Sohail Sayed

sohail.sayed@uwaterloo.ca | LinkedIn | My Portfolio | GitHub

Skills

Embedded & Electronics: STM32 (HAL), SPI, I2C, UART, PWM, ADC, DMA, Interrupts, Motor Control, PID Control, Encoder Feedback, PCB Design (4-Layer, KiCad), Power Electronics, Oscilloscope, Logic Analyzer
Robotics & Perception: ROS2, Multi-Camera Systems, Sensor Integration, OpenCV, PyTorch, YOLO, CLIP, SolidWorks
Languages & Software: Python, C, C++, Rust, JavaScript/TypeScript, SQL, React/Next.js, Flask, Docker, Git, Linux, AWS

Education

University of Waterloo — Waterloo, ON
BASc in Systems Design Engineering — *Sept 2021 – Aug 2026*

Experience

Embedded Software Intern — *Chicago, IL*
Zenblen - Robotic Smoothie Making Kiosks — *May 2025 – Aug 2025*

- Developed a real-time, closed-loop stepper motor control algorithm in **C++** with **SPI** communication on an **ARM Cortex-M7** (**Teensy**), using encoder feedback for stall detection & self-correction, reducing motor-related downtime by **70%**
- Built an **ML vision pipeline** (**YOLOv8**, **AWS Lambda**, **S3**) to detect machine-blocking errors: designed the **ETL** & auto-labeling pipeline (**100+** training images), trained & deployed a model to **95%** accuracy, reducing downtime by **40%**
- Implemented synchronized **4-camera** recording with live on-device inference on a **Raspberry Pi** (**GStreamer**), automatic camera identification via **udev** triggers & **SSIM** matching, and per-camera **WebSocket** control, doubling camera capacity
- Built daily log analysis dashboard (**React**, **Python**, **AWS Lambda**, **S3**), cutting order debugging from hours to minutes

Software Engineering Intern — *Chicago, IL*
Cube Exchange - Digital Asset Exchange — *Sep 2024 – Dec 2024*

- Led development of a mobile web game on a **3**-person team: designed the **serverless architecture** (**TypeScript**, **Node.js**, **Next.js**, **Redis**, **DynamoDB**), handling **1,000+** daily users w/ **request batching** cutting client-side requests by **90%**
- Containerized a **Rust** project w/ **Docker** (**multi-stage builds**) & wrote **50** unit tests, driving coverage from **20%** to **100%**

Embedded Software Developer Intern — *Toronto, ON*
Gastronomous - Automated Restaurant Kitchen Robots — *Jan 2024 – Apr 2024*

- Fine-tuned & deployed **YOLOv8** patty-type classification to **99%** accuracy with **ROS2**, enabling autonomous cook-time & flip control, on **10,000** images captured & labeled via an **OpenCV** pipeline, replacing a prebuilt solution & saving **$3K/unit**
- Designed **three** signal-interface and power-distribution **PCBs** in **KiCad**, including **MOSFET** level-shifting to interface **24V** industrial beam-break sensors with a **Teensy**'s **3.3V GPIO**, and replacing failure-prone wiring in space-constrained units
- Developed a **Python** library for real-time **WebSocket** comms between robot's **Linux**-based HMI & middleware for control
- Built a robot monitoring app (**TypeScript**, **Next.js**) w/ live UI/camera streams, & a cloud **SQL** app for fleet-wide telemetry

Machine Learning Intern — *Toronto, ON*
The Weather Network - Canada's Largest Weather Service Provider — *May 2023 – Aug 2023*

- Shipped an **LLM** weather assistant (**GPT-3.5**, **LangChain**) on Canada's largest weather platform (**60M** users); helped design its **tool-selection layer**, having the model pick which internal **APIs** to call per query, cutting token usage ∼**50%**
- Built **LLM evaluation platform** used to pick the production model: head-to-head model comparison across **1,000** prompts

Data Engineering Intern — *Toronto, ON*
Grantmatch - Grant Funding Strategy Software — *Sep 2022 – Dec 2022*

- Trained & deployed a multi-label text-classification network (**PyTorch**) to categorize grants, boosting throughput **300%**

Personal Projects

Autonomous Object Finding Rover (Solo Project, In Progress) — *Read More*

- Engineered an autonomous rover through **4** hardware revisions; custom **STM32** firmware (**C**, **HAL**): **RC** receiver decoding over **UART** with **DMA**, **PWM** control of **4** brushed DC motors, **I2C**/**ADC** telemetry from a custom-made **Battery Management PCB**, and a **UART** link to a **Raspberry Pi 5** running **YOLO + CLIP** for natural-language object search
- Custom designed (**SolidWorks**) & fabricated: **2020 extrusion** chassis, **GT2 belt** drivetrain, 180° **stepper** camera turret

Battery Management System and Power Distribution PCB (Solo Project) — *View PCB*

- Designed a **4-layer BMS** around a TI **BQ76925 AFE** for a **3S 11.1V LiPo**: per-cell voltage, pack current, & temperature monitoring w/ over/under-voltage and over-current fault detection, brought up in stages (emulated cells to live pack)
- Engineered **9A** of motor current and a **45mV** full-scale current measurement onto one board: dedicated inner power planes (11.1V supply & high-current ground), isolated from a quiet analog ground meeting only at the shunt, **Kelvin current sensing** w/ differential-pair routing, and an **8-via array** carrying the 9A between layers

Cable-Driven Window Cleaning Robot (Capstone Project, Electrical Lead) — *View Project*

- Designed electrical system for a cable robot: **24V** power w/ **bus-bar** distribution, inline fusing & e-stop, 4× **NEMA 23** steppers on **DM556** drivers, & custom **N-channel MOSFET** circuits w/ Schottky flyback protection for motor brakes
- Wrote the traversal **STM32** firmware (**C**, **HAL**): **interrupt-driven** step generation on a shared timer with per-motor speed division to synchronize 4-cable moves, a custom **UART** command protocol to the **Raspberry Pi** running kinematics, and **GPIO** brake actuation; designed the system control **FSM** with failure-recovery states

Browser-Based Windows XP Recreation (ReactJS, NextJS and TypeScript) — *GitHub Repo*