Mostafa Deiab

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Education

MASc in Computer Engineering with Specialization in AI | University of Guelph **Jan. 2027**

BENG in Computer Engineering (Honours) | University of Guelph **Dec. 2024**

Experience

Graduate Research Assistant **Jan. 2025 - Present**

University of Guelph - Intelligent Systems Lab Guelph, Ontario

- Developing a semantic-aware orchestration framework that dynamically manages communication and computing resources in 6G networks, optimizing for efficiency, adaptability, and user-centric service delivery.
- Leading ML-based optimization research for integrated circuits (ICs) using advanced TensorFlow and PyTorch models, projected to improve electrical efficiency by 15% and enhance long-term reliability by 25%.
- Developing and implementing secure VLC-IoT resource allocation frameworks, resulting in 30% improved resilience under fluctuating network conditions using custom security protocols and advanced bandwidth management techniques.
- Designing MAP algorithms to optimize network coverage while reducing energy consumption by approximately 22%.

Undergraduate Research Assistant **Jan. 2021 - Dec. 2024**

University of Guelph - Advanced Manufacturing Lab Guelph, Ontario

- Developed a Machine Vision detection system for detecting embedded and process defects from automobile parts using deflectometry data with TensorFlow and OpenCV. Achieved 96% accuracy and reduced processing time by 40%.
- Designed UI that allowed seamless setup settings and displayed live defects found on industrial paint and inspection lines reducing bypassed defective parts by 35% and reducing inspection time by 75%.
- Integrated CNN models into industrial processes, contributing to $3.5M annual cost savings. Presented at ISIME 2024.

Lab Systems Administrator **Sep. 2019 - Dec. 2020**

University of Guelph - Advanced Manufacturing Lab Guelph, Ontario

- Configured and maintained secure Debian servers with RAID storage, and implemented system monitoring tools.
- Optimized GPU-accelerated workstations for researchers, and implemented secure data storage protocols. Strengthened lab cybersecurity, achieving zero security breaches through hardening measures, MFA, and VPN protocols.

Projects

Smart Utilities System | BLE, Sensor Fusion, STM32, C/C++, Python **Dec. 2024**

- Developed embedded firmware for STM32 (ARM Cortex-M4) microcontroller to interface with water-level and pressure sensors over I2C and SPI.
- Achieved <100ms system response time through interrupt-driven design and DMA buffering.
- Implemented basic predictive control using sensor fusion and threshold-based decision logic; enabled early anomaly detection with 70% accuracy.

Real-Time Home Security System | STM32, FreeRTOS, C/C++ **Oct. 2024**

- Built a low-power, camera-based security system using motion sensors (PIR) and a camera module interfaced via SPI.
- Designed real-time task scheduling using FreeRTOS with priority queues and ISR routines for deterministic behavior.
- Performed JPEG compression with <80KB RAM using picojpeg, and handled output over UART and LCD.

ML-Arch | TFLite, Raspberry Pi 4, FPGAs **Nov. 2023**

- Benchmarked CNN/ANN inference on edge processors (ARM, FPGA, GPU), optimizing latency and energy for real-time applications.
- Integrated TensorFlow Lite with quantized models, and tested against resource-constrained embedded platforms.

Interactive ML Platform | Python, C, SWIG, JavaScript, SQLite **May. 2023**

- Built a full-stack neural network training and visualization tool using a custom C numerical backend with SWIG bindings.
- Enabled persistent model saving and loading through SQLite for real-time inference testing.

Technical Skills

Languages: C/C++, Python, Bash, MATLAB, VHDL, SQL, JavaScript, Java

Frameworks & Libraries: FreeRTOS, TensorFlow, TFLite, PyTorch, OpenCV, SWIG, CMSIS, HAL/LL Drivers, TinyML

Embedded Systems & Firmware: STM32, ARM Cortex-M, I2C, SPI, UART, DMA, Interrupts, Real-Time Scheduling

Wireless/IoT: BLE, Sensor Fusion, Visible Light Communication (VLC), GPS Integration, IMU Interfacing

Tools & Platforms: Git, JTAG/SWD, Oscilloscope, Logic Analyzer, STM32CubeIDE, Linux, Docker, CI/CD, AWS, PostgreSQL