Richard **Matthews**

University of Waterloo | Mechatronics Engineering | Graduating April 2020

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Languages: English (fluent), French (working proficiency)

Skills

Software

- C, C++, Python, Matlab, Assembler
- Embedded Development: device drivers and firmware
- Real Time Operating Systems
- Digital Controls (PID, State-Space)
- Display Drivers, EFI

Hardware

- ARM-Cortex M, AVR Microcontrollers
- Schematic capture, PCB Layout, Assembly and Rework
- Power Electronics including inverters, regulators, and rectifiers
- I^2C, SPI, SD SPI, UART, CAN protocols

Tools

- Altium, LTSPICE, Vector CANdb++
- Oscilloscope, Function Generator, DMM, Logic Analyzer
- Git, SVN, CVS
- Unix, Shell Scripting, GNU Make
- GoogleTest Unit Test Framework

Work Experience

Embedded Software Developer

May 2019 - August 2019

Blackberry

- Added support to camera driver for synchronizing white balance and exposure between multiple cameras
- Improved ADAS algorithm API by automatically handling buffer management for algorithms with multiple sensor inputs
- Developed driver to provide MP4 encoded stream from IP camera
- Debugged customer issues, for example identifying bug in sensor API where buffer headers were reused for multiple data buffers
- Improved code to meet safety certification ISO 26262

Embedded Software Developer

May 2018 - August 2018

Apple

- Took lead on creating test automation framework for EFI display driver code
- Designed automatic tests to catch and identify the cause of increasingly common errors due to incorrect display setup
- Modified EFI display driver code to intelligently determine failure causes and save information for use in testing
- Implemented saving of EFI display debug data in customer devices in order to aid debugging of failures occurring in the field

Embedded Software Developer

September 2017 - December 2017

Nokia

- Implemented communication API for product simulator using interprocess shared memory between Linux daemon and QEMU VM
- Shared memory communication decreased message transfer time by 75% vs old communication API

Hardware Design Intern

January 2017 - April 2017

Lumotune

- Implemented automatic firmware tests to verify hardware integrity on system startup
- Designed a PI control algorithm to maintain output voltage of DC-AC inverter with varying output loads
- Developed automatic capacitor bleed circuit and voltage quadrupler circuit to generate high voltage DC from AC input

Software Developer, Solace Systems

May 2016 - August 2016

Embedded Software Developer, Alcatel-Lucent

September 2015 - December 2015

Personal Projects

Firmware Lead

January 2017 - Present

Waterloo Formula Electric

- Selected to plan and lead implementation of 2019/20 vehicle firmware, managing team of 10 students, including 2 full-time interns
- Developed firmware for vehicle ECUs managing low and high voltage batteries, and controlling motors
- Implemented Battery Monitoring System (BMS) ensuring cell voltages and temperatures remain within safe limits
- Developed balance charging algorithm for safely coordinating charging using HV charger and BMS
- Implemented driver for LTC6811 battery monitor chip, communicating over isolated SPI bus
- Created python script to generate C code for sending and receiving CAN messages based on message and defect code database

Quadcopter Flight Controller

July 2017 - December 2017

Personal interest project

- Designed, assembled, and developed software for control board to stabilize the flight of a quadcopter
- Created schematics and PCB layout for board which included an ARM-Cortex M4 processor and multiple MEMS IMU sensors