

# Mahmoud Elsharawy

[mse63@cornell.edu](mailto:mse63@cornell.edu) | <https://github.com/mse63> | <https://mse63.github.io>

## EDUCATION

### Cornell University

*Masters of Engineering in Computer Science*

GPA: 3.94

May 2025

### Cornell University

*Bachelors of Science in Computer Science & Electrical and Computer Engineering*

GPA: 3.80

Dec 2024

**Relevant Coursework:** Compilers, Programming Languages, Computer Architecture, Parallel Architectures, Reinforcement Learning, Microcontrollers, Embedded Operating Systems

## EXPERIENCE

### Apple

May 2024 - Aug 2024

*System Electrical Engineering Intern*

Cupertino, CA

- Developed a Python tool to automate HSPICE simulations for existing Cadence designs and GPIO specifications
- Designed a battery charging circuit and USB/SPI communication for a prototype
- Created prototype analog and RF circuits for testing and future development

### Apple

Jan 2023 - Aug 2023

*System Electrical Engineering Intern*

Cupertino, CA

- Designed and tested a buck converter power module for use on internal dev boards, removing reliance on a vendor's power modules, preventing future supply chain issues and reducing cost
- Designed a PCBA to calibrate the ADC of a SAMD21 microcontroller, and programmed it using C to act as a micro-current load to precisely characterize power components
- Created prototype analog and RF circuits for testing and future development
- Coordinated with a Product Design Engineer, DFM, and PCB Designer to design flexible PCBAs for prototypes

### SpaceX

Jan 2022 - Aug 2022

*Hardware Engineering Intern*

Hawthorne, CA

- Created a Python program to use SCPI commands and REST API interaction to collect and model hardware data
- Automated an assembly line station through mechanical design and PLC TwinCAT software, tripling its speed
- Tested and qualified alternative integrated circuits for Business User Terminals, preventing a parts shortage
- Designed a dev PCBA to test various potential fixes for acoustic noise from user terminals

## PROJECTS

### Discord Hard Drive | C++, REST API, Linux, Git

Feb 2025 – Mar 2025

- Developed a Discord bot in C++ that interfaces with Discord's REST API to store arbitrary data through reading, writing, and modifying messages
- Created an nbdkit plugin in C++ to integrate the bot with a virtual block device, enabling seamless read/write operations and allowing Discord messages to be used as a hard drive

### Chess AI | Rust, Python, REST API, Systemd, Git

Aug 2021 – Present

- Developed a UCI Chess AI in Rust using a minimax algorithm with move-ordering and variable depth control
- Implemented Zobrist hashing with a hash-table to look up previously seen positions, reducing computation time
- Hosted a systemd service to interact with lichess.com's REST API, allowing the AI to play against other bots and humans, earning an Elo rating of 1850, making it stronger than 85% of human players on the website

### RP2040 Audio Communication | C++, Embedded Systems, Microcontrollers

Mar 2024 - April 2024

- Developed a 2-way audio communication protocol on RP2040 boards using 8 frequency-based bit encoding, enabling UTF-8 data transmission via sound
- Implemented synchronization logic to detect when the other board starts transmitting and adjust clocks accordingly, while using Direct Digital Synthesis (DDS) for precise audio signal generation

## TECHNICAL SKILLS

**Languages:** Rust, Java, Bash, Python, C/C++

**Developer Tools:** Linux, Nix, Git, Cargo, CMake

**Libraries:** PyTorch, Tensorflow, NumPy, Matplotlib