Bryan Kuang

Computer Engineering Student
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Education

•Bachelor of Applied Science in Computer Engineering *2023 - Expected 2028*
University of Waterloo, Waterloo, ON CGPA: 3.8

Personal Projects

•Advanced C System Programming

Linux-based concurrent systems using POSIX APIs and IPC mechanisms

- Technologies: C (POSIX), pthreads, fork/exec, IPC (Pipes/Shared Memory), gdb, Valgrind, strace
- Designed a **multi-threaded image processor** using **pthreads** and **shared memory** with mutex synchronization, achieving 3.2× speedup through parallel fragment retrieval and CRC verification
- Developed a **process-based TSP solver** utilizing **fork/exec** and **pipe IPC** with non-blocking I/O, reducing 12-node computation time by 65% through distributed path evaluation
- Identified and fixed **concurrency defects** using **gdb analysis** and **Valgrind memcheck**, implementing race-free synchronization with mutexes and semaphores

•Autonomous Sumo Robot – RoboWars 2025 (Concordia IEEE)

Designed and built a competitive autonomous robot for RoboWars 2025 with students from Waterloo, UBC, and SFU

- Technologies: Fusion 360, Arduino IDE, C/C++, IR sensors, Ultrasonic, IMU
- Led chassis design in **Fusion 360**, optimizing weight distribution and structural stability
- Programmed autonomous behavior in **C/C++** (edge detection, tracking, push strategies) using **Arduino IDE**
- Integrated **IR**, **ultrasonic**, and **IMU** sensors for real-time obstacle and boundary detection
- Collaborated under agile workflow across 3 universities; won opening match and advanced to Round 2

•STM32 Microcontroller Projects

A collection of microcontroller-based systems demonstrating proficiency in embedded C and peripheral control

- Technologies: STM32 HAL, CubeMX, FreeRTOS, C, UART, DMA, I2C, PWM, OLED, Servos
- Built a **UART/DMA**-based LED controller with **FreeRTOS** task scheduling and variable-length command parsing for efficient lighting control
- Created an **I2C sensor dashboard** using AHT20 and OLED, with custom drivers for real-time temperature/humidity monitoring
- Designed a **PWM-based smart box** featuring joystick input, OLED UI, and servo-driven lid for automated access

•ASIC Design Project (SKY130 / Tiny Tapeout)

Designed, verified, and taped out a digital hardware module using an open-source ASIC toolchain

- Technologies: Verilog, SKY130 PDK, OpenLane, GitHub Actions, ASIC synthesis, place-and-route
- Implemented a custom **Verilog RTL design** and organized source files for synthesis and verification
- Developed and adapted **testbenches** to validate functional correctness through simulation
- Executed a full **ASIC flow** (synthesis, P&R, and GDS generation) using **OpenLane**
- Automated build and verification using **CI pipelines**, preparing the design for fabrication via **Tiny Tapeout**

Experience

•Software Development Co-op *Jan 2025 – Apr 2025*
Xi'an Kuaike Network Information Partnership Technology-Divisional Office Remote

- Architected and executed a **Next.js** prototype with full-stack features, including authentication and API simulation, demonstrating strong software architecture and integration skills.
- Developed **12 reusable components** within a **Vite**-based monorepository, adopted by 2 other internal projects, highlighting modular design and code reusability.
- Implemented **cookie-based session management** supporting 3 distinct user permission levels, showcasing secure system design principles.

Technical Skills

Embedded Systems: Proficient in STM32 HAL & LL, FreeRTOS (tasks, interrupts, DMA), bare-metal C firmware, GPIO/UART/SPI/I2C/PWM, ADC/DAC, low-power modes, bootloader development, SWD/JTAG debugging
Programming Languages: C/C++ (proficient), Python, JavaScript/TypeScript, RISC-V Assembly
Embedded Linux: POSIX APIs, system calls, IPC (pipes, message queues, shared memory), C system programming, gdb, Makefile, ARM cross-toolchains
Digital Design & ASIC: Verilog, VHDL, FSM design, Quartus, ModelSim, OpenLane
Development Tools: Git/GitHub, STM32CubeMX, Keil, Arduino IDE, Fusion 360, Chrome DevTools
Lab Equipment: Oscilloscope, Logic Analyzer, Function Generator, Multimeter