Aundre Mario Jeganathan

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Education

University of Waterloo Sep. 2022 – Apr. 2027

Bachelor of Applied Science, Honours Electrical Engineering, Computer Engineering Minor

Courses: Electronic Circuits, Digital Hardware Systems (**SystemVerilog**), Data Structures and Algorithms (**C++**).

Experience

Electrical Design Team Lead Sep. 2024 – Present

Baja Sae *Waterloo, ON*

- Designed a **custom PCB** using **Altium** to integrate an **STM32 microcontroller** with **5 peripherals**, including an **accelerometer sensor, SD card mount,** and **LCD display**.
- Built a **voltage step-down board** to convert **18V to 12V**, ensuring safe power delivery to the vehicle's **electrical systems**, including lighting and the differential.
- Led **vehicle wiring harness** assembly by delegating tasks, sourcing components, and integrating the **master kill switch, brake lights**, and **differential wiring** to meet **2025 Baja SAE regulations**.
- Programmed data processing algorithms in **C** on **STM32** to analyze vehicle performance using accelerometer input.

Firmware Engineering Intern May. 2024 – Aug. 2024

WeTraq *Markham, ON*

- Developed and optimized firmware in **C++** for an activity tracker using **STM32CubeIDE** and **Git** to deliver the product within **4 months**.
- Implemented **I2C, UART,** and **SPI** communication protocols to build drivers for **5 peripherals**, including **pedometer, Bluetooth,** and **Radio Frequency (RF) modules**.
- Validated **sensor functionality** through field testing and parameter calibration, improving measurement accuracy to **over 90%**.

Electrical Engineering Intern Sep. 2023 – Dec. 2023

Ekidna Sensing *Ottawa, ON*

- Led a **multidisciplinary team of 5 engineers** to design a Moisture Analyzer using an **embedded microcontroller** for **humidity measurement** and **CSV data export**.
- Designed a **custom microcontroller** in **Altium** integrating an **RP2040 microchip, SHT33 temperature-humidity sensor**, and **USB-C port** to enhance functionality and compatibility.
- Developed **Python** scripts to extract Moisture Analyzer data, apply **mapping functions**, and assess accuracy while **predicting future trends**.
- Conducted **structured validation tests** to assess sensitivity to various **environmental** and **operating test cases**, consistently fulfilling the **over 94% accuracy target**.

Hardware Projects

Matrix-Vector Multiplication Engine Jun. 2025

- Built a **matrix-vector multiplication AI accelerator** inspired by Microsoft's **Brainwave architecture** using **SystemVerilog** and **AMD Vivado**, targeting **low-latency deep neural network (DNN)** inference workloads.
- Engineered a **pipelined datapath** with **hierarchical decode logic** to dispatch **SIMD instructions** into parallel **multiply-accumulate operations**.
- Optimized **resource utilization** by synthesizing **configurable tile engines** on an **PYNQ-Z1 FPGA**, achieving high **functional unit throughput**.
- Validated **engine performance** and **parallelism efficiency**, for **AI inference applications**, using representative **recurrent neural network (RNN)** workloads and **critical-path benchmarks**.

Digital Timer PCB Sep. 2024

- Engineered a **digital timer circuit** that counts down from a manually inputted value with **DIP switch input**, **seven-segment display output**, and buzzer alert upon completion.
- Designed **PCB schematics** in **Proteus** and integrated components such as a **BCD counter, quad NOR gate, dual D flip-flop**, and **MOSFET**, using surface-mount and through-hole soldering techniques.
- Tested and debugged the timer circuit using **Proteus simulations**, a **digital multimeter**, and an **oscilloscope** to verify functionality and resolve **PCB short-circuit, power regulation**, and **trace discontinuity issues**.

Technical Skills

Hardware: PCB Design, Soldering, STM32, Arduino, Raspberry Pi, SPI, I2C, UART, Ethernet, JTAG, FPGA, 3D Printing.
Design Tools: Altium, AMD Vivado, Keil μVision, Quartus Prime, Proteus, Git, VS Code, Putty, SolidWorks, AutoCAD.
Languages: C/C++, Python, SystemVerilog, VHDL, ARM Assembly, MATLAB.