# Shaheer Rana

linkedin.com/in/shaheer-rana shaheer.rana@uwaterloo.ca
github.com/ShaheerRana 647-657-4535
Mechatronics Engineering | University of Waterloo

## SKILLS

**Software:** C, C++, CUDA, DMA, Python, Assembly, OpenCV, Bash, Docker
**Embedded**: ARM Cortex-M/A, CAN, SPI, I$^2$C, PCIe, Ethernet, TCP/IP, UDP
**Hardware:** Signal Processing, Power Electronics, Motor Control, Digital Logic
**OS:** Kernel, Linux, RTOS, ROS 2
**Debug:** OpenOCD/GDB, Valgrind
**PCB:** Altium Designer, PSIM

## EXPERIENCE

**Embedded Intern** | Collaborative Robotics (co.bot) Santa Clara, CA | Sep 2023 – Present

- Assisting Cobot ship their initial product as the first embedded hire
- Writing cross-compiled **Linux** device drivers (ioctl, hwmon, net), and **ROS 2** nodes in **C**, **C++**
- Created a Docker build system and wrote Bash scripts for low-level **kernel customization**
- Programming a custom power distribution board with BMS and hot-swap circuits
- Designing a high-speed **10GbE** carrier board for **NVIDIA SoC** and a motor control sensing PCB

**Software Algorithms Intern** | Institute for Quantum Computing Waterloo, ON | Sep 2022 – Dec 2022

- Built a low-latency, multi-threaded control system for a quantum simulator
- Parallelized the memory block transfers in **C++** and wrote **CUDA** accelerated waveform generation algorithms, **reducing execution time by 63.6%**
- Created real-time atom detection and relocation Python library using **OpenCV** and **OpenMP**

**DSP Firmware Intern** | Dragonfly Systems Ottawa, ON | Jan 2022 – Apr 2022

- Independently built an end-to-end **real-time data pipeline** to prototype a new ultra-low-power IoT product
- Programmed filters in **bare-metal C** on EFR32 to amplify and de-noise audio
- Optimized **DMA** buffer handling, ADC sampling, and transmission frequency
- Validated audio quality using logic analyzers, oscilloscopes, and **Python** PyQT

**Robotics Intern** | VN Instruments (NASA Project) Brockville, ON | May 2021 – Aug 2021

- Owned a multi-axis linear actuator testing acoustic sensors for Mars
- Wrote control algorithms in **C** on **TI-RTOS Kernel**, reduced interrupt handling time by 35%
- Built a telematics control unit and data logger for 8 motors over **Python** sockets
- Programmed and designed demultiplexing relay driver PCB

## PROJECTS

**Technical Director** | Waterloop Sep 2020 – Dec 2022

- Led 100 members competing in and organizing North America's only active Hyperloop competition, authored the rulebook
- Established an Agile firmware team developing custom motor controller, BMS, and CAN library
- **Altium** schematic capture and layout of a 4-layer 3-phase DC/AC motor controller powering a 48V linear induction motor, simulated in **PSIM**
- Programmed fault-tolerant STM32 motor controller in **C** with 15 sensors and SVPWM

**Hack the North**

scaNFT (2021 Winner) Automatic 3D NFT scanner, secure minting and Ethereum transactions
instAd (2022) AI ad generator using multi-step stable diffusion AI and NLP

**Other Competitions**

Ontario Engineering Competition (2023 Winner) Built and programmed an autonomous mobile robot
ActInSpace Canada (2022 Winner) Machine learning for urban development

## EDUCATION

**University of Waterloo** | BASc in Mechatronics Engineering Sep 2020 – Apr 2025