Thomas Zhang

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Education

University of Waterloo Waterloo, ON

Bachelor of Software Engineering, Honours ***GPA: 3.7/4.0*** *Sep. 2025 – Apr. 2029 (exp)*

- Recipient of Colonel Hugh Heasley Engineering Scholarship **($10,000)**

Technical Skills

Languages: C++, Python, Java, SQL (PostgreSQL & SQLite), JavaScript/TypeScript, HTML/CSS
Frameworks and Libraries: FastAPI, Flask, PyTorch, OpenCV, NumPy, Matplotlib, React.js, Next.js, React Native
Developer Tools: Git, GitLab CI/CD, GitHub Actions, Docker, AWS, Celery, Redis, Apache Kafka, TimescaleDB

Experience

Rover Autonomy Developer Jan. 2026 – Present

Watonomous

- Implementing **A*** pathfinding with **8-way search** and **costmap** integration for autonomous rover navigation
- Fine-tuning **YOLOv8** object detection using **ONNX Runtime** with real-time inference for obstacle classification

Software Developer Jun. 2025 – Aug. 2025

Triple J Canada Consulting Inc.

- Engineered **full-stack** tax filing platform serving **2000+** clients using **Python Flask**, **SQLAlchemy ORM**, and **SQLite** database, processing **5000+** tax returns with robust form validation and error handling
- Designed **RESTful API** enabling real-time synchronization between client and admin interfaces
- Engineered **RBAC** authorized backend with **cookie-based** session management and automated **Flask mail** verification, **eliminating 20+ hrs/week of manual user onboarding**
- Collaborated in **agile** team of 3, establishing **Git** workflow and **Obsidian** documentation standards

Projects

TradeStream | *C++, Python, TypeScript, FastAPI, Next.js, Kafka, Redis, TimescaleDB, Docker* Oct. 2025

- Architected market data platform processing **1M+ daily ticks**, delivering **50K+ updates/sec** via **WebSockets**
- Runs a **C++** analytics microservice with **<100ms** latency at **10K events/sec** using **sliding-windows**
- Designed **Kafka** streaming pipeline for distributed event processing with **fault-tolerant** message delivery
- Implemented hybrid storage with **TimescaleDB** for persistent retention and **Redis** for recent data access

JobFlow | *Next.js, TypeScript, FastAPI, Celery, Redis, Scrapy, Selenium, PostgreSQL, Supabase* Dec. 2025

- Engineered job aggregation platform serving **150+ active users** with **FastAPI** and **Next.js**
- Implemented web-scraping pipeline with **70%+** hit rate using **Scrapy** with **Playwright** and **rotating proxies**
- Designed **distributed task queue** with **Celery workers**, **Redis pub/sub**, and **WebSocket** broadcasting
- Implemented **JWT**-based authentication and deployed via **Docker Compose** on **Railway**

Karaoke Generator | *FastAPI, React, Demucs, FFmpeg, yt-dlp, LRClib* Nov. 2025

- Built automated system with **FastAPI** and **React** to convert YouTube songs into videos with a **95%** success rate
- Optimized **FFmpeg** video rendering pipelines, reducing processing latency by **40%** (**<5 min** per song)
- Implemented **Demucs AI** and **LRCLib** synchronization, validating stability via **100+** execution benchmarks
- Delivered within 4 sprints using **Agile methodology** and **GitLab CI/CD**, maintaining **>70%** test coverage

Haunted Harbour | *C++, Win32 API* Dec. 2024

- Developed 2D platformer with **Win32 API** with **double-buffered rendering** achieving **60 FPS** without tearing
- Designed **object pooling pattern** for projectile management, reducing memory allocations by **80%**
- Engineered **AABB collision detection** system with **directional resolution** for proper physics responses
- Implemented **parallax scrolling** background system and **finite state machine** for 8-state player control