Manush Patel

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Education

McMaster University Expected: April 2028
B.Eng, Computer Engineering (GPA: 3.7/4.0) *Hamilton, ON*

Experience

Controls and Firmware Developer | Mac Formula Electric **– Hamilton, ON** Sept 2024 – Present

- Implemented C++ drivers for low voltage battery management systems, enabling stable cell-voltage reads and 30+ diagnostics used in pre-drive safety checks
- Migrated control logic from **Simulink models** to C++, allowing for Git-based review and simpler debugging
- Computed suspension travel from position sensors and delivered validated data to Vehicle Dynamics for setup and correlation with lap-time results

Embedded Software Engineer Intern | Lumatone – Toronto, ON April 2025 – Aug 2025

- Developed **C firmware** on **BeagleBone/PICkit** to validate hall-effect sensor **ADC inputs** during hardware testing, enabling faster identification of faulty readings and reducing QA time
- Cut calibration time by creating real-time sensor **visualization** using **Matplotlib**, allowing engineers to quickly interpret sensor trends and replace manual log review
- Debugged interrupt-status flags and input-handling logic in C firmware, improving reliability
- Documented firmware test procedures and debugging findings, supporting manufacturing and new firmware

Software Developer | Gerrits Engineering Ltd – Barrie, ON Jan 2025 – March 2025

- Automated engineering workflows with **n8n**, extracting structured data from PDFs into CSV for analysis
- Deployed AI agents integrated with **Supabase auth** and hosted on **Firebase**, reducing manual entry
- Built reusable automation pipelines to support multiple document formats and evolving engineering requirements

Projects

STM32 Bootloader

- Built an **ARM Cortex-M** bootloader in **C** for an **STM32** microcontroller to validate firmware and manage application execution from internal flash
- Implemented flash erase and program routines with strict memory boundary enforcement to prevent corruption
- Configured linker scripts and startup logic to relocate the interrupt vector table, reset the main stack pointer, and safely transfer control to application code

Nav-Aid

- Designed an AI-powered navigation aid on **Raspberry Pi** that performs real-time street-sign detection and routes results to a custom tactile Braille board
- Built a **servo-driven** Braille-style interface, synchronizing actuators from **Python** to render tactile characters
- Used **Python**, **OpenCV**, and **EasyOCR** to process live camera input with low end-to-end latency

CampusCart

- Built a full-stack marketplace using **React, Node.js, Express, PostgreSQL, and Tailwind CSS** for housing, textbooks, and services
- Implemented secure listings with **JWT authentication**, calendar synchronization, & media uploads via **AWS S3**

Skills

Languages: C, C++, Python, JavaScript, Verilog
Protocols: CAN, UART, I2C, SPI, USART, CRC
Embedded & Firmware: STM32, BeagleBone, ADC/DAC, PWM, Interrupts, Timers, Oscilloscope
Tools & Platforms: Git, Simulink, Docker, Altium, AutoCAD, GoogleTest, FreeRTOS, Linux/Unix