# Andrew Zheng

andrew.zheng1@uwaterloo.ca | in/andrewzheng2007 | github.com/awzheng | awzheng.me | Portfolio

## Education

**University of Waterloo** | *BASc, Computer Engineering* | GPA: 3.9 — Sep 2025 – Apr 2030

## Skills

**Languages**: C, C++, Python, Golang, Verilog, Java, SQL, HTML, CSS, JavaScript, TypeScript, Bash
**DevOps/Tools**: AWS (Lambda, S3, IAM), Docker, Git, Jupyter, QEMU, Virtualization, VMWare Fusion, Linux
**Libraries/Frameworks**: FastAPI, React, MongoDB, Streamlit, NoSQL, REST API, Tailwind CSS, Next.js
**Embedded/Hardware**: Altium Designer, KiCad, STM32, ST-LINK, CAN, UART, I2C, SPI, Oscilloscope, Logic Analyzer

## Projects

**SageWall** | ML Cloud Security System (GitHub) | *AWS, Python, Streamlit, Machine Learning* — Dec 2025

- Architected a serverless Intrusion Detection System (IDS) deployed as a **SageMaker** endpoint using an **XGBoost** classifier, analyzing network traffic with **99.9%** classification accuracy and **<100ms** inference latency
- Engineered and automated the ETL pipeline using Lambda to transform raw network logs in S3, processing **125,000+** records from the NSL-KDD dataset and provisioning infrastructure via AWS SDK (Boto3)
- Deployed a Streamlit web dashboard for real-time system observability, secured with AWS IAM policies, using CloudWatch to monitor system health and triggering SNS security threat alerts via email

**CrawlStars** | Concurrent Search Engine (GitHub) | *Golang, MongoDB, REST API, Concurrency* — Dec 2025

- Engineered concurrent web crawler with custom HTTP client using scalable producer-consumer architecture with parallel goroutines and buffered channels, processing **2000+ pages**/minute with **<15MB** memory usage
- Optimized high-concurrency pure **Golang** backend with thread-safe deduplication using sync.Map and atomic operations, enabling O(1) (constant-time) lookup for **50,000+** URLs and filtering **70%** of redundant crawls
- Developed a relevance ranking algorithm using MongoDB Atlas Search integration with aggregation pipelines and fuzzy query matching to map SEO relevance metrics to a 5-star rating system

**Mangaroo** | PDF-to-Manga AI Illustrator (GitHub) | *FastAPI, Python, REST API, Generative AI* — Nov 2025

- Architected an asynchronous REST API orchestrating an agentic pipeline (**Gemini 1.5 Pro** + **Imagen 3**) using **FastAPI**, handling **1000+ concurrent sessions** to process **250+ page** novels and **50MB** input
- Engineered Story Bible context system with structured JSON prompting and session-scoped caching, reducing token usage by **97%** (2.5M to 70K per 100 panels) while maintaining O(n) memory complexity

## Experience

**Embedded Systems Developer** | Waterloo Rocketry | Waterloo, ON — Sep 2025 – Present

- **Remote Arming Board** (GitHub) | *Safety-critical Avionics Recovery PCB*
  - Engineered **4-layer KiCad PCB** with dual-redundant LiPo power input via discrete PMOS high-side switching
  - Architected **hardware fail-safe** via passive gate biasing, ensuring system availability during MCU Hi-Z faults
  - Implemented low-level **C** firmware for **PIC18** bridging UART altimeter telemetry onto the **CAN bus** via MCP2562
- **Fuel Injector Sensor Hub** (GitHub) | *Real-Time Propulsion Telemetry System*
  - Developed **STM32** firmware in **C++** to acquire pressure telemetry via **ADC** and log to SD Card mid-flight
  - Validated **signal integrity** and SPI/I2C timing constraints using oscilloscopes and logic analyzers

**Hardware Designer** | UW Biomechatronics Design Team | Waterloo, ON — Sep 2025 – Present

- **EMG Bionic Arm** (GitHub) | *Bionic Arm PCB in KiCad and Altium Designer*
  - Spearheaded migration to **Altium**, engineering an **ESP32**-based control system with **USB-C** connectivity
  - Validated electromechanical integration by collaborating on design constraints in **SolidWorks** for seamless fit

**Case Competition Coach** | Self-employed — Jun 2024 – Present

- Scaled self-founded coaching business from contract work to fully independent, achieving **5-figure revenue**
- Developed curriculum for 150+ secondary school students across 10+ schools, leading to 50+ international qualifiers, 30+ finalists, and 33% (4/12) of Team Ontario's **1st-place** finishes at ICDC 2024

## Awards

**1st Place World Champion (Marketing – Product Management)** | *DECA ICDC @ Los Angeles* — Apr 2024

**7x National Honour Roll** | *University of Waterloo CEMC Mathematics Contests* — 2020 – 2024