Mostafa Ayesh

Embedded Software Engineer

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Education

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

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

Experience

Software Engineer
Indie Semiconductor
Jan. 2023 – Present
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 - Embedded Systems
Stellantis (McMaster Automotive Resource Centre)
May 2020 – Dec. 2022
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
NEUDOSE
Oct. 2018 – May 2020
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
McMaster Centre for Software Certification
May 2017 – Apr. 2020
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 available on iOS & Android, enabling users to find books using cover images

> Implemented image search functionality using Google Cloud services, allowing users to explore and discover books of interest effortlessly

Sumobot Challenge   Mar. 2018

> Led the design and construction of a Sumobot, selecting components and building the electrical circuitry

> Developed a C++ Arduino project, implementing motor control and sensor sampling functionalities, including line detection and ultrasound sensing

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