

# Hafiz Muhammad Waqas Qammar

Senior Embedded Software Engineer

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Senior Embedded Software Engineer with 7 years shipping production firmware across automotive, medical, industrial IoT, consumer safety, and research domains. Expert in C/C++ on bare-metal and RTOS, targeting ARM Cortex-M, RISC-V, and ESP32. Brings formal ASPICE and ISO 26262 discipline alongside deep low-power wireless and biomedical signal processing experience.

Currently targeting senior firmware roles in safety-critical automotive and medical device development. Drawn to product environments where field reliability and formal process compliance are non-negotiable.

## SKILLS

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**Programming Languages:** C, C++14, Python, MATLAB, JavaScript, Kotlin

**RTOS:** FreeRTOS, RTEMS, Zephyr, Linux-RT

**Microcontrollers and Architectures:** ARM Cortex-M, RISC-V, STM32, NRF52, ESP32, NOEL, 8-bit AVR

**Wireless and IoT:** BLE 5.0, Web BLE, UWB, LoRa, NB-IoT, Cat-M, WiFi, MQTT, WebSocket, TCP/UDP

**Communication Protocols:** CAN, LIN, SPI, I2C, UART, RS-485, RS-232

**Signal Acquisition and DSP:** ADS129x (EEG/EMG), ADPD400x (PPG), digital filtering, biomedical signal processing

**Debugging and Tools:** JTAG/SWD, Git, Jenkins, CMake, QEMU, MISRA, Helix QAC, Tessa, Polarian, Enterprise Architect

**Hardware and FPGA:** Altium Designer, Autodesk Eagle, Circuit Studio, SmartHLS (PolarFire FPGA)

**DevOps:** Buildroot, Podman, Docker

**Safety Standards:** ASPICE, ISO 26262

## PROFESSIONAL EXPERIENCE

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**Senior Embedded Software Engineer** | Intellias, Portugal | Nov 2024 to Present

*Develop safety-critical firmware for Elmos Semiconductor under full ASPICE compliance, targeting next-generation automotive ECUs.*

- Developed a modular universal bootloader in C as part of the team, replacing a rigid legacy system across requirements, detailed design, coding, and testing. The design supports chip-specific variants and cut qualification time from months to weeks.
- Own the flash driver layer, the safety-critical component performing in-field programming of chip flash memory across the Elmos product line.
- Implemented CAN and LIN programming interfaces, enabling in-field ECU programming across all Elmos production chips including for OEMs like Mercedes.
- Delivered all ASPICE SWE.1 to SWE.5 artefacts: software requirements in Polarian, UML architecture in Enterprise Architect, and unit and integration tests in Tessa.
- Contributed to a 10-person cross-functional team building a bootloader that ships into millions of ECUs globally.

**Research Engineer** | Vortex-colab, Portugal | Jul 2023 to Oct 2024

*Extended real-time RTOS and hardware-accelerated runtime monitoring systems under the EU-funded ROUTE21 research grant.*

- Extended RTEMS on RISC-V architecture for the Real-Time Monitoring Library (rtmlib), enabling a new library release for safety-critical real-time systems.
- Designed hardware-accelerated runtime monitors on Microchip PolarFire FPGA using SmartHLS. Offloaded monitoring workload from CPU via PCIe DMA and AXI4, achieving significant CPU reduction with benchmark-level speedup results.
- Built Buildroot-based Real-time Linux support for RISC-V containers, enabling containerized Real-time ROS applications.

**Freelance Embedded System Engineer** | Dormotech, Israel | Aug 2022 to Jul 2023

*Sole firmware engineer for DormoVision X, a clinically validated 38-channel wireless sleep diagnostics device deployed in clinics globally.*

- Developed the complete embedded firmware stack on NRF52, from analog front-end drivers (ADPD4000, ADS1296) through BLE data streaming.
- Implemented digital filtering and signal conditioning algorithms for real-time multi-channel biometric signal processing (EEG, EOG, EMG, PPG).
- Delivered firmware supporting clinical-grade reliability for unattended multi-night home sleep testing.

**Freelance Embedded System Engineer** | Mindfield Biosystems Ltd., Germany | Jun 2020 to Mar 2022

*Designed and built two commercial biofeedback products shipping to consumers and clinicians worldwide.*

- Designed PCBs in Autodesk Eagle and developed full RTOS-based firmware for eSense Muscle (EMG) and eSense EEGenius (multi-channel EEG).
- Implemented a library of 12+ custom DSP filters (mains notch, configurable band-pass) for EMG and EEG signal conditioning, with BLE data transmission and SD card storage.

**Freelance Embedded System Engineer** | Locus Connect, Taiwan | Apr 2022 to Oct 2022

*UWB asset tracking firmware optimised for ultra-low-power coin cell operation.*

- Designed UWB tag firmware on DW1000 + NRF52840 achieving 2+ years battery life on a coin cell through aggressive low-power modes and minimal-overhead ranging protocols.

**Freelance Embedded System Engineer** | Infonix GmbH, Germany | Sep 2021 to Mar 2022

*Industrial IoT firmware for temperature monitoring and infrastructure sensing.*

- Developed multizone temperature monitoring firmware on STM32 + NRF52 using proprietary LoRa protocol with JSON output over UART, BLE, and MQTT (6 to 8 sensors per station).
- Prototyped an NB-IoT distance measurement unit for bridge water level monitoring, reporting to ThingsBoard cloud.

**Freelance Embedded System Engineer** | Baby Alert International, USA | Aug 2020 to Sep 2021

*Hardware and firmware for retail child-safety products preventing pediatric vehicular heatstroke.*

- Designed hardware and firmware for the SaferCHILD product line: a unified NRF52 + BLE 5.0 platform of three retail-shipped child-presence detection devices. Achieved 1 to 2 year battery life on standard coin cells.

**Freelance Embedded System Engineer** | TankMate, New Zealand | Mar 2020 to Jun 2021

*Agricultural IoT firmware for connected water tank level monitoring.*

- Built RTOS-based firmware for IoT tank level sensors on ESP32 with Cat-M and WiFi, achieving 1+ year battery life through near-theoretical power efficiency.

**Freelance Hardware Designer** | Guinaz, Spain | Feb 2021 to Feb 2022

*High-speed industrial PCB design for power conversion and connectivity.*

- Designed 6-layer PCB boards featuring DC-DC and AC-DC converters, USB 3.0 switches, and gigabit Ethernet interfaces, covering high-speed signal integrity requirements.

**Hardware Engineer** | BlueSky Software, Lahore (Optergy, Australia) | Nov 2018 to Aug 2019

*Wireless building automation hardware and firmware development.*

- Developed hardware and firmware for NRF52832-based wireless building automation devices, covering full product cycle from design to quality assurance.

## EDUCATION

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**B.Sc. Electronics Engineering** | University of Engineering and Technology Taxila | Oct 2013 to Jul 2017 | CGPA: 3.12

## CERTIFICATIONS AND COURSES

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- Overview: Automotive SPICE (ASPICE) on Udemy
- ISO 26262 Crash Course: Functional Safety Mastery on Udemy
- Embedded Systems: Shape the World by UT Austin on edX
- Introduction to Power Electronics by University of Colorado Boulder on Coursera
- Deep Learning Specialization by deeplearning.ai on Coursera