Ayaz Hasan

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Education

Bachelor of Engineering, Electrical Engineering — Sep 2024 – Expected 2029
Toronto Metropolitan University — *Toronto, ON*

Experience

Hardware Integration Intern — Sep 2026 – Present
Waefa (Defence Technology Startup) — *Toronto, ON*

- Integrating an SDR and a GNSS receiver with a Raspberry Pi 5 for a counter-UAS prototype, covering power, cabling, interfaces, and configuration
- Writing Python scripts that verify each device over serial/USB and capture raw outputs, and running bench tests for data stability, synchronization, and failure recovery
- Documenting the integration in a setup and troubleshooting guide and a technical validation report

Electrical Subteam Member — Nov 2025 – Present
TMU Baja SAE — *Toronto, ON*

- Compared master power cutoff topologies: one high-side contactor vs. dual contactors with a hardware interlock
- Selected a 12V SPDT contactor by sizing on inrush margin rather than continuous rating, per the datasheet
- Designed the schematic and PCB layout in KiCad for a subsystem of the vehicle's electrical system
- Recalculated fuse sizing, updated the wiring diagram, and wrote a troubleshooting guide and pre-test checklist

Undergraduate Research Assistant — Oct 2025 – Sep 2026
Haptics and Telerobotics Laboratory (HapTel), TMU — *Toronto, ON*

- Designed and ran 101 controlled trials on an Intel RealSense L515 LiDAR across 3 moisture levels, 3 distances (0.5–0.7 m), and 0–342 lux of ambient light
- Built a Python capture tool (pyrealsense2, OpenCV) with depth-gated ROI tracking and auto ROI sizing, logging 120-frame trials of depth, IR, and confidence data to CSV
- Certified on and operated a Cary 5000 UV-VIS-NIR spectrophotometer for optical moisture measurement
- Traced inconsistent early results to their root cause in the capture procedure and rebuilt the test setup around it
- Co-authored and presented a CSME-CFDSC-CSR 2026 paper; the LiDAR model predicted moisture at $R^2 = 0.959$

Projects

Transforming Drone-Car | *ESP32-C3, Betaflight, C++, PlatformIO* — Sep 2026 – Present

- Designing a 4-inch quadcopter that tilts its rotor modules 90° on the ground so their rims become wheels
- Built a weight and thrust budget from published motor data and sized parts against each power rail

Autonomous Warehouse Follower Robot | *C++, Python, ROS2, Raspberry Pi 4, ESP32* — May 2026

- Split CV and LiDAR perception on a Raspberry Pi 4 from real-time ESP32 motor control, linked over ROS2
- Implemented closed-loop motor control with encoder feedback and a watchdog that stops the chassis on link loss

8-Bit Microcoded Processor | *VHDL, Quartus, Altera FPGA* — Nov 2025

- Designed an 8-bit processor in VHDL (FSM control unit, 4:16 decoder, microcoded ALU) and ran it on an FPGA
- Verified every module with functional waveform simulation in Quartus before board implementation

Portable Blood Oximeter | *KiCad, LM358 Op-Amp, Red/IR LEDs, Arduino* — Jul 2025

- Designed a discrete optical sensing circuit on a custom KiCad PCB and debugged bring-up with a scope
- Programmed an Arduino to process the sensor signal and show live pulse and SpO2 readings on an LCD

Technical Skills

Languages: Python, C/C++, VHDL, Verilog, MATLAB, Java, JavaScript/TypeScript, Bash
Hardware & Lab: KiCad (schematic and PCB), oscilloscope, multimeter, soldering, Cary 5000 spectrophotometer
Embedded: ESP32, Raspberry Pi, Arduino, PlatformIO, ROS2, Quartus, Altera FPGA
Tools & Data: Linux, Git, SolidWorks, NumPy, Pandas, OpenCV, Microsoft Office
Certifications: WHMIS, IBM Applied Data Science with Python