

# Alex Li

[atli@uwaterloo.ca](mailto:atli@uwaterloo.ca) | [linkedin.com/in/alex-li-619870294](https://linkedin.com/in/alex-li-619870294) | [github.com/alexli8408](https://github.com/alexli8408) | [axli.me](https://axli.me)

## Education

University of Waterloo | BAsC, Computer Engineering | GPA: 3.96

Sep 2025 – Present

## Technical Skills

**Languages/Databases:** TypeScript, JavaScript, Python, C++, C, SQL, CSS, HTML, Bash, PostgreSQL, MongoDB, Supabase

**Frameworks:** Next.js, Node.js, Express, React, React Native, Expo, FastAPI, Tailwind CSS

**Libraries:** Prisma, Mongoose, NextAuth.js, WebSocket, SQLModel, Pydantic, OpenCV, YOLOv3, ElevenLabs, tldraw

**Tools/Cloud:** AWS (IAM, S3, CloudFront, Lambda), Azure OpenAI, Vercel, Railway, Pytest, Git, GitHub, Linux, Jupyter

## Experience

**Software Developer** | UW Orbital | Waterloo, Ontario, Canada

Sep 2025 – Present

- Introduced middleware with request tracing and centralized error handling to reduce average debugging time by **40%**
- Architected **12+** REST API endpoints for satellite command objects using FastAPI with Pydantic validation and SQL storage
- Developed a Pytest test suite with **50+** unit tests for endpoint verification in CI/CD pipeline to achieve **95%** code coverage

**Computer Architecture Research Intern** | CEcloud | Beijing, China

Jun 2025 – Aug 2025

- Benchmarked virtual memory management across **3** OS architectures using **8** CPU/GPU workload configurations
- Analyzed paging behavior and page table performance to identify **15-25%** latency variance across CPU/GPU workloads

**Full Stack Development Intern** | Tsinghua University | Beijing, China

Jun 2024 – Aug 2024

- Overhauled UI styling across **15+** pages for WCAG accessibility compliance to decrease user-reported issues by **30%**
- Refactored CSS for an academic website serving **500+** monthly users to improve page load performance by **20%**

## Projects

**Linkmark** | AWS (IAM, S3, CloudFront, Lambda), PostgreSQL, Prisma, Next.js, NextAuth.js, Tailwind CSS, TypeScript

- Engineered a full stack bookmark manager utilizing **16** REST API endpoints, robust NextAuth OAuth session management, and a custom Manifest V3 Chrome extension to reduce saving friction to **1** click and increasing user workflow efficiency by **>50%**
- Designed an SPA dashboard architecture supporting **7** relational PostgreSQL tables with **50+** fields, featuring @dnd-kit drag-and-drop to seamlessly organize **100+** of saved URLs with **<200ms** tag-filtering latency and a highly responsive UX
- Deployed **100%** serverless infrastructure using Node.js AWS Lambda **24/7** background jobs to process records in concurrent batches of **10** within a **60s** timeout and provide automated broken-link detection and metadata extraction with **0** downtime

**PaletteAI** | Azure OpenAI, MongoDB, Mongoose, Next.js, NextAuth.js, Tailwind CSS, TypeScript

- Developed a full stack AI color palette generator with **10+** REST API endpoints, Google OAuth authentication, and integrated Azure OpenAI (GPT-4o-mini) to enable **<2s** harmonized palette generation from keywords or high-res image uploads
- Built a responsive dashboard with **5+** protected routes supporting **4** CRUD operations on **100+** user-saved palettes, featuring seamless **5-hex** image color extraction, detailed color swatch views with **1-click** copy, and **3** export formats (CSS/JSON/SVG)
- Deployed on Vercel with MongoDB via Mongoose for efficient document storage, utilizing Next.js App Router for optimized API routing and server-side rendering to achieve **<15ms** page optimizations, **<200ms** load times, and **99.9%** uptime

**CoWhiteboard** | Supabase, FastAPI, WebSocket, Next.js, tldraw, TypeScript, Python

- Architected a full stack real-time collaborative whiteboard using a custom FastAPI WebSocket server that handles **150+** JSON state diffs per second to maintain **<30ms** latency for live cursor tracking for **50+** concurrent users per active room
- Engineered a responsive Next.js frontend leveraging the tldraw SDK, integrating Google OAuth session management across **5+** REST endpoints, and auto-generating **8-character** shareable room codes with frictionless post-login redirection under **400ms**
- Deployed the frontend to Vercel and the backend to Railway, connecting to a serverless Supabase PostgreSQL database to persist large **>500KB** infinite canvas snapshots every **30s** and achieve **99.9%** uptime and strict **60** FPS client-side rendering

**TrueLight** | FastAPI, Next.js, React Native, Expo, OpenCV, YOLOv3, ElevenLabs, TypeScript, Python

- Built a React Native dashcam app delivering **<50ms** audio alerts that grade **8** colorblindness profiles at **85%** confidence
- Designed a Python FastAPI service using YOLOv3 and OpenCV to map **20** color ranges down to a **0.05** confidence threshold
- Implemented **5** Next.js endpoints evaluating **125ms** frames with a **1000-point** priority algorithm across **4** transport modes

**Data Structures Library** | C++

- Developed a C++ library of **6** core data structures from scratch, managing **100%** of heap allocations with **0** memory leaks
- Engineered a robust testing framework with **150+** assertions across **17** test suites to validate core logic and edge cases
- Designed a benchmark averaging **5** trials prioritizing **3,000,000+** elements, executing up to **11%** faster than STL equivalents