Carson Swoveland

(719) - 888 - 0227 / cswovela@andrew.cmu.edu
4050 Spaatz Rd, Monument, CO, 80132

Technical Projects

- ➔ Custom **self-charging GPS-enabled** smartwatch with **unlimited battery life**
- ➔ Designed hardware for serial communication and firmware for an autonomous vehicle
- ➔ **Custom CPU Design**, 3-stage pipelined 3-operand RISC architecture in **SystemVerilog**
- ➔ Optimizing compiler backend in **Rust** targeting Minecraft command language
- ➔ Built a **custom computer** as a replica NES out of a 6502 and 74xx series parts
    - Also designed an operating system from scratch for an in-circuit graphics emulator
    - Authored a **custom course** on homebrew computer design; currently teaching
- ➔ Custom **real-time operating system** written in **C** and **ARM Assembly**
- ➔ Performant *Minecraft*-esque game written in **Python** using an **OpenGL** backend
    - Includes **networked multiplayer** and infinite procedurally generated gameplay
- ➔ Combined game engine, level editor, and art editor written in **C++**

Work Experience

- ➔ **Apple Platform Architecture Intern** **(Summer 2024)**
    - Developed a **custom PCIe-based FPGA compute accelerator**
    - Added **new support** to existing tools for the accelerator in both simulation and hardware
    - Designed **custom AXI components** and an **FPGA network** system from scratch
    - Integrated IP using **Vivado** tools with attention to both simulation and synthesis inference
- ➔ **Apple Platform Architecture Intern** **(Summer 2023)**
    - Developed a custom compression scheme for an instruction set
        - Attained **significant size reduction** with **less cost** than industry-standard methods
    - Modified compiler, assembler, and simulator to support compression on real code
    - Created debugging, visualization, and prototyping tools for future development
- ➔ **Deephaven Data Science Intern** **(Summer 2022)**
    - Developed a new client API in **Go** for a streaming data processing server
    - Independently wrote technical promotional material for the client
- ➔ **Carnegie Mellon Distributed Mixed-Reality Runtime Researcher** **(Fall 2022)**
    - Ported traditional applications to the **WebAssembly**-based runtime

Education

Carnegie Mellon University - B.S. in Electrical and Computer Engineering **(4.0 GPA, 2020 - 2024)**

Logic Design and Verification, Intro to Embedded Systems, Microelectronic Circuits, Signals and Systems, Electronic Devices and Analog Circuits, Intermediate German II, Compiler Design, Intro to Computer Architecture

Carnegie Mellon University - M.S. in Electrical and Computer Engineering **(4.0 GPA, 2024 - Present)**

Introduction to Information Security, Real-Time Graphics, Silicon Fabrication Lab

Awards

- ➔ 1st Place, Carnegie Mellon ECE Capstone Project
- ➔ 1st Place, MITRE Embedded CTF Competition 2023 and 2024
- ➔ Carnegie Mellon Dean's List (4.0 GPA), all semesters

Relevant Skills

- ➔ **Programming Languages:** C, C++, Python, Rust, Go, ARM Assembly, x86 Assembly
- ➔ **Software Tools:** Windows, macOS, Linux (Ubuntu), Git, Autodesk Inventor, KiCAD, Google Suite
- ➔ **Hardware:** SystemVerilog, Vivado, analog design, computer architecture
- ➔ **Other**: Licensed amateur radio operator (KF0GFW), German speaker