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 **voltage step-down board**, converting **18V to 12V** to safely power an off-road vehicle's **electrical systems, including lighting** and **a differential**.
- Developed a **custom PCB** using **Altium** to integrate an **STM32 microcontroller** with **peripherals**, including an **accelerometer sensor, SD card mount,** and **LCD display**.
- Programmed algorithms using **C** to **collect and process accelerometer data**, enabling precise vehicle performance analysis using an **STM32 microcontroller**.
- Designed and fabricated custom **electronic component housings** using **SolidWorks** and **3D printing**, ensuring **durability**, **precise fit**, and **protection against vibration and debris** in off-road conditions.

Firmware Engineering Intern May. 2024 – Aug. 2024

WeTraq *Markham, ON*

- Collaborated with a team of **4 senior firmware engineers** to develop, and optimize firmware for an activity tracking device using **C++** in **STM32CubeIDE** and **SmartGit**, delivering the product within **4 months**.
- Implemented and integrated **I2C, UART,** and **SPI communication protocols** to develop peripheral drivers, including for **Pedometer, Bluetooth,** and **Radio Frequency modules**.
- Tested and validated **sensor functionality**, leading to performance optimizations and achieving over **90% accuracy** in sensor data readings.

Electrical Engineering Intern Sep. 2023 – Dec. 2023

Ekidna Sensing *Ottawa, ON*

- Led a **multidisciplinary team of 5** mechanical, data, and nano engineers to design and validate a Moisture Analyzer that uses an **embedded microcontroller** to **measure humidity** and **export data as a CSV file**.
- Engineered a Moisture Analyzer in **Altium** to use an **RP2040 chip, SHT33 temp,** and **humidity sensor**, while optimizing the design to include a **USB-C port** for better compatibility.
- Utilized Visual Studio Code to write **Python** scripts for reading data from the Moisture Analyzer and **mapping functions** to the results for analyzing accuracy and predicting future trends.

Hardware Projects

Matrix-Vector Multiplication Engine Jun. 2025

- Implemented a **matrix-vector multiplication accelerator** inspired by Microsoft's **Brainwave architecture** using **SystemVerilog** and **AMD Vivado**, targeting **low-latency**, **batch-1** DNN inference workloads.
- Designed 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** for **real-time AI** tasks.
- Validated **engine performance** against **critical-path metrics** and benchmarked **parallelism efficiency** using representative **RNN workloads**.

Digital Timer PCB Sep. 2024

- Developed a **digital timer circuit** that counts down from a manually inputted value, via a **DIP switch**, and displays elapsed time using a **seven-segment display**, with a buzzer indicating when the count is finished.
- Designed schematics using **Altium** and integrated components such as a **BCD counter, quad NOR gate, dual D flip-flop,** and a **MOSFET**, then assembled the **PCB** using surface-mount and through-hole soldering techniques.
- Tested and debugged the **timer circuit**, utilizing **Proteus simulations** alongside lab instruments such as a **digital multimeter** and **oscilloscope** to ensure proper functionality and troubleshoot short-circuit issues on the **PCB**.

Technical Skills

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