

# Austin Jiang

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## SKILLS

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**Languages:** C++, C, Python, Java, Bash, TypeScript, Rust

**Tools/Libraries:** Linux, Git, CUDA, CMake, PyTorch, TensorFlow, SQL, Docker, Nginx, Flask, FastAPI, Express

**Concepts:** GPU Programming, Concurrency, Lock-Free Data Structures, Multithreading & Synchronization, High-Performance Computing, Distributed Systems, Compilers, Database Systems

## EXPERIENCE

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### Multicore Lab, University of Waterloo

Waterloo, ON, Canada

*Undergraduate Research Assistant (supervised by Dr. Trevor Brown) | C++, CUDA*

*Sep 2025 – Present*

- Contributed to extending Verlib (PPoPP'24) with **lock-free data structures on GPU** for efficient range queries.
- Implemented a CPU baseline (hash map with global locking) for controlled performance comparison.
- Migrated the build to the **CUDA toolchain (nvcc)**, resolving host-device and compiler compatibility issues.
- Developed a **VerlibAdapter abstraction** to support both **versioned and non-versioned** data structures.

### Wolfram Research

Remote

*Research Intern | Mathematica, Wolfram Kernels*

*Sep 2025 – Present*

- Built a cellular automata **parallel computing** engine with tiled updates and halo exchange for correctness.
- Implemented sparse frontier updates plus dense scans, achieving a **127% speedup** on low activity states.
- Designed a **benchmark harness** reporting updates per second, active ratio, and scheduling overhead.
- Designed a **load-balancing strategy** with imbalance monitoring and tile repartitioning across **multiple kernels**.

### Wolfram Research

Remote

*Research Intern | Mathematica*

*Sep 2024 – Jan 2025*

- Designed a pipeline voxelizing **10<sup>6</sup>** 3D meshes into binary grids for cellular automata, achieving **3x GPU speedup**.
- Developed algorithms to detect unsupported and overhanging regions, increasing infill stability by **55%**.
- Designed **benchmarking metrics** to measure density, connectivity, and printability of generated infills.
- Produced a first-author research paper, presented at the **Wolfram Technology Conference 2025**.

## PROJECTS

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**Lambda Calculus Interpreter | C++:** Built a Lambda Calculus interpreter with a parser, AST, and normal order evaluator, using de Bruijn indices to avoid variable capture and supporting curried forms.

**LookAround AI, AdventureX (Multimodel Track Winner) | Python, React:** Built a voice-controlled multi-agent tour guide using the TEN Framework, integrating Google Maps Street View API for route narration.

**Zebra Giraffe Swap | Google Cloud Platform, PyTorch:** Built a concept-swapping fine-tuning model via selective UNet training, implemented in PyTorch with Hugging Face Diffusers, using a preprocessing pipeline on COCO 2017.

**Stock Explain, Cal Hacks | Python, React:** Built a full stack AI platform with an autonomous web browsing agent, integrating BrightData APIs and adaptive search strategies to actively fetch, unlock, and reason over live market data.

**Personal Infrastructure & Services | Linux, FastAPI, SQL:** Built & maintained a personal Linux server hosting a full-stack website behind Nginx, Cloudflare DNS, cloud storage, OpenVPN, email service, and FastAPI + SQL backends.

## EDUCATION

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### University of Waterloo

Waterloo, ON, Canada

*Bachelor of Computer Science (Honours) | Major GPA: 4.0/4.0*

*Expected May 2028*

**Scholarships:** Mathematics National Scholarship, President's Scholarship of Distinction

**Coursework:** Operating Systems, Computer Architecture, Data Structures, Algorithms, Distributed Systems

## AWARDS

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**Meta Hacker Cup Round 2:** Ranked 813th out of 13,779 participants overall, top 6% worldwide.

**Generation Google Scholarship:** Google's flagship undergraduate scholarship for impact in technology (1 of 55).

**Canadian Computing Olympiad 2024 & 2025:** Silver medalist x2 (6th and 7th out of 10,000+ participants).

**USACO 2024 (Platinum):** Achieved the highest division, ranked top 100 out of 15,564 participants.