BRIAN TSOI

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Education

University of Toronto Expected May 2025
Bachelor of Applied Science in Computer Engineering (Third Year) GPA: 3.64/4.00

Skills

Programming: C, C++, Python, HTML, CSS, JavaScript ,Git, Github
Hardware/Embedded: Arduino, STM32 microcontrollers, UART, SPI, RTOS, FPGAs (verilog)
Languages: Chinese (native in Cantonese, fluent in Mandarin), English (fluent)

Experience

Firmware Developer Sept 2022 – Present
University of Toronto Aerospace Team Space Systems
- Developed an adaptive Python compression algorithm (based on Golomb-Rice coding), achieving **1.5:1** compression ratio (**33%** reduction) for hyperspectral images
- Prototyped **finite state machines (FSM)** for **STM32** MCUs on UTAT CubeSat using **FreeRTOS**
- Leveraged the STM32 HAL library to interface with GPS module, enabling NMEA message reception through UART and SPI
- Collaborated with electrical and payload sub-team in component drivers and FSM development

Software Developer Sept 2022 – Present
University of Toronto Spark Design Club
- Designed an interactive LED pattern recognition display alongside with 3 sub-team members
- Programmed minigame using **Arduino Uno** to synchronously control peripherals for user I/O
- Assembled circuits and soldered electrical components for game prototype

Projects

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 using C programming constructs (structs, bitwise operation, pointers and dynamic memory allocation)

AI Ray Tracing Image Denoising Filter May 2023 – August 2023
- Trained an autoencoder neural network using **Pytorch** that aims to denoise low-sampling rate ray tracing images and remove computation barrier of high quality 3D graphics rendering
- Optimized network architecture and fine-tuned hyperparameters, achieving **83%** noise reduction
- Outperformed conventional denoising filters by **47%**

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

Non-technical Experience

English Tutor May 2021 – August 2021
- Conducted one-on-one ESL learning sessions with grade 7 students, fostering a positive and engaging learning environment
- Developed customized lesson plans tailored to individual student needs and proficiency levels
- Improved students' reading, writing, speaking, and listening skills through interactive activities, games, and multimedia resources