Muhammad Zulqarnain Shah

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EDUCATION

National University of Sciences and Technology (NUST), Islamabad *2021–2025*
B.E. Computer Engineering

PROFESSIONAL EXPERIENCE

Senior Hardware Associate – Firmware (Embedded Linux) *Jul 2026 – Present*
AIOapp Inc.

- Own the Android 15 BSP for a QCM6125 (SC668S) kiosk: 570+ commits, releases via flash and A/B OTA
- Display bring-up: LT9211D MIPI-to-LVDS bridge, backlight sequencing, ILI2510 I2C touch, Device Tree
- Integrated NXP PN7220 NFC for tap-to-pay: I2C kernel driver as a GKI vendor module, HAL and framework
- Set up AVB/ABL OEM signing; integrated GMS and security patches; fixed CTS/VTS/GTS failures
- Built the factory provisioning system (Rust, Tauri, React, axum): EDL/QDL flashing via an Arduino jig, secure-boot fusing, serial programming over AT/ADB, and keybox/RKP CSR provisioning

Hardware Associate – Firmware *Dec 2025 – Jul 2026*
AIOapp Inc.

- Brought up the T7 battery SC668S device: charger IC, fuel gauge, NTC temperature in healthd, Type-C HAL
- Debugged XBL/EDL (Sahara/Firehose) boot and flash failures via QFIL/QDL; cut debug time by 40%
- Integrated the MDM client into the system image; debugged hardware via UART console and kernel logs

Junior AI Engineer *Aug 2025 – Dec 2025*
CareCloud (MTBC)

- Built a physician-assistant pipeline using LangChain, OpenAI GPT-4, Whisper ASR and Gemini APIs
- Designed a patient-profiling ML system (8+ behavioral features); deployed rate-limited microservices

Embedded Systems Engineer Intern *Jun 2025 – Aug 2025*
Articares (Singapore)

- Developed a Python automated test suite for STM32F4-based rehabilitation devices, reaching 95% test coverage
- Built a firmware validation pipeline and real-time performance-monitoring dashboards

Embedded Systems Intern *Summer 2024*
RiseTech

- Wrote STM32F103 and 8051 firmware in C and Assembly; debugged with on-chip debuggers and logic analysis
- Designed EMG acquisition with multiplexed ADC sampling and a 50–500 Hz Butterworth band-pass filter

TECHNICAL PROJECTS

HemoGuard – Thalassemia Detection System (Final Year Project)

- Trained an XGBoost classifier on a CBC dataset (∼500 samples, 7 features), achieving 92% diagnostic accuracy
- Wrote a custom Dart inference engine parsing 300-tree XGBoost JSON models for offline mobile use
- Built an end-to-end TCP/IP pipeline: STM32 device → Flutter app → offline prediction in $\leq$50 ms

FPGA Matrix Multiplier (Verilog)

- Designed a 4-stage pipelined systolic-array multiplier (3×3 to 10×10): 1 result/cycle at 100 MHz

TECHNICAL SKILLS

Languages: C, C++, Rust, Python, Bash, TypeScript, Verilog, Assembly, Dart, MATLAB
Embedded: Qualcomm QCM6125 / Quectel SC668S, STM32 (F1/F4), 8051, ESP32, Arduino
Firmware/OS: Embedded Linux, Android BSP, kernel drivers, GKI, Device Tree, XBL/ABL, AVB, OTA, SELinux
Protocols: UART, SPI, I2C, USB/Type-C, MIPI-DSI, LVDS, NFC, AT commands, CAN, TCP/IP
Tools: Git, ADB, QFIL/QDL, GDB/OpenOCD, CTS/VTS/GTS, KiCad, Tauri, SQLite, Keil, STM32CubeIDE
ML/Data: XGBoost, LangChain, OpenAI APIs, on-device ML inference

CERTIFICATIONS & HONORS

IoT System Development & Applications – NUTECH (A+) 2023
Honors: Dean's List (3 semesters); Top 10% in Embedded Systems coursework