Abdalla Eldoumani

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Education

University of Calgary — Sep 2022 – Jun 2027

B.Sc. Computer Science, Minor in Philosophy — *Calgary, Alberta*

GPA: 3.6/4.0 | Dean's List (2023–2024, 2024–2025)

Relevant Coursework:

- Computing Machinery I & II (C, ARMv8 Assembly, Computer Architecture), Principles of Operating Systems, Design & Analysis of Algorithms, Data Structures & Algorithms, Computer Networks, Database Management Systems, Artificial Intelligence, Computer Security, Network Systems Security, Software Engineering, Reverse Engineering

Work Experience

Teaching Assistant — Sep 2025 – Present

University of Calgary — *Calgary, Alberta*

- Serve as **Head TA for CPSC 355**; coordinate TAs, configure **Gradescope auto-graders**, and automate grade splitting.
- Teach labs on **computer architecture**, **C**, and **ARMv8 assembly** covering memory management, register allocation, and ISA.
- Lead **CPSC 413** tutorials on **algorithm design**: greedy, **divide-and-conquer**, **dynamic programming**, and **NP-completeness**.
- Debug **low-level code** and evaluate student **assembly programs** and **C implementations** for correctness and efficiency.

AI Training Specialist — Oct 2024 – Sep 2025

Outlier — *Remote, Canada*

- Evaluated **AI-generated Python code** across **500+ dual-response scenarios**, analyzing algorithm efficiency and optimization.
- Tested AI solutions for **functional correctness** and performance, documenting **comparative analysis** with technical feedback.
- Identified bugs and optimization opportunities in diverse **programming tasks** including data structures and algorithms.

Software Engineering Fellow — Jul 2024 – Sep 2024

Headstarter AI — *Remote, Canada*

- Built and deployed **5 AI-powered applications** using **Python** and **Docker**, completing intensive hackathons with teams.
- Developed a capstone project serving **1,000+ users** using **React.js**, **TypeScript**, and modern web frameworks.

Python Mentor — Jul 2021 – Jul 2022

Al Oruba International School — *Riyadh, Saudi Arabia*

- Led programming workshops for **30+ high school students**, teaching **Python fundamentals** and algorithm implementation.
- Designed hands-on coding exercises and **project-based assignments** improving student programming confidence.

Projects

Rust HTTP Server | *Rust, Axum, SQLite, WebSocket* | Solo Developer — Jul 2025 – Present

- Architected production-grade server handling **10,000+ concurrent connections** with sub-**10ms latency** and **JWT auth**.
- Integrated **full-text search** with fuzzy matching, intelligent caching reducing DB load by **60%**, and **rate limiting**.

AEOS — Educational OS | *C/C++, ARMv8 Assembly, QEMU* | Solo Developer — 2025 – Present

- Built a **monolithic kernel** from scratch on the **QEMU virt board** (ARM64) with bootloading and **interrupt handling**.
- Engineered **memory management** subsystem and **process scheduler**, exploring core OS primitives at hardware level.

FastMathExt | *C++, Python, AVX2 SIMD, OpenMP* | Solo Developer — Jan 2025 – Present

- Optimized **matrix multiplication** achieving **25–41% gains** over NumPy through cache blocking and **SIMD vectorization**.
- Implemented **Strassen's algorithm** with task-based concurrency, reducing complexity from $O(n^3)$ to $O(n^{2.807})$.

DUST | *Next.js, TypeScript, Convex, Clerk* | Calgary Hacks 2026 — Jan 2026

- Built a **real-time multiplayer** web game where players explore a decaying internet as digital archaeologists via **Convex**.
- Implemented **competitive and cooperative modes** with secure **Clerk authentication** and immersive discovery mechanics.

AI-Platform | *Next.js, TypeScript, OpenAI API, Prisma, MySQL* | Solo Developer — 2024

- Developed multi-tool **AI platform** with **conversation**, image/video generation, music composition, and **code generation**.
- Integrated **Stripe** subscription management, API rate monitoring, and **secure auth** with a centralized dashboard.

Budget Buddy | *Next.js, TypeScript, PostgreSQL, Clerk, Vercel* | Team Lead — Feb 2024

- Built full-stack financial platform with **real-time stock data** integration and secure authentication for **100+ users**.
- Implemented **budget tracking**, investment projections, and **financial analytics** dashboard deployed on **Vercel**.

Interactive Cybersecurity Site | *HTML, CSS, JavaScript* | Team Lead — Sep 2023 – Dec 2023

- Developed **educational platform** with interactive quizzes on **cryptography**, hashing, **malware**, and digital privacy.
- Authored content on **encryption methods** and security principles with a **hands-on**, interactive learning approach.

Self-Checkout Station Simulation | *Java, JUnit, Git* | Team Member — Sep 2023 – Dec 2023

- Collaborated in a **20-member team** to build a **self-checkout simulation** with responsive GUI using **Java** and **OOP**.
- Conducted comprehensive testing with **JUnit** and improved productivity by **30%** through effective **Git** workflows.

Technical Skills

Languages: C, C++, Python, Java, JavaScript/TypeScript, Rust, SQL, ARMv8 Assembly

Tools & Frameworks: Git, Linux, Docker, React.js, Node.js, Next.js, Flask, Django, FastAPI, Spring Boot

Technologies: AWS, Azure, Google Cloud, PostgreSQL, MongoDB, MySQL, REST APIs, WebSocket, CI/CD, Kubernetes