DANIEL RUSH

Senior Software Engineer

rush.daniel95@gmail.com | San Francisco, California | daniel-rush95 | theDrsh

EXPERIENCE

Senior Software/Firmware Engineer

Carbon, Inc.

June 2017 - Current | Redwood City, California

- Main firmware engineer on the M3 and M3 Max project. Developed project from conception through engineering build, alpha, beta, and production
- Maintained firmware for all Carbon products and subsystems
- Developed automation, code generation, hardware-in-the-loop tests, and tools for building and testing firmware and hardware
- Main Owner of core subsystems that enable printing, including the Oxygen control, and motion control subsystems

Associate Firmware Engineer

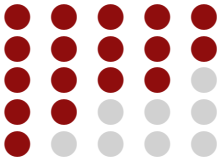
California Mechatronics Center

November 2016 - May 2017 | Chico, California

- Developed firmware for an earthquake sensing system using MQTT and USB device for data transmission and redundant storage in case of blackout or loss of internet
- Worked on Verilog HDL for FPGA based sensor system with mass parallel sampling and data transfer
- Developed encoding and decoding of data from FPGA to microcontroller
- Overcame hardware constraints with custom serialization library for data transmission with limited RAM

LANGUAGES

C++
C
Python
Verilog
Bash



PROFICIENCIES

I2C | SPI | UART | USB | MQTT | Protobuf | Docker | System Integration | Board Bring-up | Linux | Bazel | Cmake | Jenkins | HIL Testing | RTOS | YAML | Mako

STRENGTHS

Detail Oriented | Self-Starter | Dedicated Teammate | Communicator | Persistent Problem-Solver

EDUCATION

B.Sc. Mechatronics Engineering

California State University, Chico

Aug 2013 - May 2018

B.Sc. Computer Engineering

California State University, Chico

Aug 2013 - May 2018

PROJECTS

M3 And M3 Max

Carbon

- Worked with hardware engineers, product managers, and print development engineers to create firmware requirements.
- Built all new subsystems in house to create Carbon's "smartest" printer
- Wrote firmware with extensibilty, ease of debug, and robustness in mind to create a lasting product.
- Brought up and integrated 3 systems, from the first engineering build to the first production unit.
- Dealt with many challenges including supply chain shortages which necessitated new drivers from scratch on a short timeline.

Motor Controller

Carbon

- Developed from conception a FOC Motor controller, with cascaded control loop allows for torque, velocity, relative position, or absolute position control.
- Created drivers for USB Logging, UART API interface, SPI Controlled FET-Driver chip, I2C EEPROM hardware version control.
- Designed and implemented hardware fault detection and safety states to prevent damage to mechanics and electronics.
- Architected HIL(Hardware-In-the-Loop) tester using dynamometer for system and firmware validation.

OTHER PROJECTS

Open Source Firmware communications

uComs

- Ongoing project to make starting an embedded project's communication protocol easy and generated
- Integrates all the low-level intricacies of communicating between a host and a device, providing a boilerplate for communications

Microtest

Carbon

- Developed a firmware image which was able to test core interfaces of the microcontroller item Server-side application to interface the microcontroller with gtest on Linux, using **Nanopb**
- Developed Jenkins-based job to automatically run tests upon pull request.
- Created ability write firmware that could be automatically called and tested via Jenkins.
- Recorded statistics like execution time and logs on target processor.

Code Generation Projects

Carbon

- Worked to develop python-generated firmware to automate different parts of the firmware stack:
  - Server <-> embedded system communication.
  - microcontroller <-> microcontroller communication and commands.
  - Hardware faults and alerts generated through entire software stack micro -> server -> cloud.

Board Bootloader and Over-The-Air(OTA) Update Software

Carbon

- Helped build the bootloaders for smart subsystems of printer
- Extended OTA updates to incorporate updating all smart subsystems.