Ryan Li

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Technical Skills

Languages: Python, C/C++, R, SQL, JavaScript, Racket
Libraries/Frameworks: NumPy, pandas, Plotly, scikit-learn, PyTorch, FastAPI, OpenCV, Express.js, React
Platforms/Tools: Docker, PostgreSQL, Git, Linux (Bash/Zsh), VS Code, PyCharm, Jupyter, LaTeX, Excel

Experience

Wat Street Dec 2025 – Present
University of Waterloo

- Building a 5-Minute Momentum Flag System as a principal project engineer on Waterloo's Quantitative Finance design team. Collaborating with a **5-person** subteam to develop Python scripts identifying momentum continuation signals on 5-minute bars, backtesting using historical data.

UBC Timber Engineering and Applied Mechanics (TEAM) Lab Jun 2024 – Aug 2024
University of British Columbia

- Supported postdoctoral researchers in recording earthquake test measurements in Excel and standardizing data for cross-platform analysis. Developed Python scripts using pandas and matplotlib to create clear, reproducible graphics visualizing results. Recognized by supervisors as *"exceptionally reliable and proactive"*.

Projects

Semantic- and Signal-Aware Audio Ad Insertion Engine - UofTHacks Winner Jan 2026

- Built a B2B web application and API for natural insertion of human-like sponsor reads into podcasts and songs, integrating OpenAI API for contextual ad generation and ElevenLabs API for text-to-speech and voice cloning.
- **Reduced processing latency by 35%** by supplementing LLM-based loudness and rhythm normalization with FFmpeg/librosa/pydub pipelines. Won Best Use of ElevenLabs at UofTHacks 13, placing **1/100+** teams.

Weather-Conditioned Music Classification Engine Dec 2025 - Jan 2026

- Developed a full-stack web application mapping user-inputted songs to weather categories using ML.
- Trained and compared models in scikit-learn (Logistic Regression, Gradient Boosting), achieving **0.76 weighted F1** with 5-fold stratified cross-validation. Engineered features using permutation feature importance and Spearman correlation analysis, reducing hardest class confusion (rainy/snowy) **by 59%** through model iteration.

Steel Supply Chain Optimization System - MIT Energy and Climate Hack Semi-Finalist Nov 2025

- Developed a decision-support dashboard optimizing steel shipping routes from **50+ global manufacturers** to 26 major U.S. industrial hubs. Formulated weighted sums quantifying CO2 emissions/cost trade-offs.
- Processed and normalized scraped data using pandas, cleaning, aggregating and visualizing both dynamic and static datasets. Submitted to the 11th **MIT Energy and Climate Hackathon**, placing in the semifinals.

2×N Tiling Solver and Analysis Library Mar 2025

- Authored a **19-page** combinatorics paper on ordinary generating functions for a 2×N floor tiling problem.
- Implemented bitmask DP in C++ with backtracking for **O(N)** verification of the paper's recurrence relation and developed a SymPy/mpmath pipeline corroborating the paper's closed-form solutions with partial fraction decomposition, identifying **N=8** as the threshold where floating-point error causes approximation failure.

Honors & Awards

- **Waterloo National Mathematics Scholarship** ($15,000), Waterloo President's Scholarship of Distinction ($2,000)
- **Governor General's Academic Medal**, Churchill Scholar's Award ($1,250), BC Achievement Scholarship ($1,250)
- International Baccalaureate Diploma 44/45 (**top ∼0.5% worldwide**)
- Notable math contest awards: Canadian Mathematics Olympiad Qualifier, **Fermat Student Champion** (placed 1/19644), 3× American Invitational Mathematics Examination Qualifier

Education

University of Waterloo Waterloo, ON
Candidate for Bachelor of Honours Mathematics *Sep 2025 – Present*

- **95.2% Cumulative Average, 98.0% Faculty Average**
- All Advanced Coursework: MATH145, MATH147, CS145, MATH146, MATH148, CS146