Hasaan Haq

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Education

University of California San Diego **Expected June 2026**

B.S. in Computer Engineering

Relevant Coursework: Advanced Data Structures, Systems Programming, Circuit Analysis, Assembly Programming, Digital Logic Design, Design & Analysis of Algorithms, Operating Systems

Experience

Embedded Systems Engineering Intern Oct 2022 – Sept 2024

Calpak USA, Inc. *Hawthorne, CA*

- **Modified firmware** for embedded systems by analyzing documentation and customizing code for specific applications, including a Wi-Fi-controlled LED dimmer module.
- Shadowed a Principal Embedded Software Engineer in **firmware development** for an STM32F429 Cortex-M4 microcontroller used in a **Flolab Plethysmograph medical device**.
- Developed **Python scripts** for firmware flashing and testing of STM32 MCUs, flashing/testing over 1000 production boards.
- Diagnosed **USB-to-UART bridge and GPIO** issues controlling MOSFET-driven solenoids in a USB multi-port inflator, ensuring proper hardware operation.
- Captured and analyzed UART and SPI communication protocols using a Saleae 16-channel logic analyzer for **reverse engineering and troubleshooting** I/O for the Plethysmograph.
- **Debugged embedded firmware** on STM32 microcontrollers using GDB, setting hardware breakpoints, inspecting registers, analyzing memory dumps, and resolving GPIO, ISR, and memory access issues.
- Performed bench-testing and production validation of PCBs using oscilloscopes, multimeters, and power supplies to **troubleshoot hardware failures** and verify proprietary circuit performance.
- Reviewed and reported AOI inspection data, assisting in **defect detection and quality control** for both single-board and panelized assemblies in an SMT production line.
- Reviewed and analyzed electrical schematics for STM32-based embedded systems, verifying signal integrity, power distribution, and component connections to ensure accurate circuit functionality.
- **Coordinated with cross-functional teams** to align hardware testing requirements, **ensuring on-time product release**.

Projects

Wi-Fi LED Dimmer Module

- **Engineered custom firmware** for an **ESP32-C3**, enabling remote control and WiFi connectivity.
- **Modified schematics and hardware** for seamless integration, boosting system reliability.
- **Implemented IoT features** to allow over-the-air updates and real-time light adjustments.

USB-Multi-Port Inflator

- **Authored Python scripts** to flash and test **STM32F103** firmware, enhancing production efficiency.
- Flashed and verified firmware for 1,000+ boards, resolving hardware and USB connectivity issues.
- Streamlined QA processes by identifying and documenting frequent firmware errors.

HTTP Chat Server | C, Networking | Link

- Developed a **multi-threaded HTTP chat server in C**, leveraging POSIX threads to handle concurrent client connections efficiently.
- Managed client requests and responses using **low-level network programming**, implementing **TCP sockets** and multi-threading to enable efficient data exchange.
- Ensured **thread safety and performance scalability**, using mutex locks for shared data protection and memory management.

Password Cracker | C, Cryptography | Link

- **Created a SHA256-based password cracker** to identify passwords from a hashed database.
- Demonstrated proficiency in cryptographic techniques and low-level programming for security applications.
- Engineered a multi-threaded HTTP server in C, handling concurrent client requests efficiently.

Skills

Languages: C, C++, Assembly, Java, Python, HTML, CSS, Javascript
Tools: Git, Logic Analyzers, Oscilloscopes, GDB, Valgrind
Specialized: Testbench Testing, Hardware Validation, Circuit Validation, PCB Validation