BRIAN TSOI

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Education

University of Toronto Expected May 2026
Bachelor of Applied Science in Computer Engineering (Completed Third Year) GPA: 3.65/4.00

Skills

Programming: C, C++, Rust, Java, Python, HTML, CSS, JavaScript, Assembly, Go, SQL, Git, Github
Embedded/Hardware: STM32 microcontrollers, RTOS, Arduino, UART, I2C, SPI, FPGAs (Verilog)
Languages: Chinese (native in Cantonese, fluent in Mandarin), English (fluent)

Professional and Technical Experience

Backend Software Engineer Intern | Mozilla May 2024 – Present
OS Integration Team for Firefox
- Ongoing **year-long** full-time internship, contributing to the **21M line C++/Rust** codebase of **Firefox**
- Enhancing the industry-leading **Rust-minidump** crash reporter (used by Microsoft, Sentry)
- Adding crash inconsistency detection by parsing **x86-64 Assembly**, refining **2.3M analysis** monthly
- Creating a **RAM scanner**, utilizing moving inversion and row hammering to detect faulty memory
- Working in a **globally distributed** team across 15 time zones through effective communication

Student Software Developer | UTAT Space Systems Sep 2022 – Present
University of Toronto Aerospace Team Space Systems
- Developed an adaptive **Python** compression algorithm based on Golomb-Rice coding
- Achieved **2:1 compression ratio** (50% reduction) for hyperspectral images
- Porting to **STM32** MCUs and improving runtime performance by **18 times** through rewrite in **C**
- Architected **FreeRTOS**-based high level finite state machine for **multi-threaded** satellite software

Student Project Lead and Software Developer | UofT Spark Sep 2022 – Present
University of Toronto Spark Design Club
- Leading a 12"x12"x48" arcade game project involving **Arduino/C++** and **Raspberry Pi/Python**
- Designed a **Python OpenCV**-based pinball tracking camera system with under **79ms** latency
- **Mentoring** team members on software development tools usage and best practices

Projects

Toy Porgramming Language Interpreter and Compiler Jun 2024 – Present
- Created a **Rust-based interpreter** for LoxLang, supporting expressions, conditionals, loops etc
- Implemented lexical analysis, **recursive descent parsing**, **abstract syntax tree** and tree-walking
- Designing a **compiler** that converts Lox to bytecode to be run on a **virtual machine** written in **C++**

Terminal Text Editor Sep 2022 – Present
- Constructed a terminal text editor utilizing **C**, **POSIX API** and **VT100** terminal sequences
- Implementing Vim-like keyboard bindings and **modal editing** functionality

Distributed Key-Value Database Jan 2024 – Apr 2024
- Architected a leader-based concurrent distributed NoSQL database in **Java** with a team of 3
- Tested with the Enron dataset of **over 2.6 GB**, attained **99.3% reliability** and below **5ms of latency**
- Augmented ring-based **consistent hashing** mechanism with **virtual nodes** for even data distribution

Google Maps Clone Jan 2023 – Apr 2023
- Rendered OpenStreetMap data at over **60 fps** by writing efficient **C++** graphics algorithms
- Reduced path routing time to under **23ms** by utilizing **A* path finding** algorithm
- Crafted a GUI using the **GTK** library, enabling users to drag, zoom and search for map locations