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 Raspberry Pi, STM32, ESP32, FPGA, Linux, Git, Docker, Kubernetes, Buildroot
tools Fusion 360, Eagle, KiCAD, ROS, MuJoCo, PyTorch, OpenCV, OpenGL, Jupyter Notebook
skillsets Operating Systems, Control Systems, Networking, Concurrency, IoT, VR/AR

experience

Pex Labs: CEO and Co-founder | Retro handheld gaming startup   2024
- Formed company building a retro handheld game console for the PICO-8 game platform
- Built **10+** 3D printed prototypes, **3** custom PCB revisions and engineered game emulator
- Spoke with **60+** customers, gained **100+** waitlists, and raised $**5,000** in grants

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**

projects

Hexasaur : Autonomous walking hexapod robot   Aug 2024
- Designed and 3D printed a walking hexapod robot using **Fusion 360** and Cura Slicer
- Deployed **ROS** on **Raspbeberry Pi** for teleoperation, motor control and stream camera feed
- Leveraged **FreeRTOS** and **ESP32** MCU to drive 18 servo motors using **inverse-kinematics**

OpenAI Gym Exercises : Reinforcement learning environments   July 2024
- Developed and trained **DQN** agent from scratch using **PyTorch** to play N64 Mario Kart
- Trained agents for Lunar Lander environment using **DQN+PER** and **DDQN** as well as MuJoCo Ant using **PPO**; evaluated and tuned model to generate a detailed report

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

interests

hackathons Participated and submitted to 30+ hackathons winning 10+ times
open source 7000+ total contributions, 500+ pull requests created and 350+ stars
language acquisition fluent English, Mandarin, and Japanese; studying Korean and German