Boshen Lin

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Education

University of Alberta — Edmonton, AB
Bachelor of Science in Computing Science (Honors) — *Sept. 2021 – Present*

Experience

Research Assistant – Part-time — Oct. 2025 – Present
Department of Civil & Environmental Engineering, University of Alberta — *Edmonton, AB*

- Developing the Android version of the EmotiBit Oscilloscope for real-time visualization of physiological sensor data
- Implemented wireless data streaming from EmotiBit (ESP32) via UDP/TCP with packet parsing and synchronization.
- Designed Kotlin rendering modules for multi-channel biosignal visualization (EDA, PPG, accelerometer, temperature).
- Optimized rendering to support high-frequency data (50–200 Hz) with minimal latency on mid-range devices.
- Validated signal fidelity against the desktop/openFrameworks EmotiBit Oscilloscope.

Software Developer – Part-time Intern — Dec. 2024 – Oct. 2025
So Shall We.co — *Edmonton, AB*

- Built a full-stack marketing analytics platform ingesting Google Ads, Meta Ads, and GA4 data via API with daily ETL updates.
- Designed a multi-layered SQLite + Pandas ETL pipeline supporting scheduled data extraction, cleaning, and loading.
- Developed an interactive Plotly Dash frontend for KPI exploration (CVR, CPA, CTR, ROAS, spend, impressions).
- Created RESTful backend services with async processing and pagination for high-volume queries.
- Automated ingestion and data integrity checks using GitHub Actions.
- Configured Google Cloud Storage + BigQuery for scalable analytics workloads.

Student Researcher – Full-time — Sept. 2024 – May 2025
Campus Saint-Jean, University of Alberta — *Edmonton, AB*

- Researched automated crane path planning for modular construction using computational geometry and optimization.
- Developed a spherical-coordinate search grid for path evaluation considering elevation and obstacle constraints.
- Formulated a multi-objective function including path length, risk estimation, elevation penalties, and angle constraints.
- Reduced search nodes by 97% and iterations by 98.6% using domain-specific preprocessing.
- Published as first author in the 2025 CSCE conference proceedings.

Research Assistant – Full-time — May 2024 – Dec. 2024
Department of Civil & Environmental Engineering, University of Alberta — *Edmonton, AB*

- Developed an Android app for analyzing physiological and geolocation data from wearable sensors.
- Identified emotion fluctuation hotspots using RMSSD and KDE visualized on Google Maps.
- Achieved 92% detection accuracy during field tests with senior participants.
- Adopted by Edmonton city officials to support evidence-based urban design.

Software Engineer – Part-time Intern — May 2024 – Sept. 2024
Leettle Mint LLC — *Pittsburgh, PA (Remote)*

- Built a Vue 3 SPA with advanced filters, responsive charts, and screenshot sharing.
- Improved caching, reducing query latency by 50%.
- Implemented RESTful backend with MongoDB indexing for concurrency.

Projects

Gazprea Compiler — *ANTLR, C++, MLIR*

- Built a full compiler toolchain for the Gazprea language, implementing lexing, parsing, semantic checks, and MLIR generation.
- Developed ANTLR grammar with precedence rules, short-circuit boolean logic, loops, functions, and user-defined data types.
- Implemented scoped symbol tables, type inference, and static error reporting for undefined identifiers and type violations.
- Generated optimized MLIR supporting arithmetic, branching, memory ops, and function calls.

Generative Models Benchmarking — *PyTorch, Diffusion Models, VAE*

- Implemented and evaluated Variational Autoencoders (VAE), DDPM, DDIM, and Latent Diffusion Models (LDM) on FashionMNIST using PyTorch.
- Benchmarked reconstruction and generative fidelity using MSE, SSIM, FID, and classifier-based evaluation metrics.
- Improved training stability with EMA weights, KL-annealing, cosine noise schedules, and mixed precision (AMP).
- Visualized latent space structure and diffusion sampling trajectories; logged and compared experiments with Weights & Biases (W&B).

Findom Visualization Platform — *Vue 3, MongoDB, Node.js, Vercel*

- Built a web app to visualize financial data with interactive charts and filters.
- Implemented client-side caching and responsive UI for mobile and desktop.
- Added screenshot exports and basic access control.

Emotion Hotspot Mapping App — *Kotlin, Firebase, Google Maps API*

- Processed biosignal and GPS data from older adults wearing EmotiBit sensors.
- Computed RMSSD-based stress events and generated KDE heatmaps.
- Supported city-level decision-making for urban planning.

Crane Path Planner — *Python, NumPy, 3D Geometry*

- Implemented a multi-objective path planning algorithm for cranes.
- Used spherical search grids and pruning to reduce search space.
- Validated against real modular construction layouts.

Technical Skills

Languages: Python, Kotlin, C#, TypeScript, JavaScript, Go, Rust, C++, Java, ANTLR
Web / Database: Django, React, Vue 3, Node.js, Firebase, MongoDB, SQL, Google Cloud, GitHub Actions, Playwright, Docker, AWS S3
Tools: Git, Linux, Android Studio, Unity, VS Code, Autodesk 3ds Max, Excel, Vim, LaTeX
Data / Analytics: Pandas, NumPy, PyTorch

Awards

International Student Scholarship 2021 – 2023
University of Alberta

University of Alberta Undergraduate Leadership Award 2023
University of Alberta

Top 25% in Canadian Senior Math Contest 2021
University of Waterloo

Maple Leaf First Year Excellence Scholarship 2021
University of Alberta

Languages

English (Proficient)
Cantonese (Native)
Mandarin Chinese (Native)