Mahir Emran

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Education

University of Washington, B.S. Computer Science; Minor in Applied Mathematics — Sept 2025 – June 2028
GPA: 3.99

- **Coursework:** Systems Programming, Data Structures, Algorithms, Operating Systems, Concurrency/Parallelism, Probability/Combinatorics, Digital Design, Hardware/Software Interface, Discrete Math, Relational Database Design, Natural Language Processing, Data Center Systems
- **Languages/Frameworks:** Java, Python, C++, C, Dart, HTML/CSS, JavaScript, TypeScript, F', Swift, SQL, Rust
- **Technologies:** Firebase, Flutter, React, Google Cloud, GitHub Auth, Arduino, STM32, NLP (SpaCy, NLTK), Matplotlib, scikit-learn, XCode, Docker, AWS, DynamoDB, BeautifulSoup, Selenium, PlayWright, KiCad, Altium

Experience

Husky Satellite Lab – Avionics Intern, Command/Data Handling Lead — Oct 2025 – Present

- Refactored a **15,000-line** horizon- and star-tracking codebase to eliminate heap allocations, enabling deployment on a BeagleBone Black flight computer.
- Implemented CCSDS 123.0-B-2 image compression, increasing projected downlink capacity from **2 to 27 images/day**.
- Developed Basilisk/Vizard simulations for **20 camera-baffle configurations** and **3 battery scenarios** to validate spacecraft behavior before hardware integration.
- Contributing to a **60-component** NASA JPL F' codebase, validating v1/v2 revisions of **4 avionics PCBs** (ADCS, EPS, CDH, Payload), and authoring **6 design documents** as a full-time (paid) Summer 2026 avionics intern.
- Built a C++ mocking and dependency-injection framework for isolated unit testing and standardized development environments with Docker. Used LLM agent loops to reduce human time spent on software design document (SDD) and code reviews by approximately **66%**.
- Used power tools and milling machines to manufacture approximately **4 camera baffles** and **30 structural parts**, developing practical mechanical fabrication skills for flight hardware.

Society of Advanced Rocket Propulsion – Avionics System Software Lead — Oct 2025 – Present

- Lead **6 embedded developers** building STM32H7 flight software for a liquid bipropellant rocket.
- Implemented and tested **5 peripheral drivers** and **3 device drivers** spanning UART/USART, SPI, PWM, actuator control, RS485 radio, GNSS, and temperature sensing.
- Designed a crash-logging framework using **256 MB onboard flash**, supporting **1 Hz** logs with approximately **5 ms latency** for post-test failure analysis.
- Established unit-testing and CI/CD infrastructure and coordinated hardware-in-the-loop testing across radio, actuator, sensing, and communications subsystems.
- Created and presented a **120 slide** presentation showcasing our flight computer software/hardware for our Critical Design Review (CDR).

University of Washington – Teaching Assistant (Operating Systems) — Sept 2026 – Present

- Teach office hours, debug kernel code, and assist students with operating systems concepts including virtual memory, synchronization, file systems, and scheduling.
- Support instruction for the xk operating system codebase through project guidance, grading, and mentoring on kernel synchronization, virtual memory, process scheduling, file systems, and system calls.

Projects

- **Simplex Conference** – Led development as Technical Lead on a cross-platform conference logistics mobile app published on the App Store and Google Play, reaching **4,000+ downloads**. Coordinated feature integration, testing, deployment, and release management across a **6-member team** from November 2023 - November 2025.
- **Search Engine (C++)** – Implemented a multithreaded search engine featuring recursive crawling, inverted indexing, TF-IDF ranking, HTTP query processing, and concurrent request handling. Built custom concurrent hash tables, document indices, and HTTP request handling using POSIX threads, sockets, and modern C++.
- **Global Literacy Analysis (Python)** – Integrated and cleaned data from **8+ international datasets** covering **140+ countries** using Pandas, performed statistical hypothesis testing with SciPy, and curated a **10-page** independent report using Plotly and Matplotlib.