Muhammad Faheem

Embedded System Engineer | Software Developer

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in Linkedin ⌾ Github 🔗 Portfolio Up Upwork ⅄ peopleperhour

👤 PROFILE

I am an experienced professional in electronics and embedded systems processes, specializing in software and firmware development, hardware designing, programming, testing, debugging and troubleshooting. My expertise ensures efficient and innovative solutions that can significantly benefit your projects.

🧠 SKILLS

- C, C++, C#, Python
- NRF Zephyr SDK
- CAN/LIN/MOST
- FPGA Programming
- RTOS Development
- MATLAB
- Profibus, DeviceNet
- Audio Signal Processing
- Firmware Architecture
- FPGA Development
- AWS IoT Core Integration
- Software Quality Testing
- State Machine Design
- SPI/I2C/I2S/UART
- WIFI & BLE
- Automated Testing

💼 PROFESSIONAL EXPERIENCE

Minebea Intec GmbH 🔗
Embedded Systems Engineer / Software Tester
12/2023 – present
Germany
- Developed RTOS-based embedded software, including thread management, task scheduling, priority handling, memory management, timers, and the implementation of mutexes and semaphores
- Utilized TCP/IP, Profibus, CAN bus, RS232, and HTTP for robust network communication and data exchange, incorporating XML for structured data representation in embedded systems
- Designed, executed, and maintained manual and automated software tests on simulated environments and real systems to validate software functionality

AXO Track GmbH 🔗
Senior Embedded Systems Engineer
06/2023 – 11/2023
Germany
- Led firmware development on custom hardware featuring the nRF9160 with a modem chip, utilizing the nRF Zephyr SDK (C, C++, C#) and implemented serial and parallel communication protocols.
- Enabled data exchange and system functionality through communication with AWS IoT Core and S3
- Designed an innovative and robust firmware architecture incorporating advanced message passing, event-driven mechanisms, and state machine principles based on RTOS concepts

Cobra Firing Systems 🔗
Embedded Systems Engineer
03/2021 – 05/2023
United States
- Designed a precise time code methodology using MATLAB/Simulink, ensuring accurate encoding and decoding of audio signals (Frequency Shift Keying (FSK), BPSK, QPSK, GFSK)
- Created versatile graphic libraries for GUI design, incorporating advanced rendering techniques, vector graphics, and hardware acceleration for enhanced visual performance
- Employed bit-banging techniques to optimize system performance and developed customize drivers

The University of Lahore (IECE)
Embedded System Engineer
10/2018 – 03/2023
Pakistan
- Designed software architecture for the electrical control unit, offering configurations for EV (Electric Vehicle), HEV (Hybrid Electric Vehicle), and ICE (Internal Combustion Engine) modes
- Spearheaded design of hybrid electric vehicles, BLDC motor controllers and self-charging systems
- Integrated automotive sensors, motor driver accelero-gyrometers to enhance vehicle performance

JOLTA Battery Private Limited 🔗
Electronics Embedded System Engineer (R&D Team)
06/2016 – 09/2018
Paksitan
- Used WiFi chips, ESP8266, ESP-12E, USB, Bluetooth, Zigbee and PCI technologies for development
- Worked with range of microcontrollers, including PIC, STM32, GPM, 8051, Arduino, FPGA kits
- The Artix FPGA family to develop efficient, cost-effective solutions, emphasizing high-performance signal processing, parallel computation, and reconfigurable logic for IoT applications

🎓 EDUCATION

MSc Computer Engineering   2019 – 2023
University of Engineering and Technology Lahore 🔗   Pakistan

BSc Electrical (Electronics) Engineering   2012 – 2016
Air University, Islamabad 🔗   Pakistan

📂 PROJECTS

Railway Switch Health Monitoring Device 🔗
- Sensor system with accelerometers, vibration, temperature, and humidity sensors to assess railway track switch health
- Developed long-life optimized battery solutions to ensure sustained operational efficiency of the sensor system·
- Implemented an OTA update infrastructure, enabling remote firmware updates for continuous improvement of devices
- Utilized FRAM for advanced memory management within the project, enhancing data storage capabilities with its non-volatile, high-speed, and energy-efficient characteristics, ensuring optimal performance and reliability

Advanced Fire Cue System with LCD Display Integration 🔗
- Developed a real-time fire cue system using Kinetis and ColdFire microcontrollers, integrated with FreeRTOS
- Interfaced controllers with TFT LCD displays featuring controller ICs SSD2119, ILI9341, ILI9325, ST7735, and ST7789
- Implemented parallel interfaces such as ISA, ATA, SCSI, PCI, as well as 8080 and 6080, for LCD display applications

IOT Project Development with NRF and BLE Integration
- IoT BLE projects and product development, using diverse programming languages and toolkits (power profiler etc.)
- Architecture for data exchange among master and slave devices while interfacing with various sensors and modules
- Successfully interfaced nRF52842 and nRF52840 with Bluetooth Low Energy modules (BLE) and I2S microphones

IoT Security Camera with Artix FPGA Kit
- Real-time image processing and transmission of encrypted video feed over a secure network
- FPGA-based image processing pipeline for real-time object detection and facial recognition using hardware acceleration
- Integrated network protocols to enable secure data transmission over the internet, ensuring privacy, data integrity
- Power-efficient design utilizing Artix FPGA's low-power features, extending the camera's battery life for verstaile operation

Hybrid & Electric Vehicle Development (2-3-Wheeler)
- Scalable plugin hybrid electric powertrain with a range extender for light-duty vehicles, adaptable for 3- and 4-wheelers
- Desgined main electric control unit and its subsystems, including battery management, regenerative braking systems
- Utilized automotive-grade Raspberry Pi Novasom, PIC, and STM chips, using CAN, LIN protocols for high efficieincy

Advanced Vehicle Data Logging Device
- A versatile data logging device for 2-4-wheeler vehicles, capturing comprehensive data parameters
- Providing precise drive cycle information like distance, direction location, angular and linear acceleration, and velocity
- Equipped with a efficeint array of sensors, including Gyroscope, Accelerometer, GPS, GSM Module, SD Card Data logger
- Utilized ATmega2560 & 328p chips as controllers, implementing multiple serial protocols for seamless data integration

Dynamometer (Engine Testing Bed)
- An advanced dynamometer for a wide range of vehicles, incorporating torque measurement and rotational speed analysis
- Autonomous system utilizing drive cycles generated from data logging device, enabling precise simulation and testing
- Implemented load and voltage control methods using AVR, WIFI modules controlled form GUI application

Smart Home Automation Projects: BUBFI Bulb, I/O Board, Water Automation System
- Leveraged technologies such as WiFi modules (ESP8266, ESP-12E), USB, Bluetooth, for smart home automation projects
- Integrated wireless communication into BUBFI Bulb, water automation systems, and I/O board for seamless connectivity
- Enabled convenient android-based (graphical user interface) control and automation for all smart home devices

Android-Based GPS-Guided Projectile Launcher
- Integrated Android and microcontroller platforms for precise target acquisition and launching
- Utilized Bluetooth for seamless wireless communication between the android application and control system
- GPS coordinates from a module mounted on the device to calculate the required angle and distance for accurate targeting

📚 COURSES

Algorithms for Battery Management Systems
University of Colorado System, Coursera

Embedded Systems
University of California, Coursera

Mastering Programming with MATLAB
Vanderbilt University, Coursera