Richard **Matthews**

UNIVERSITY OF WATERLOO 3A MECHATRONICS ENGINEERING

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Skills

Software

- C, C++, Matlab, Python, Assembler, TCL, TeX/LaTeX
- Embedded Development: device drivers and firmware
- Real Time Operating Systems
- Control Algorithms

Hardware

- ARM-Cortex M, AVR Microcontrollers
- Schematic capture, PCB Layout, Assembly and Rework
- Power Electronics including inverters, regulators, and rectifiers

Tools

- Altium, Eagle, LTSPICE
- Oscilloscopes, Function Generators, DMMs, Logic Analyzer
- Git, SVN, CVS

Work Experience

Embedded Software Developer
September 2017 - December 2017

NOKIA

- Developed new communication API for product simulator using interprocess shared memory
- Shared memory communication decreased previous message transfer time by 75%
- Developed unified API for communication between main processor and FPGAs
- New API replaced numerous redundant functions with one interface to access all FPGA memory regions

Hardware Design Engineer
January 2017 - April 2017

LUMOTUNE

- Implemented automatic firmware tests to verify hardware integrity on system startup
- Designed a control algorithm to maintain voltage level output of DC-AC inverter with varying output loads
- Integrated into existing board new capacitor bleed circuit and voltage quadrupler circuit to generate high voltage DC from AC input
- Performed circuit Simulation in LTSPICE to model new circuitry before adding it to the PCB
- Debugged noisy DC-AC inverter with multiple hardware and software tests
- Reworked board to test out various snubber and choke circuits for reducing noise

Software Developer
May 2016 - August 2016

SOLACE SYSTEMS

- Developed multiple features in Python for new REST API used to configure messaging router product
- Improved reliability and ease of development by automating the classification of new configuration attributes added to the API

Embedded Software Developer
September 2015 - December 2015

ALCATEL-LUCENT

- Implemented interrupt driven processing of DSL lines to reduce task CPU usage by 50%
- Modified a CPU usage monitoring/profiling tool to handle multi-core systems using VxWorks RTOS
- Created numerous tools to aid with debugging low-level code

Personal Projects

Quadcopter Flight Controller

- Designed, assembled, and developed software for board to stabilize the flight of a quadcopter
- Used Altium Designer to create schematics and PCB layout of board which included an ARM-Cortex M4 processor, and multiple MEMS IMU sensors
- Hand soldered board and performed multiple software and hardware tests to ensure full functionality
- Developed control software, running on FreeRTOS, to stabilize flight of quadcopter by controlling motor speeds based on sensor input
- Implemented asynchronous reading of sensors over I2C using DMA with the resultant performance increase allowing faster control loop frequency

Data Aquisition Unit

WATERLOO FORMULA ELECTRIC

- Developed firmware for onboard Data Acquisition Unit (DAU) running FreeRTOS
- Programmed DAU to log data from multiple analog sensors and GPS location to SD Card
- Developed SD card driver to initialize, read and write data over the SD card SPI interface
- Synchronized multiple tasks to read from sensors at varying frequencies and log output to SD Card