Muhammad Ammar Sadiq

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PROFESSIONAL SUMMARY

Embedded and Control Systems Developer with a background in **Electrical Engineering** and **3+ years** of experience in **Firmware Development**. From optimizing *power-constrained mobile aerial robots* to architecting firmware of *high-power-density multi-port power routers*, I specialize in designing **real-time, safety-critical embedded systems**. Having collaborated closely with senior architects and cross-functional teams, I am adept at **leading and managing engineering tasks** and streamlining coordination across complex projects.

TECHNICAL SKILLS

Embedded Systems & Avionics

- **Languages:** C, C++, Python, JavaScript | *HDL:* VHDL, Verilog
- **Micro-controllers & SoCs:** Zynq-7000 SoC (ARM Cortex-A9 + Artix-7 FPGA), STM32 (Cortex-M), ESP32, Raspberry Pi, Arduino
- **Safety & Standards:** MISRA C/C++, UL-1998 (Functional Safety), MATLAB Polyspace
- **SDKs & RTOS:** Xilinx-IDE, STM32Cube, ESP-IDF, PlatformIO, FreeRTOS, Ardupilot
- **Protocols, Interfacing & Debugging:** CAN, Ethernet, AXI4 Bus, I2C, UART, SPI, LVDS, DMA, ADC, JTAG/SWD
- **Design & Simulation:** Vivado Design Suite, Altium Designer, KiCad, LTspice, Proteus, Simulink, CoppeliaSim
- **Full-Stack & Tooling:** FastAPI, REST APIs, React, Node.js, SQL (SQLite, MySQL, PostgreSQL), MongoDB | VS Code, Git
- **Documentation:** MS words, MS Excel, MS Visio, MS PowerPoint, LaTex, Draw.io

Power Electronics & Controls

- **Inverter Controls:** 3-Phase Inverter Control, DAB Matrix Converters, PLL, PI Controllers
- **Modulation & Commutation:** 6-sector and 12-sector Commutation Schemes, Space Vector PWM (SVPWM)

EXPERIENCE

Powersoft19 — Lahore, Pakistan Nov 2023 – Present
Embedded Software Developer

- **High-Power EV Infrastructure:** Architected safety-critical firmware for the *Liquid Cooling System* of a 200kW Level 3 EV charger, ensuring thermal stability under peak loads.
- **Dual-Core Optimization:** Engineered a custom synchronization architecture for bare-metal applications on a dual-core SoC (Zynq-7000), offloading blocking routines to a secondary core to avoid control loop disruption on primary core.
- **FPGA IP Core Development:** Designed and implemented high-performance FPGA modules in VHDL, including a configurable-frequency PWM driver and a real-time ADC processing engine with averaging and min-max detection.
- **System Scalability:** Co-led the firmware evolution from a single-port architecture to a **centralized-distributed multi-port system**, integrating replicated ports and designing a custom serial link protocol for port synchronization with central hub.
- **Advanced DSP in Hardware:** Implemented fixed-point weighted average and sliding window filtering algorithms within FPGA fabric to provide low-latency signal conditioning for power control loops.
- **Leadership:** Co-leading the R&D cycle for a High Power Density Isolated Multi-port converter, overseeing implementation, debugging, and maturity of inverter control algorithms.

FARIS — Rawalpindi, Pakistan Apr 2023 – Oct 2023
Assistant Manager Electronics Design

- **Test & Instrumentation:** Lead the development of a **BLDC Thrust Stand** to characterize motor profiles; designed custom FDR (Fault Data Recorder) tester tools to validate hardware integrity.
- **Protocol Integration:** Decoded and implemented the S-BUS protocol on STM32 platforms for high-speed radio signal capture; developed PC-side parsing utilities for MR-72 nano-Radar telemetry.
- **Hardware Design:** Designed two-layer PCBs (Altium) and complex wiring harnesses (Visio) for custom FDR tester tool; developed HMI interfaces using Nextion Studio.
- **Firmware Engineering:** Developed robust firmware for STM32-based devices using the STM Cube and GNU Arm Toolchain, focusing on real-time sensor fusion and data logging.

PTPRI — Islamabad, Pakistan Jun 2022 – Aug 2022
Intern Electrical Engineer

- **Control Systems:** Developed a closed-loop control system for precision magnetic field regulation.
- **Modeling & Simulation:** Identified super-capacitor parameters and performed high-fidelity simulations for capacitor-based voltage sensing circuits.

Pakistan Institute of Engineering and Applied Sciences (PIEAS) Islamabad
Final Year Project Lead 2022 – 2023

- **Multi-rotor drone-swarm:** Led the development of the multi-rotor drone-swarm. Demonstrated a triangular swarm formation, consisting of three drones, with the leader on front vertex broadcasting it's coordinates, followed by two followers on both flanks, intercepting the leader's co-ordinates and following optimal calculated trajectory to maintain triangular formation.
  Technologies: *Ardupilot, Pixhawk, RaspberryPi, nrf24 Radio, GPS*

EDUCATION

Pakistan Institute of Engineering and Applied Sciences (PIEAS) Islamabad
Bachelor of Science in Electrical Engineering — CGPA: 3.59 2019 – 2023

TRAININGS & CERTIFICATIONS

Embedded Systems & Architecture

- **Arm Cortex-M Architecture and Software Development Specialization** | *ARM*
- **Embedded Software and Hardware Architecture** | *University of Colorado Boulder*
- **Introduction to the Internet of Things and Embedded Systems** | *UC Irvine*
- **Raspberry Pi Projects Specialization** | *Johns Hopkins University*

Software Engineering & Data Science

- **C Programming with Linux Specialization** | *Dartmouth College & Institut Mines-Télécom*
- **Supervised Machine Learning: Regression and Classification** | *DeepLearning.AI*
- **Python for Everybody Specialization** | *University of Michigan*
- **Introduction to Git and GitHub** | *Google*
- **PEC Generative AI Training (Cohort-2)** | *Pakistan Engineering Council*

Professional Development

- **AI For Everyone** | *DeepLearning.AI*
- **What is Data Science?** | *IBM*
- **Foundations: Data, Data, Everywhere** | *Google*
- **Get Started with Presentation Applications: PowerPoint** | *SkillUp*