Matt MacLeod

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SUMMARY

Ambitious Embedded Systems Engineer with 5 years’ experience writing code and over 3+ years of professional experience contributing to all aspects of product development across a wide range of industries. Professionally, I’ve worked on many different projects with teams of varying sizes and currently I’m leading the software team of 4 at Rainhouse, where I have had the opportunity to get in on the ground floor of product development, being heavily involved in all aspects of design—from Schematic/PCB design to full stack software engineering and AI development. As such, I am intimately familiar with contributing to a codebase in a team setting and comfortable with collaboration flows such as: pull requests, code reviews, automated pipelines, code formatters/linters and QA testing. I have a proven track record of effective communication with teammates and clients alike to ensure that the code produced is robust, on time and to specification.

SKILLS

**Languages & Protocols: C, C++, Python**, CMake, Bash, **git**

**Embedded Systems:** Microprocessors: (**Armv8**-M**, Armv7E**-M**,** Avr), RTOS: (Zephyr, FreeRTOS), Interfaces: (**SPI, I2C, UART**, **CAN**)

**Hardware:** Design Software (Eagle, Altium, LTspice), Debug Tools: (gdb, RTT)

**Lab Equipment:** Oscilloscope, **Logic analyzer**, Digital Multimeter, Signal Generator, Power Supplies

WORK EXPERIENCE

**Embedded Firmware Engineer** JULY 2021 – PRESENT

**Rainhouse**  Victoria, BC, Canada

* **Lead electronics team** in start-up (team of 4), to deliver all required hardware, embedded firmware, and full stack software for a wireless IoT, SMART CNC machine tool product line. Resulted in successful delivery of TRL-7 prototype, SDK, and the filing of 2 international patents.
* Wrote optimized, **multi-threaded embedded software** (**in C**) for 2 dual core **ARM** **SoCs**, to facilitate the real-time transmission and reception of 7 independent sensors over Bluetooth low energy at 1Mbps throughput.
* Experience with full board bring up of embedded ARM SoC including PCB design, bootloader configuration, debugging

hardware peripherals and writing embedded software.

* Wrote the full stack IoT architecture encompassing gRPC streams to achieve 99.99% signal transmission over upper limit of Bluetooth low energy.
* Wrote **embedded Linux,** Zephyr **RTOS** baseddrivers (in **C)** for the nrf5340 ARM SoCto interface accelerometer ICs, ADC controller ICs, PCM microphones, thermocouples, and force sensors for high performance data collection.

**Electrical Systems Design Engineer (Internship)** JAN 2020 – AUG 2020 (8 MO)

**Motorola Solutions**  Vancouver, BC, Canada

* Developed a software for hardware, automation framework (using C++/python) to characterize the IO performance of SSDs, HDDS and raid controllers over a temperature hysteresis profile. Final solution resulted in a **12x faster test procedure** and improved the storage device characterization **accuracy by 50%.**
* Spearheaded the board bring up, **hardware re-design** (using Altium) and **debug** of a PoE controller board for an NVR product family. Resulted in successful delivery of first-generation rugged NVR product line.

**Electrical Engineer (Internship)** MAY 2019 – AUG 2019 (4 MO)

**Seaspan ULC**  Vancouver, BC, Canada

* **Collaborated across multi-disciplinary teams** and managed sub-contractors to deliver electrical single line diagrams for Canadian Coast Guard and Naval vessels.
* Sourced several major electrical instruments that became standard among a replenishment ship for the Canadian Navy.

**Jr Autonomous Systems Engineer (Internship)** SEPT 2018 – DEC 2018 (4 MO)

**InDro Robotics**  Ganges, BC, Canada

* Designed, built and tested a working TRL-7 prototype of an after-market payload deployment mechanism that could be actuated through the DJI hand controller and mounts externally onto DJI’s M210 drone. Resulted in the solution becoming a part of the company’s product line.
* Programmed **embedded** **Linux flight controllers using C++** to integrate third party sensors and cameras with OEM **drones** for remote sensing operations.

**Electrical Engineer (Internship)** JAN 2018 – APR 2018 (4 MO)

**AML Oceanographic**  Sidney, BC, Canada

* Tasked with using limited resources to improve the existing quality control process of PCBs before the next stage of manufacturing
* Automated the testingprocedure of raw circuit boards using a combination of custom PCBs, test jigs and firmware validation scripts to yield a 5xfaster quality control process

PERSONAL PROJECTS

**Nissan Leaf Battery Analytics Framework (RP2040, C++, python)**

* Goal: Decode the CanBus messages to persist intrinsic battery pack sensors from a depleted Nissan leaf pack to a cloud storage system for predictive analytics in a remote, off grid storage system.
* Embedded Systems: See custom [can bus decoding library](https://github.com/macleod-matt/nissan-leaf-can-bms)

**AI Home Security Guard (Raspberry Pi Zero W, C++):**

* Goal: Create a device that utilizes facial and voice recognition methods to unlock door based on person’s identity
* Hardware: Raspberry Pi Camera, USB Microphone, Bluetooth intercom System, Metal Gear Servo driven actuator to unlock door
* Embedded Systems: OpenCV Eigenfaces method for facial recognition, Voice to speech recognition algorithm used for user interface.

More Coming soon. For now, check out my [GitHub!](https://github.com/macleod-matt)

PATENTS

* Sensor-based Smart Tooling for Machining Process Online Measurement and Monitoring **(Pending)**
* Real-Time DAS and SDK for Machine Parameter Online Measurement and Monitoring **(Pending)**

EDUCATION

**Bachelor of Electrical Engineering** (Digital and Embedded Systems Specialization) SEPT 2016 – AUG 2021

**University of Victoria** Victoria, BC, Canada