

MAHMOUD ZOUROB

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EDUCATION

University of Ottawa

Ottawa, ON

Bachelor of Computer Engineering

Graduating April 2027

Coursework: Computer Architecture; Digital Systems ; Signal and System Analysis; Computer Systems Design; Principles and Applications of VLSI Design; Data Communications and Networking

EXPERIENCE

EcoSafeSense – Solar Charge Controller Configuration Engineer

Jan 26' – Present

- Improved solar charging efficiency by **30%** using a **TI BQ25798** buck-boost charger with integrated **MPPT** and NVDC power-path control.
- Configured charger operation via **I²C register tuning** and validated performance using bench PSU testing and real-time V/I power measurements.
- Built firmware-ready battery charge profiles using measured system load data (**157 mW baseline**) for reliable cold-weather embedded operation.

National Research Council – Automation Engineer Intern

May 25' – Aug 25'

- Implemented hardware process control for DIW electrode fabrication using **Hyrel 30M**, **Repetrel**, and **PrusaSlicer**, tuning deposition parameters for repeatable electrochemical performance.
- Built data-driven optimization pipelines using **Python/MATLAB** to process electrochemical test data and model microstructure–performance relationships.
- Performed hardware validation using battery cyclers and potentiostat instrumentation, achieving **125 mAh/cm²** LMNO half-cell performance with reduced electrolyte overhead.

PROJECTS

UART Design | *ASM, FSM design, VHDL, Digital Systems, RTL Design*

- Designed a fully functional UART transmitter and receiver using FSM/ASM control logic.
- Implemented RTL-level digital systems in VHDL, following strict structural design constraints.
- Integrated baud rate generation, shift registers, and control/status registers.

uOttawa Supermileage – Embedded Systems & Telemetry Engineer

- Designed and implemented a real-time telemetry system to collect, transmit, and visualize vehicle performance data (speed, RPM, battery voltage).
- Integrated sensors and microcontrollers (Arduino, ESP32) with CAN bus communication for vehicle diagnostics and system monitoring.

VR Simulation on Autonomous Systems | *Unity, C#, Oculus SDK, VR Development*

- Engineered a Unity-based VR simulation highlighting challenges with autonomous systems.
- Integrated Oculus Quest, real-time audio synchronization, NPC behavior, and user feedback loops for enhanced realism and engagement.

Battery-less Bio-Sensing Wearable | *C++, Seeed XIAO Sense, BQ25570RGRR, OPA333, I2C, BLE, Oscilloscope*

- Developed firmware for Seeed XIAO Sense (nRF52840) using Arduino IDE, implementing low-power states and BLE stacks for wireless data transmission.
- Designed a battery-less power rail with the BQ25570RGRR harvester, regulating nano-watt inputs from biofuel cells to a 100 mF supercapacitor.

TECHNICAL SKILLS

Languages: C++, Python, VHDL, Verilog, C, C#

Developer Tools: Arduino IDE, Repetrel, PrusaSlicer, GitHub, Bench Power Instrumentation (PSU, Oscilloscope, Power Profiling)

Hardware/Embedded Platforms: Arduino, Embedded Sensor Systems, Energy Harvesting Systems, Battery Management Systems (BMS), Solar MPPT Power Systems, DIW Manufacturing Systems (Hyrel 30M)