

Bryan Deng

Toronto, Canada; Canadian Citizen

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SUMMARY

- Proficient in **C, C++, Python and JavaScript** with 4 years experience and over 60,000 lines of code written.
- Motivated learner excelling in rigorous, proof-based advanced mathematics courses taken by the top 10% of students.
- Strong leadership and communication skills from 3 years as a summer camp counselor.

SKILLS

- Languages: C, C++, Python, Java, JavaScript, TypeScript, SQL, Rust, Go, Haskell, LaTeX.
- Tools/frameworks: Numpy, Pandas, Keras/Tensorflow, React, Svelte, GLSL, WebAssembly, Git, Linux.

EMPLOYMENT

Seven Eight Capital | SOFTWARE ENGINEERING INTERN | TORONTO

September - December 2024

- Incoming Software Engineering Intern.

PROJECTS

Quad-tree image compression

[Source code](#)

RUST

June - August 2024

- Developed a highly efficient library and CLI for image compression using quad tree and prefix sum array data structures.
- Designed an algorithm with complexity independent of image size, capable of compressing an 8K image through **millions of iterations in under a second**.

Imperative language interpreter

[Source code](#)

HASKELL

January - May 2024

- Implemented from scratch a lexer, parser and interpreter for a custom, Turing-complete, **dynamically-typed and garbage-collected** imperative language which structurally resembles JavaScript and Python.

Boids algorithm simulation

[Source code](#)

RUST, WEBASSEMBLY, TYPESCRIPT

July - August 2023

- Simulated 50,000+ birds flocking using the boids algorithm in a web browser with only a few milliseconds of latency.
- Implemented simulation engine in **Rust, compiled to WebAssembly** to work with TypeScript/HTML canvas renderer.
- Optimized with a **quad tree data structure, reducing entity collision detection checks by 92%**.

Path-tracing based 3D rendering engine

[Source code](#)

C++, GLSL, OPENGL

March - August 2023

- Developed a 3D rendering engine using custom physics engine from scratch, incorporating advanced lighting algorithms and Monte Carlo simulation methods; able to **render complex scenes with billions of light rays within an hour**.
- Created GLSL shaders for GPU-based concurrent execution in scheduled and batched jobs.
- Simulated various materials including light emitters, rough surfaces, and mirrors **using BxDF techniques**.
- **Improved performance by 96%** through optimizations based on a bounding volume hierarchy data structure.

Building decision trees with genetic algorithm

[Source code](#)

PYTHON

June - October 2022

- Implemented a novel **reinforcement learning algorithm** which emulates evolution to construct and optimize **decision trees for data classification**.
- Created a **Python library** with modular support for diverse fitness evaluators, selection strategies, genetic mutation strategies, and desired depth.

EDUCATION

University of Waterloo

September 2023 - April 2027 (expected)

BACHELOR OF MATHEMATICS; DOUBLE MAJOR IN COMPUTER SCIENCE AND MATHEMATICAL FINANCE

- Probability, Algorithm Design, Object Oriented Programming, Advanced Linear Algebra I/II, Advanced Calculus I/II/III.
- Major GPA: 3.9/4.0.

ACHIEVEMENTS

- 2023 Waterloo CEMC Euclid Math Competition - **top 2% in Canada; 2x AIME Qualifier**.
- Completed Toronto Half Marathon (1:55, 1:57, 2:16).