Thomson Tong

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EDUCATION

University of Waterloo - Biomedical Engineering

Candidate: BASc | Second-Year Student | 3.84/4.00 Overall GPA   *September 2024 - Present*

- **Relevant Coursework**: Data Structures & Algorithms, Linear Algebra (Vector Spaces, Eigenvalues), Calculus, Digital Computation, Materials Science Lab (Numpy, Pandas, MatPlotLib), Biology, Chemistry

TECHNICAL EXPERIENCE

AI Model Engineer | *WAT.ai - Waterloo, Ontario*   *June 2025 - Present*

- Built a **Python-based data preprocessing pipeline** for automated video frame extraction and structured dataset indexing, improving dataset preparation time for downstream experiments.
- Analyzed **5+ SOTA ML research papers** (pose estimation, gesture recognition, emotion detection), summarizing architectural trade-offs and evaluation methods for the internal research team.
- Created **comparative technical reports** on OpenPose, MediaPipe, DETR, and VLLM-based models, focusing on accuracy, latency, and computational cost to guide model selection.

Systems Diagnosis Technician | *M-Zone Auto, Markham, Ontario*   *June 2025 - Aug 2025*

- Diagnosed and repaired 250+ vehicle systems, **applying signal tracing, structured debugging and hypothesis-driven diagnostics** to isolate faults in software-integrated automotive systems.
- **Interpreted ECU logs, real-time sensor data and subsystem interactions** to identify root causes and resolve complex failure modes, improving repair accuracy and reducing repeated service incidents.
- **Developed a systematic diagnostic workflow** that mirrored software engineering debugging practices, such as using fault trees, signal tracing, and hypothesis-driven testing.

PROJECTS

🐙 **EvoForge** — *Rust, Bevy ECS, Rayon, XAI, Python, Cursor*

High-performance ecosystem simulation with interpretable AI analysis on genome success   *November 2025*

- Developed a **Rust-based 1000+ agent evolution simulator** with parallel scheduling, spatial hashing and data-oriented design using Bevy ECS.
- Implemented a **structured metrics + logging framework** (Serde → CSV + tracing) to support repeatable experiments and later ML analysis.
- Built an **interpretable ML model (XAI)** in Python to predict genome–environment fitness, using simulation logs to analyse key feature attributions and behavioural drivers.

🐙 🌐 **Transight** — *LightGBM, Python, Pandas, Claude, FastAPI, Mapbox*

Full-stack ML system to predict and visualise TTC bus delays using real-time data   *Hack The Valley: Sept 2025*

- Built a **React + TypeScript Application with FastAPI-based Python REST services** within 36 hours to forecast TTC bus delays up to 4 hours using historical transit data, with real-time geospatial visualisation
- Engineered temporal, spatial, lag-based, and route-context features and optimised time-series modelling, enabling a LightGBM model with rolling cross-validation to reach **10–11 min MAE** (50% improvement over baseline).
- Deployed the application using Docker, Render and Nginx, implementing CI/CD (CircleCI) pipelines for automated builds, testing, and cloud deployment.

🐙 🌐 **Real Time Chess** — *Node.js/Express, React/TypeScript, Socket.IO, PostgreSQL, AWS, Cursor*

Real-time multiplayer chess variant with cooldown mechanics, eliminating traditional turn-based constraints   *In Progress*

- Developing low-latency distributed systems with AWS RDS and **AI workflow development**.
- Planning to implement an **RL-based AI** with modular ML pipelines, strengthening alignment with **custom ML systems**.

SKILLS

Frontend: React, TypeScript, Redux Toolkit, Material UI, Single-Page Applications (SPA)
Backend: Python, FastAPI, REST API Development, SQL databases
Cloud / DevOps: GCP, Docker, Git/Github (branch workflows), CI/CD (CircleCI)
Additional: PyTorch, LightGBN, Scikit-learn, Pandas