Ryan A. Marsala

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EDUCATION

Colorado School of Mines, Golden, CO — Aug 2023 – Aug 2025
M.S. Computer Science — Graduate GPA: 3.83
Thesis: **End-to-end Simulation Framework for Hybrid SFQ/CMOS-Memory Compute Systems**

Colorado School of Mines, Golden, CO — Aug 2016 – Aug 2020
B.S. Double Major: Electrical Engineering & Computer Science

RESEARCH

Project: Modeling the Memory-Compute Gap in Large-scale Superconductive Systems — Aug 2023 – Aug 2025
Collaborative Project with Rochester and UVA professors and students

- **Objective:** To build a novel simulation framework for identifying performance bottlenecks in next-generation superconducting computer architectures
- Explored modeling and analyzing novel superconducting computers utilizing RSFQ logic
- Developed analytical models to characterize various physical characteristics of cryostats and their interconnects
- Integrated cache modeling and latency characterization specific to cryogenic environments
- Implemented cache simulation, RISCV instruction decoding, and synthesized RISCV traces

WORK EXPERIENCE

Research Intern, **Lawrence Berkeley National Lab** — June 2025 – Sept 30, 2025
Collaborative Project involving AMCR, CAD, computer science, and physics division scientists

- **Objective:** Exploring noise modeling and analysis on superconducting ADCs by developing MATLAB and simulink models to validate their performance and pinpoint critical error sources
- Created noise models for characterizing superconducting specific intrinsic noise effects such as pulse jitter
- Improved on ADC simulink designs for better accuracy, performance, parallel simulation and runtime optimization
- Improved SNDR calculations for spectral analysis by adding Blackman-Harris windowing
- Exploring mitigation methods for noise sensitive areas to improve design robustness
- Presented methodology and results at CSASP summer intern poster session

Canary X Sensor, **Lunar Outpost** — May 2020 – July 2020
Field session project commissioned and managed by Lunar Outpost engineers

- **Objective:** Develop a micro controller solution for periodically communicating sensor information
- Designed a custom firmware for encryption and dynamic transmission through ethernet, wifi, and cellular networks
- Implemented various inter-device communications and logic using UART, SPI and I2C connections
- Made specialized data retention and state machines for robust logic and fault tolerance
- Awarded 1st in technical presentation of the final implementation by class vote

Previous Experience: Assistant Manager, Hammer & Nails Grooming Shop (2020 – 2023)

PUBLICATIONS

Marsala, R. A., et al. "End-to-end Architectural Simulation Framework for Hybrid SFQ/CMOS-Memory Compute Systems". In preparation for IEEE ISPASS (derived from M.S. thesis)
Marsala, R. A., et al. "Noise Analysis on Superconducting ADCs". In preparation for IEEE ISCAS

INTERESTS AND PROJECTS

- Member of bowling club and rhythm game club, involved in hosting various events
- Various GPU, parallel, web, android and game programming projects including CUDA, OpenMP and OpenGL
- Various electrical projects including an autonomously navigating robot, PCB design, BPM detecter, and FPGA boards

SKILLS & STRENGTHS

Programming: C++, C, Java, Python, JavaScript, PHP, Kotlin, MATLAB, LabVIEW, SQL, Verilog, Lisp, HPC, PCB
API/ABIs: OpenGL, GLFW, GLSL, CUDA, OpenMP, OpenCV, RISCV, Android, Next.js, PyTorch
Electrical Experience: Microcontrollers, Motors and Generators, PCB design, Soldering, CAD
Software: Git, Autodesk EAGLE, Linux, Microsoft Office, SolidWorks, VSCode, Docker, Simulink, Traces, WRspice
Professional Skills: Documentation, Collaboration, Communication, Adaptability, Problem Solving, Teamwork