Mostafa Ayesh

Embedded Software Developer

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Education

Software Engineering MASc. Sep. 2020 – Dec. 2023
McMaster University *Hamilton, ON*

Mechatronics Engineering & Management B.Eng. Sep. 2014 – Apr. 2020
McMaster University *Hamilton, ON*

Experience

Application Engineer Jan. 2023 – Present
Indie Semiconductor *Toronto, ON*

- Designed and developed customized software and hardware solutions to meet customer requirements
- Implemented features within image sensor drivers of a camera vision processor SoC
- Developed tools for extracting, parsing and verification of embedded data from a video stream
- Created host-side tools for communicating with the camera vision processor SoC via I^2C
- Conducted functional safety and timing analyses to ensure industry standards compliance

Graduate Research Assistant May 2020 – Dec. 2022
McMaster Automotive Resource Centre *Hamilton, ON*

- Collaborated with NXP Semiconductor and an automotive OEM to migrate a motor control application to a centralized architecture
- Developed firmware for pre-production hardware (NXP S32S & S32K3) configuring peripherals, clock trees and pin multiplexing
- Implemented time synchronization using Time Sensitive Networking (TSN) over Automotive Ethernet
- Utilized Lauterbach TRACE32 with JTAG debugging and ETM tracing for hardware and software testing and troubleshooting
- Conducted signal verification and timing analysis for networking and motor control applications

Embedded Systems Specialist Oct. 2018 – Aug. 2020
NEUDOSE Satellite Team *Hamilton, ON*

- Worked on a project funded by the Canadian Space Agency (CSA) to build and launch a satellite
- 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

Research Assistant May 2017 – Apr. 2020
McMaster Centre for Software Certification *Hamilton, ON*

- Developed a model-based Pacemaker, following Boston Scientific's Pacemaker System Specification, using MATLAB Simulink on an embedded target NXP FRDM-K64F.
- Implemented UART communication in MATLAB Simulink to configure and monitor the Pacemaker in real-time using a Python graphical user interface (GUI).
- Created an automated hardware testing and verification process, including Arm Mbed based firmware in C++ and Python scripts for communication over UART.

Projects

RETINA (Realtime Indoor Navigation Assistant) May 2020

- 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 Jan. 2018

- 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 Mar. 2018

- Selected the components and built the electrical circuitry for the Sumobot
- Developed a C++ arduino project 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

Languages	C, Python, C++, ARM Assembly, JavaScript, Java, Dart, Verilog, SQL
Tools	CMake, Ninja, GDB, OpenOCD, Git, Docker, SVN
Software	MATLAB, Simulink, Altium Designer, Lauterbach TRACE32, STM32CubeMX
Hardware	ARM Cortex-M (STM32, NXP S32K3), ARM Cortex-R (NXP S32S24), PowerPC (NXP MPC5777C), FPGA
Communication	CAN, Automotive Ethernet (TSN), UART, SPI, I^2C, MQTT, UDP, TCP/IP