Aiden Harper

Profile

An upcoming computer engineer deeply interested in Signal Processing, Embedded Systems, and Analog Circuit Design. Excited to begin a technical career in meaningful roles that introduce new skills. Passionate about learning new topics in technology and science, especially areas related to audio processing, machine learning, and robotics.

Education

Northern Arizona University, Flagstaff, AZ — Expected Graduation: May 2025
Bachelor of Science in Computer Engineering — GPA: 4.0

Work Experience

- **Lead Research Intern** | Northern Arizona University **January 2024 - Present**
  Working within the Complex Systems Informatics Laboratory and the FEWSION Project aiding the development of the world's most comprehensive global supply chain database and analytical capabilities.
  - Engineered open-source Large Language Models (LLM) (via **HuggingFace** and **Ollama**) and deployed them within a high-performance computing environment (**Slurm Resource Manager**).
  - Utilized and researched emerging technologies in Natural Language Processing (NLP) such as semantic and hierarchical embeddings for commodity classification, the **DSPy** framework for a programmatic approach to prompt engineering, and Retrieval Augmented Generation (RAG) for LLM task-specific context retrieval.
  - Applied complex systems, network science, and graph theory principles to investigate supply chain models, including topological visualization, identifying community structure, and assessing degree distribution for determining scale-free networks using **NetworkX**.

- **Student Worker** | Northern Arizona University **October 2022 - August 2023**
  Working with NAU Information Security Services supporting identity and access management.
  - Engineered **PowerShell** scripts for querying and updating **Microsoft Active Directory** user database.
  - Built a KVM switch with a **RaspberryPi** using the **Pi-KVM** software for interacting with headless servers/machines.
  - Designed and updated tools to query and analyze log data for detecting brute-force attacks using **Splunk**.

Personal Projects

- **6502 Microprocessor**
  - Built an 8-bit computer with an W65C02S 8-bit microprocessor.
  - Constructed an AT28C256 EEPROM programmer using an **Arduino** NANO to program machine code instructions with a VASM 6502 assembler.
  - Built a custom Arduino I/O expander using a SN4HC165 8-bit parallel-in and serial-out shift registers to monitor the 6502 microprocessor.
- **Analog Scrambling using Chaotic Behavior**
  - Constructed an analog circuit to scramble audio signals using chaotic behavior (without any digital encryption/processing) for secure voice communications.
  - Designed a circuit to modulate and demodulate an audio signal (scramble and descramble respectively) using synchronized Chua circuits, simulated in **NI Multisim**.

Skills & Technical Acumen

Technical Skills: Embedded Systems Programming (RaspberryPi, Arduino, MSP430), Digital Design/Verification and FPGA Design (Intel Quartus Prime and Xilinx Vivado), Circuit Design/Software (NI Multisim, Cadence) Analog Circuit Design, Data Science, Statistical Analysis and Modelling, Generative Artificial Intelligence, Prompt Engineering, High Performance Computing (Slurm Resource Manager), Natural Language Processing, Remote Sensing

Programming Languages: Python (NumPy, SciPy, Pandas, Matplotlib, PyTorch), C/C++, SystemVerilog, MATLAB, Bash, PowerShell