

Yahia Hassanen

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Highlights of Qualifications

- Enrolled in year 3 of 5 in McMaster University's Electrical and Biomedical Engineering Co-op program, eligible for 4, 8, and 12 months co-op placements starting May '26.
- A self-directed and empathetic leader with a proven track record of fostering high-performance collaboration and clear communication across multidisciplinary project teams.
- Strong passion for embedded systems in the context of health solution applications.

Education

McMaster University *Electrical Engineering (B.Eng.)* 2023-2028 (Expected)

Relevant Courses: Electronic Devices and Circuits, Advanced Circuit and Systems, Electromagnetics II, Data Structures and Algorithms, Microprocessors, and Biomedical Signals and Systems.

Work Experience

Embedded Systems Firmware Engineering Intern May. '26 – Present

PROVA Innovations, Hamilton, ON

- Optimized power management protocols achieving a 5x improvement in battery life under strict power and size constraints in a regulated medical device development environment.
- Developed C/C++ firmware and VHDL/Verilog FPGA modules for a size-constrained medical IoT wearable, integrating IMU and force sensors via I2C and SPI.
- Designed RF testing protocols for pre-compliance testing using VNAs, spectrum analyzers, TEM cells, and antennas.
- Wrote Python scripts for automated test execution and firmware validation; tracked and documented defects systematically across iterative builds in agile sprint cycles with cross-functional hardware, software, and data science teams.

Embedded Engineer

May '25 - Present

Abilities Living Laboratory, Ottawa, ON

- Engineered a low-latency multi-processor architecture in C/C++ and Go, miniaturizing legacy musical hardware by a factor of 10 into a portable platform; now deployed in biweekly music rehabilitation sessions at a hospice in Ottawa, with a permanent installation being built for a children's hospice.
- Designed a cross-platform Python communication layer managing concurrent IoT sensor streams between hardware and VJ software, enabling synchronized real-time audio-visual feedback with sub-10ms latency.

Biomedical Engineering Researcher

May '24 – August '24

Carleton University, Ottawa, ON

- Developed a cross-platform C++/Python sensor integration pipeline fusing raw 6-axis IMU accelerometer and gyroscope data into BLE-MIDI wireless commands, handling real-time sensor fusion, data normalization, and protocol translation from embedded firmware through a configurable Python GUI.
- Created a biomedical data acquisition system in MATLAB, performing Analog-to-Digital Conversion (ADC) and real-time serial communication to process EEG signals.

Teaching Assistant

Jan. '26 – May 26'

McMaster University, Hamilton, ON

- Instructed 30 undergraduate engineering students in Python, object-oriented programming, AutoCAD and soldering as part of a health-focused design course covering computation, prototyping, and materials.
- Guided student teams through the full iterative engineering design pipeline, from translating clinical requirements into hardware specifications through sensor integration, debugging, and validation.

Lead Student Planner and Ambassador

Aug. '23 – present

McMaster University, Hamilton, ON

- Led outreach initiatives as the liaison between McMaster Engineering and the student body by developing semester-long engagement campaigns that increased student awareness of Co-op and Career Services by 200%.
- Directed a team of 3 ambassadors through full event lifecycle management - from goal-setting and timeline planning to execution and post-event evaluation - at industry events and career fairs.

Extracurricular

Faculty Advisor and Team Liaison | Health Hatch, **Director of Allyship** | Voices for Peace, **Operations** | Design League, **Co-Founder** | Rotary Club Merivale Chapter. **Team Captain** | Football intramurals

Technical Skills

C/C++, Python, MATLAB, Go, Assembly, VHDL, Verilog/System Verilog, JavaScript, HTML; FPGA (Xilinx), ARM Cortex-M4, Arduino, Raspberry Pi, ESP32, TM4C1294; I2C, SPI, UART, JTAG, BLE, Wi-Fi; Altium Designer, PSpice, ModelSim, PlatformIO, Git/GitHub; Oscilloscope, VNA, Multimeter; Circuit Design, Breadboarding, 3D-printing, laser cutting, AutoCAD, Fusion.

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Highlighted Projects

Automated Narcan Dispenser | *Winter '26*

- Designed a wearable autonomous overdose-response device with an integrated SEN0344 CO2 sensor and SpO2 blood oxygen sensor on an Arduino Nano to detect respiratory depression with >90% detection accuracy.

3D LiDAR Room Mapping System | *Winter '26*

- Designed and built a complete 3D spatial mapping system on a TM4C1294 microcontroller using a VL53L1X Time-of-Flight sensor with I2C communication, SysTick interrupt-driven timing, and stepper motor positional control; developed a Python point cloud visualization pipeline rendering full room scans over UART.

VOC-Based Lung Cancer Biosensor | *Winter '25*

- Co-designed a synthetic biological AND-gate circuit in *S. cerevisiae* to detect lung cancer biomarkers in exhaled breath, triggering GFP chromoprotein expression with near-zero leaky expression confirmed via MATLAB SimBiology simulation.
- Modelled multi-branch transcriptional regulation including olfactory receptor-coupled GPCR signalling, GLD1+ promoter induction, and glucose-responsive false-negative detection; validated AND-gate logic across 5 experimental groups achieving target specificity with GFP plateau at ~400 seconds.

Space Palette Lite | *Summer '25*

- Re-engineered the Space Palette Pro's hardware and software stack using 3D touch pressure sensors, enabling simultaneous real-time music generation and visual painting; optimized the signal processing chain to achieve synchronized audio-visual output, deployed across 5 hospitals and hospices in Ottawa.
- Presented at the Carleton IP Innovation Awards; permanently installed at a children's hospice in Ottawa for ongoing group music therapy sessions.

SymphoSolids | *Summer '24*

- Developed a set of IoT-enabled wearable rehabilitation devices using C++/Arduino firmware with BLE-MIDI, translating real-time IMU orientation and velocity data into musical expression for hospital patients with limited mobility; designed a Python GUI for spatial mapping and vector-geometry configuration.
- Presented at multiple accessibility conferences and symposiums including the Carleton IP Innovation Awards.

Guardian Angel | *Winter '24*

- Built a real-time epilepsy seizure monitoring system using EMG sensors on a Raspberry Pi, implementing signal acquisition, threshold-based detection algorithms, and automated servo-actuated bed rail deployment upon seizure detection.
- Designed the mechanical bed rail enclosure in AutoCAD and performed validation testing to optimize detection sensitivity and minimize false positives.

