Mostafa Ayesh

Embedded Software Engineer

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Education

Software Engineering MASc. - Automotive E/E Architectures Sep. 2020 – May. 2024
McMaster University *Hamilton, ON*

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

Experience

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

- Developed drivers supporting new image sensors and serializers/deserializers
- Created tools for extraction, processing, and verification of embedded data from video streams
- Engineered host-side tools to facilitate communication with the camera video processor SoC through I^2C
- Conducted comprehensive functional safety and timing analyses, ensuring adherence to industry standards and regulatory requirements

Researcher - Automotive Embedded Systems May 2020 – Dec. 2022
Stellantis (McMaster Automotive Resource Centre) *Hamilton, ON*

- Brought-up pre-production hardware (NXP S32S & S32K) to support an electric motor control application, configuring peripherals, clock trees, and pin multiplexing
- Migrated a production decentralized motor control application to a real-time centralized architecture
- Implemented precise time synchronization using Time Sensitive Networking (TSN) over Automotive Ethernet
- Utilized advanced tools such as Lauterbach TRACE32 with JTAG debugging and ETM tracing for thorough hardware and software testing, troubleshooting, and optimization
- Conducted comprehensive signal verification and timing analysis for networking and motor control applications, ensuring adherence to OEM performance requirements

Embedded Firmware Specialist Oct. 2018 – May 2020
NEUDOSE *Hamilton, ON*

- Engineered STM32-based CAN drivers for satellite On-Board Computer with (CSP) network stack support
- Developed mission-critical FreeRTOS-based flight software for the On-Board Computer in C/C++
- Designed a prototype Printed Circuit Board (PCB) using Altium Designer, serving as a crucial component in the testing phase of the flight software

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

- Developed model-based Pacemaker following Boston Scientific specs using MATLAB Simulink on FRDM-K64F
- Implemented real-time Pacemaker configuration and monitoring over UART in MATLAB Simulink
- Automated hardware testing over UART utilizing Arm Mbed firmware (C++) and Python

Projects

RETINA (Realtime Indoor Navigation Assistant)

May 2020

- Developed a Real-time Indoor Navigation Assistant, catering to individuals with visual impairment by leveraging Ultra-Wide Band (UWB) technology, achieving 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
- Utilized Nominatim for reverse geocoding to enhance location-based services and integrated Valhalla for efficient route generation tailored to indoor environments
- Contributed to the accessibility and inclusivity of indoor spaces by developing a system that goes beyond traditional navigation, ensuring a smooth and reliable user experience

Booky

Jan. 2018

- Developed a Cross-Platform mobile app using Flutter available on iOS & Android, enabling users to find books by taking a picture of the cover
- Implemented image search functionality using Google Cloud services, allowing users to explore and discover books of interest effortlessly

Training & Certification

JavaScript Algorithms and Data Structures
freeCodeCamp

Advanced MATLAB for Scientific Computing
Stanford Online

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

Programming Languages
C, Python, C++, ARM Assembly, JavaScript, Java, Dart, Verilog, SQL

Development Tools
CMake, Ninja, GDB, OpenOCD, Git, Docker, SVN

Software Development
MATLAB, Simulink, Altium Designer, Lauterbach TRACE32, STM32CubeMX, Keil μVision

Hardware Platforms & Architectures
ARM Cortex-M (STM32F, NXP S32K), ARM Cortex-R (NXP S32S), PowerPC (NXP MPC5), FPGA

Communication Protocols & Technologies
CAN, Automotive Ethernet (TSN), UART, SPI, I^2C, MQTT, UDP, TCP/IP