

Daniel Liu

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education

University of Waterloo

📅 2020–2025

Bachelor's of Computer Science with Digital Hardware Specialization

skills

languages Bash, C, C++, C#, Go, Haskell, Java, Javascript/Typescript, Python, Rust, Verilog

technologies LLVM, OpenCV, OpenGL, Linux, Git, Docker, Kubernetes, FPGA, ROS, Raspberry Pi

web React, Vue, Nodejs, Flask, Firebase, SQL, GraphQL, OpenAPI

skillsets Operating Systems, Compiler Construction, Networking, Concurrency, IoT, VR/AR

experience

Tesla: Vehicle Update System

📅 2024

- Introduced **over-the-air (OTA)** modem updates to the **Golang** based Tesla updater for the Optimus robot, eliminating time-consuming manual code uploads for robot developers
- Productionized robot software by implementing **encrypted updates** for autopilot computer

Wind River Software: Open Source Embedded Developer

📅 2023

- Responding to customer request, ported **Golang** to **VxWorks** - the industry leading RTOS
- Involves porting system calls and writing runtime bootstrapping code in assembly
- Enabled **VxWorks** kernel and **Golang** process remote debugging using **gdbserver**

Voiceflow Inc: Platform Team Software Developer

📅 2022

- Developed a proof of concept **markup language** to integrate into existing platform, complete with a working compiler written in **Rust**, developer tools and documentation
- Extensively optimized the Voiceflow runtime, cutting compile times by **more than half**

Waterloo Rocketry: Software Team

📅 2022

- Simulated rocket flight conditions such as radiation levels using **C++** and **Geant4**

UW Computer Science Club: Term Com

📅 2021

- Used **Ansible** to automate the creation of development VMs for both **Qemu** and **Libvirt**
- Worked on **Golang** script to sync Linux package repositories with the **CSC mirror**

projects

TrainOS[®] : Real-Time Operating System for Train Control

📅 Sept 2023

- Developed **microkernel** using **C** with context switching, dynamic memory allocation, interprocess communication, test framework, and suite of userland programs
- Designed standard library and Ncurses inspired **rendering API** from the ground up
- Orchestrate multiple model trains with **collision avoidance** and **cooperative pathfinding**

VRiOT[®] : Virtual Reality Manager for IoT Devices

📅 Jan 2023

- Built VR application in **Unity** to interface with **IoT devices** in real time, winning **MIT Reality Hacks 2023** in two categories
- Developed **Rust** backend with **SurrealDB** to proxy traffic between IoT devices and VR headsets, along with SDKs to provide seamless bidirectional communication
- Features prototype IoT devices based on the **ESP32 microcontroller** running **micropython**, including an intruder alarm system, multiroom lighting and smart doorbell

InDaBin[®] : Self Sorting Garbage Bin

📅 Aug 2022

- Built waste sorting apparatus complete with analytics platform, winning **first place**
- Used **Rust** to write controller software for **Raspberry PI** that is capable of motion detection using **OpenCV**, control of GPIO pins and proximity detection using **bluetooth**
- **Golang** backend that interfaces with Google **image recognition** and **text-to-speech** APIs

WLP4 Compiler Toolchain[®] : Compiler and Linker

📅 Apr 2022

- Created **compiler** for WLP4, a C like language, with parser, type checking, linker, and code generation to MIPS using **C++**. Features a variety of **code optimization** techniques

interests

hackathons Participated and submitted to 30+ hackathons winning 10+ times

game jams Submitted to 7+ game jams

open source 6000+ total contributions, 500+ pull requests created and 200+ stars

language acquisition fluent English, Mandarin, and Japanese; studying Korean and German