

# Mostafa Ayesh

Embedded Software Developer

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## Education

### Software Engineering MASc.

McMaster University

Sep. 2020 – Dec. 2022

Hamilton, ON

- **Thesis:** Synchronizing Real-Time Hardware Control Across TSN Capable Networks

### Mechatronics Engineering & Management B.Eng.

McMaster University

Sep. 2014 – April 2020

Hamilton, ON

## Experience

### Graduate Research Assistant

McMaster Automotive Resource Centre

May 2020 – Present

Hamilton, ON

- Worked closely with NXP Semiconductor and an automotive OEM on migrating an existing motor control application to a centralized architecture
- Developed firmware for pre-production hardware (NXP S32S & S32K3) configuring peripherals (PWM, ADC, Timer, Trigger Unit, etc.) and setting up clock and pin multiplexing targeting a motor control application
- Implemented time synchronization using Time Sensitive Networking (TSN) over Automotive Ethernet
- Used Lauterbach TRACE32 with JTAG debugging and ETM tracing during development for testing and troubleshooting hardware and software
- Performed signal verification and timing analysis using an oscilloscope for various hardware signals generated by the application

### Embedded Systems Specialist

NEUDOSE Satellite Team

Oct. 2018 – Aug. 2020

Hamilton, ON

- Worked under the funding and supervision of the Canadian Space Agency (CSA) to develop a small satellite launching in January 2023 to study the effects of radiation on the human body
- Developed CAN drivers for the satellite's On-Board Computer (STM32) to support a network stack (CSP)
- Contributed to the development of the On-Board Computer's FreeRTOS based flight software in C/C++
- Designed a Printed Circuit Board using Altium Designer to serve as a prototype for testing flight software

### Undergraduate Research Assistant (Model Based Software)

McMaster Centre for Software Certification

May 2017 – April. 2020

Hamilton, ON

- Developed a model based Pacemaker following Boston Scientific's Pacemaker System Specification using MATLAB Simulink running on an embedded target NXP FRDM-K64F
- Implemented UART communication in MATLAB Simulink configuring and monitoring the Pacemaker in real-time using a python graphical user interface (GUI)
- Created an automated hardware testing and verification including Arm Mbed based firmware in C++ and python scripts communicating with the hardware over UART

### Instructional Assistant Intern (IAI)

McMaster University

May 2018 – April 2019

Hamilton, ON

- Developed Raspberry Pi I<sup>2</sup>C drivers for an Inertial Measurement Unit (IMU) and a pulse oximeter
- Created a python testing tool and a Golang server providing students with feedback on python assignments
- Setup docker containers to automate the print submission and monitoring process on 3D printers

## Projects

### RETINA (Realtime Indoor Navigation Assistant)

Capstone Project

- > A navigation system to assist people with visual impairment navigate buildings utilizing Ultra-Wide Band (UWB) technology with sub-meter precision
- > Implemented BLE communication between the mobile app and Decawave DW1000 UWB transceivers to retrieve the user's real-time position and heading
- > Integrated the mobile app with OpenStreetMap API for indoor maps as well as Nominatim for reverse geocoding and Valhalla for route generation

### Booky

DeltaHacks Hackathon

- > A Cross-Platform mobile app (iOS & Android) that allows the user to search for books by using a picture of the book built using Google flutter
- > Used Google Cloud services for image search as well retrieving information about the book of interest

### Sumobot Challenge

McMaster University

- > Selected the components and built the electrical circuitry for the Sumobot
- > Developed C++ code for motor control as well sensor sampling (line detection, ultrasound)

## Publications

### Two Simulink Models with Requirements for a Simple Controller of a Pacemaker Device

Sep. 2022

- > Accepted at the 9th International Workshop on Applied Verification of Continuous and Hybrid Systems

## Skills

<b>Languages</b>	C, Python, C++, ARM Assembly, Java, Dart, Verilog, SQL
<b>Tools</b>	CMake, GDB, OpenOCD, Git, Docker
<b>Software</b>	MATLAB, Simulink, Altium Designer, Lauterbach TRACE32, STM32CubeMX
<b>Hardware</b>	ARM Cortex-M (STM32, NXP S32K3), ARM Cortex-R (NXP S32S24), PowerPC (NXP MPC5777C), FPGA
<b>Communication</b>	CAN, Automotive Ethernet (TSN), UART, SPI, I2C, MQTT, TCP/IP