

# Donovan Sproule

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## EDUCATION

**Columbia University, The Fu Foundation School of Engineering and Applied Science.** Sep 2024 – May 2026  
*Masters – Electrical Engineering*

**Columbia University, The Fu Foundation School of Engineering and Applied Science.** Sep 2023 – May 2025  
*Bachelor of Science – Computer Engineering, Honors: Dean's List*

**University of California, Santa Cruz, Baskin School of Engineering** Aug 2021 – June 2023  
*Bachelor of Science – Robotics Engineering, Honors: Dean's List*

**Relevant Coursework:** Operating Systems, Circuit Analysis, Data Structures & Algorithms, Python Abstractions, Object Embedded Systems, Digital/Analog Circuit Design, Object Oriented Programming, Computational Theory, Intro to Databases, CAD, Digital VLSI, System on Chip, Digital Signal Processing

## ENGINEERING EXPERIENCE

**Undergraduate Researcher** May 2024 – Present  
*Robotics and Rehabilitation Lab (ROAR Lab), Columbia University*

- Developed and designed Augmented Reality (AR) experiments used to gather postural data for machine learning models training robotic postural assistance to wheelchair-disabled patients. Experiments are used across the lab.
- Leading the development of a new research paper relating to rehabilitation with AR technology and haptic sensors.
- Constructed new networking based methodology to synchronize larger system
- Presented to, mentored and trained PhD colleagues on applications of AR in their lines of research.
- Reported weekly on findings to the principal investigator. Designed independent workplan and research goals.

**Undergraduate Research Assistant** May 2024 – Present  
*Systems Lab, Columbia University*

- Updated existing custom hypervisor framework to conform to linux kernel 6.1 from the previous 5.15 version, facilitating security of virtual machine/host data from a compromising attacker.
- Independently reconciled changes made to original 5.15 kernel for the implementation of specifications detailed in HypSec 2019 paper with the documented changes in the official 6.x kernel release changelogs.

## PERSONAL PROJECTS

### **NLP Transformer-Encoder Transcription Model**

- Leveraged a CNN based transformer-encoder architecture to develop transcription of audio files.
- **Tools used:** NLP, Python, Pytorch, Signal Processing, Machine Learning

### **De-1 SoC FPGA Gameboy Emulator**

- Created a hardware emulator accurate to patented Nintendo schematics integrated within a larger IP with modern technological upgrades.
- Created automated Verilator testbenches for incremental development.
- **Tools used:** FPGA, SystemVerilog, Logic Design, Embedded Systems, C, Interfacing, Quartus, Verilator

### **Priority Based Low Latency Scheduler**

- Developed a custom process scheduling class beating the Linux default by optimizing resource usage for estimated task completion time of processes.
- **Tools used:** Linux, C, Scheduler Design, Multiprocessing Synchronization Techniques

### **Web Scraping Dataset Construction Toolkit for Convolution Neural Networks**

- Built a framework facilitating the development of training datasets for image recognition CNN-ML models.
- **Tools used:** Python, PyTorch, Web-Scraping, Asynchronous Programming, Machine Learning

### **De-1 SoC FPGA Chat Client**

- Leveraged low-level interfaces in an embedded context to create a client communicating with an external server.
- **Tools used:** FPGA, C, Peripheral interfacing, VGA, Multi-threading

## SKILLS & RELEVANT COURSEWORK

**Language:** Fluent Spanish

**Technical skills:** Linux, Machine Learning, Timing Diagram Analysis, Arduino, RISC-V, SolidWorks, Git, FPGA, Digital Logic, Oscilloscope, Microcontroller, CNN/RNN/Transformer-Encoders, Hypervisor Design, AR/VR Development, Vim, C, C++, C#, Python, Matlab, SystemVerilog, HTML, CSS, Assembly, Scripting, LTSpice, Raspberry Pi, SQL

**Interests:** Weightlifting, playing the guitar, Snowboarding, cooking, bartending, salsa dancing

**Additional Experiences:** Popeyes Crew Member, Immigrant Robotics Workshop Leader, Olive Garden Host