineering

April 2027(Expected)

Humber Polytechnic, Etobicoke, ON

- Dean's Honour List (all years)

Relevant Coursework:

- **PLCs:** Programmed ControlLogix PLCs and PanelView HMIs; wired motors, indicators, pneumatic cylinders, and sensors. Created wiring diagrams in AutoCAD Electrical.
- **Control Systems:** Simulated and tuned a helicopter controller in MATLAB/Simulink using PID and pole-placement methods.
- **Microcontrollers:** Wrote embedded C firmware on TM4C for real-time sensor/actuator control in a cartoning machine.
- **Robotics:** Programmed KUKA KR4 R700 for pick-and-place with sensor feedback.
- **Signal Processing:** Built a modular MATLAB API for EEG filtering, FFT, and feature extraction.
- **Autonomous Systems:** Developed PID and Stanley control, LiDAR mapping, Kalman filters, and ROS2 nodes for vehicle simulation in C++.

Projects

I2C/SPI-to-UART Bridge Driver (SC16IS740)

June 2025

Personal Project

- Developed a **modular, reusable driver** for the NXP SC16IS740 I2C/SPI-to-UART bridge compatible with any microcontroller.
- Implemented **UART** configuration (baud rate, parity, stop bits, word length), loopback test mode, 64-byte burst Tx/Rx, and **error/status tracking**.
- **Abstracted** low-level I2C/SPI operations via user-defined **function pointers**, improving portability, **debuggability**, and modularity.
- Validated driver functionality using **loopback** and **integration tests**, which were verified using **Saleae logic analyzer** software.
- Roadmap includes support for continuous communication, interrupts, and flow control.
- **Published open-source** alpha release on GitHub to gather feedback and iterate collaboratively.

Autonomous Box Cartoning Machine

Sept 2023 – Apr 2024

Team Lead – Humber Capstone Expo

- Led a team of **3** to deliver a fully automated box cartoning system prototype showcased at the Humber Capstone Expo.
- Implemented **pneumatic actuation** using **solenoids** and **flow control** valves, automating box handling and reducing manual intervention.
- Developed **embedded C firmware** for real-time sensor integration and control of solenoids and DC motors, enhancing system reliability.
- Designed relay logic to safely interface high-voltage solenoids with the **TM4C** microcontroller, ensuring protection and safe operation.

DC Motor PWM Control Board

Dec 2023

- Built a PWM-based DC motor controller using a 555 timer circuit, enabling variable speed control for low-voltage motors.
- Laid out and routed PCB in Ultiboard, soldered and assembled over 20 components, ensuring high reliability and signal integrity.
- Validated functionality via oscilloscope waveform analysis and multimeter continuity checks.

Awards & Interests

- UTM Appathon Winner: Best Mobile App (2019)
- Computer Engineering Technology Award (2021)
- French Immersion Certificate (2021)
- Passionate about custom PC building and embedded hardware prototyping