Juan Pablo Becerra-Padilla
Mississauga, ON
(647) 201-8034 | juanpablobecerra103@gmail.com
linkedin.com/in/juanpbp | juanpbp03.github.io

Profile

Third-year Mechatronics Engineering student with hands-on experience developing embedded systems, designing hardware, and leading automation projects. Adept at building robust, scalable firmware and integrating hardware/software solutions from concept to deployment. Eager to leverage strong technical and problem-solving skills in an embedded systems co-op or internship.

Technical Skills

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

Projects

Autonomous Box Cartoning Machine Sept 2023 – Apr 2024
Team Lead – Humber Capstone Expo

- Led a team of 4 to deliver a fully automated box cartoning system showcased at the Humber Capstone Expo.
- Engineered **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.
- Integrated relay logic to safely interface high-voltage solenoids with the **TM4C** microcontroller, ensuring protection and safe operation.

STM32 Embedded Software Development May 2025 – Present
Personal Project (Ongoing)

- Designed and implemented register-level **GPIO drivers** and user-facing API in C for **STM32 microcontrollers**.
- Verified driver timing and logic operation using a **logic analyzer**, ensuring robust and accurate hardware control.
- Currently expanding peripheral driver support (**I2C, UART, SPI, LCD-TFT**) and integrating **RTOS** concepts to strengthen low-level firmware expertise.

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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.

Education

Bachelor of Engineering – Mechatronics Engineering
Humber Polytechnic, Etobicoke, ON
Expected Graduation: April 2027

- Dean's Honour List (all years)
- **Relevant Coursework:**
    - **PLCs:** Programmed **ControlLogix PLCs**, **PanelView HMIs**, wired field devices (motors, sensors).
    - **Microcontrollers:** Embedded C firmware for sensor/actuator automation.
    - **Instrumentation:** Sensor wiring/calibration, signal processing (LabVolt).
    - **Signal Processing:** MATLAB API for modular EEG data analysis.
    - **Autonomous Vehicles**: PID & Kalman filtering, LiDAR mapping, **ROS2** nodes for vehicle control.

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