

# ANDY REN

## Computer Engineering at University of Waterloo

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## EXPERIENCE

### Embedded Software Intern

#### Nuvation Energy

January 2021 – April 2021

Waterloo, Canada

- Developed firmware in C/C++ for the Nuvation **Battery Management System**
- Drafted and implemented a prototype software model for migrating flash memory data after a firmware upgrade
- Constructed system tests in C++ and Python to verify firmware features in simulated and hardware environments
- Debugged and investigated numerous real-time bugs and test regressions using gcc and Python, improving firmware robustness

### Software Developer

#### VirtaMove

September 2019 – December 2019

Kanata, Canada

- Built a robust internal test framework for VirtaMove using Python and Robot Framework, which executed release-critical manual tests nightly, reducing software testing and verification time by up to 50%
- Implemented features in C/C++ which enabled V-Migrate host certificate regeneration, and resolved various runtime concurrency errors
- Configured the V-Migrate installer to automatically resolve TCP/IP port collisions, and perform closed network installation using WiX Toolset
- Redesigned migration agent key generation, enabling V-Maestro to communicate with previously linked agents after a system restart, improving product scalability
- Prototyped a new product activation graphical interface for migration licensing using C#, .NET Core, and C++

## PROJECTS

### ARM RTX Project

May-Aug 2021

- Constructed a real-time operating system kernel for an ARM Cortex M3 microcontroller in C for a course lab component.

### Systolic Array

May-Aug 2021

- Developed and deployed a matrix multiplication systolic array bitstream using Verilog for a Xilinx Pynq FPGA board

### home-monitor

github.com/ren-andy/home-monitor

- Built a multi-threaded home monitoring embedded system using a Raspberry Pi 3B+ and C++ capable of detecting nearby intruder movement, reading and displaying temperature and humidity, and playing music.

## SUMMARY

- Professional experience in software/firmware development and testing with ARM Cortex M based embedded systems using C, C++, Python
- Practical experience with Unix programming, RTL programming in Verilog, and RISC-V assembly

## SKILLS

### Languages

C C++ Verilog Python JavaScript

### Tools and Frameworks

Linux gcc Git Docker Vivado  
Robot Framework Pyunit Cpputest

## EXTRACURRICULARS

 **Engineering Student Councillor**  
Advocate for student interests

 **Fitness Enthusiast**  
Avid weightlifter and distance runner

 **Lifelong Musician**  
Played Piano, and Alto Saxophone for over a decade

## EDUCATION

### BASc, Computer Engineering

University of Waterloo

September 2018- Present

- Relevant Courses:
  - ECE 250 - Algorithms and Data Structures
  - ECE 224 - Embedded Microprocessor Systems
  - ECE 252 - Systems Programming and Concurrency
  - ECE 350 - Real-Time Operating Systems
  - ECE 327 - Digital Hardware Systems