

Ajay Jadhav

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Professional Summary

Embedded System Engineer experienced in architecting **Real-time embedded systems for EV charging and Wireless Power Transfer (WPT)** applications. Proven track record in designing **multi-MCU platforms**, implementing robust communication networks, and delivering production-grade firmware features including **OTA updates**, wireless telemetry, and fault management systems. Strong foundation in embedded software design, system integration, and hardware validation on **STM32** and **ESP32** platforms.

Technical Skills

- **Programming Languages:** C, C++, Python
- **Firmware Development:** Bare-Metal, FreeRTOS, FSM Design, Driver Development, Interrupt handling, DMA
- **Microcontrollers & Platforms:** STM32 (G4/F4/F3/F1 Series), ESP32 (S3/C3/WROOM), ESP8266
- **MCU Peripherals:** GPIO, ADC, DAC, PWM, Timers, DMA, RTC, CRC, Watchdog (IWDG/WWDG), External Interrupts
- **Connectivity & Communication:** CAN, UART, SPI, I²C, BLE, Wi-Fi, ESP-NOW, MQTT
- **System Architecture:** Multi-MCU Systems, Real-Time Systems, OTA Update pipelines, Wireless Communication Gateways
- **Debugging & Validation:** Oscilloscope, Logic Analyzer, SWD/JTAG Debugging, GDB, OpenOCD, Hardware Bring-up
- **Development Tools:** STM32CubeIDE, ESP-IDF, Keil uVision, VS Code, GNU Arm Embedded Toolchain (GCC), Git
- **Domain Expertise:** EV Charging (IS 17017-31), Wireless Power Transfer (WPT), Automotive Embedded Systems, Power Electronics

Experience

Embedded Systems Engineer

Jun 2024 – Present

Dash Dynamic Pvt. Ltd., New Delhi

- Architected firmware and **multi-MCU system** software for a **1.2 kW Wireless Power Transfer (WPT)** system, implementing **deterministic FSMs** for charging and fault management.
- Designing a failsafe **Over-The-Air (OTA) update** framework for a distributed multi-MCU system architecture utilizing a store-and-forward update mechanism and custom **dual-bank STM32 bootloader**, enabling seamless rollback and firmware recovery. (*Ongoing*)
- Engineered **DMA-driven** UART communication with **custom framing, sequencing, and CRC validation**, ensuring reliable inter-controller data exchange in **high-EMI environments**.
- Developed **ESP-NOW** based wireless communication with automatic device pairing and **FreeRTOS task orchestration**, achieving reliable low-latency data exchange between distributed controllers.
- Implemented **EV charging communication workflows** compliant with **IS 17017-31** and integrated **BLE and MQTT telemetry** for remote monitoring and cloud diagnostics.
- Resolved persistent CAN bus-off failures through **isolated CAN architecture** redesign and improved wireless communication robustness by mitigating RF attenuation using external antenna solutions.
- Performed **schematic review, hardware validation, and bring-up of control boards** for rapid firmware integration.

Embedded Systems Intern

Jan 2024 – May 2024

Dash Dynamic Pvt. Ltd., New Delhi

- Developed **closed-loop digital control** firmware for a 100 kHz buck converter, implementing **PI and 3p3z algorithms** to drastically reduce transient response time from **30 ms to 3 ms**.
- Optimized **interrupt service routines (ISR)** and improved ADC measurement accuracy through customized **analog and digital filtering** techniques.
- Developed **CAN-based BMS** data acquisition firmware and early WPT prototypes leveraging **ESP-NOW** and **SPI** interfaces.

Projects

Production-Grade LittleFS Integration on STM32G4

Tech Stack: C, STM32G4, SPI with DMA, LittleFS, W25Qxx NOR Flash

- Ported the **LittleFS** fail-safe filesystem to an **STM32G4** platform, enabling wear-leveled and power-loss resilient storage on external **SPI NOR Flash**.
- Developed **DMA-driven block device drivers** (Read, Program, Erase) for W25Qxx flash memory, ensuring non-blocking file operations and deterministic system execution.

ML-Based Foreign Object & Misalignment Detection

Tech Stack: Python, TensorFlow Lite, Raspberry Pi, ESP32-CAM

- Trained and deployed a **TensorFlow Lite** model on a **Raspberry Pi** for real-time detection of receiver coil misalignment, foreign objects, and vehicle presence in a Wireless Power Transfer system.
- Eliminated EMI-induced video instability by implementing an **ESP32-CAM based HTTP streaming server**, enabling reliable wireless image acquisition for inference.

Education

Savitribai Phule Pune University

Pune, India

Master of Science (M.Sc) - Electronic Science; GPA: 8.5/10

Aug 2022 - May 2024

Punyashlok Ahilyadevi Holkar Solapur University

Barshi, India

Bachelor of Science (B.Sc) - Electronics; GPA: 9.44/10

Aug 2019 - May 2022