AJAY C

B.E. Electronics & Communication Engineering | Tiruppur, Tamil Nadu
+91 8608334383 | ajay360x@gmail.com | linkedin.com/in/mr-aj/ | github.com/aj-0 | Portfolio

SUMMARY

Third-year Electronics and Communication Engineering (ECE) student with over one year of hands-on experience in embedded systems development using STM32 and ARM Cortex-M4. Skilled in Embedded C, communication protocols, peripheral interfacing, debugging, and FreeRTOS-based firmware development, with multiple embedded projects documented on GitHub and portfolio.

EDUCATION

B.E. Electronics & Communication Engineering

KPR Institute of Engineering & Technology, Coimbatore, Tamil Nadu | 2024–2028

CGPA: 7.6/10 | 12th Grade: 84.16% | 10th Grade: 75.8%

TECHNICAL SKILLS

Languages: C, Python, Rust (Basic)

Microcontrollers: STM32 (Nucleo F411RE, F407 Discovery – ARM Cortex-M4), ESP32, Arduino

Protocols: UART, I2C, SPI, CAN 2.0 (UDS) , Ethernet (TCP).

Peripherals: GPIO, Interrupt / NVIC , DMA, ADC, PWM/Timers, RTC, IWDG/WWDG

Firmware Development: Embedded C / HAL / Register level Programming

FreeRTOS : Native APIs, Task Scheduling, Inter-Task Communication, Synchronization, Software Timers, ISR Synchronization, Stack & Heap Memory Management

Tools: STM32CubeIDE, Keil, VS Code, Git & GitHub

Other: KiCad (Basic PCB Design) , X-CUBE-AI (TinyML deployment)

DEBUGGING & ANALYSIS

Tools: ST-Link (v2.0), Logic Analyzer (PulseView), Multimeter , Wireshark(Ether Packets), Datasheet/RM/Shecmatic /Errata analysis

• Used ST-LINK with breakpoints, register/memory inspection, and SWV trace to isolate firmware and peripheral configuration issues during development.

• Analyzed FreeRTOS stack usage and heap allocation through kernel-aware debugging to detect stack overflows and memory issues during task execution.

• Captured and decoded UART, I2C, SPI, and CAN signals using a Logic Analyzer (PulseView) — verifying frame structure, timing, and data flow across protocols.

PROJECTS

5-DOF Robotic Arm | STM32 + ESP32

• Implemented a real-time controlled robotic arm system

• Architecture: Mobile App (Wi-Fi) → ESP32 (UART) → STM32 F411RE (PWM) → 5× Servo Motors

• Optimized servo actuation precision and minimized command latency

Multi-Protocol Communication Engine

• Implemented and validated communication protocols on STM32 using GSM800L (UART), MPU6050 (I2C), and SX1278 LoRa (SPI) modules.

• Measupred and compared the operating speed, throughput, and communication latency of UART, I2C, and SPI interfaces under different operating conditions.

• Analyzed and debugged UART, I2C, and SPI waveforms using a logic analyzer to verify timing, protocol integrity, and reliable data transfer.

Distributed ECU Network with CAN, FreeRTOS & UDS Diagnostics

• Developed a 2-ECU automotive network using STM32F407, FreeRTOS, CAN(MCP2551) and UDS for real-time communication and diagnostics.

• Implemented sensor interfacing, fault detection, DTC management, LCD monitoring, and CAN-based data exchange between ECUs.

• Designed a UDS diagnostic ECU to read/clear DTCs and log diagnostic events to an SD card with RTC timestamps.

SPI–Ethernet Webserver (FreeRTOS)

• Developed a FreeRTOS-based Ethernet web server on STM32 using the W5500 Ethernet controller over SPI.

• Implemented TCP/IP communication and served HTTP requests from a dedicated FreeRTOS task.

• Captured and analyzed Ethernet packet data using Wireshark to verify Ethernet, IP, TCP, and HTTP transactions and network reliability.

Communication Protocol Analysis & Debugging

• Interfaced and validated multiple embedded peripherals including fingerprint sensors, Ethernet controllers (SPI), and SD cards on STM32 platforms.

• Analyzed and debugged UART, I2C, and SPI waveforms using logic analyzers and protocol decoding to identify timing, framing, and communication faults.

• Verified protocol transactions, interrupt behavior, and signal integrity to ensure reliable hardware communication and embedded system operation.

CERTIFICATIONS & COURSES

• Electronics Foundation Course — Etalvis Learning
• Embedded Systems for Beginners — NIELIT Calicut
• ARM Cortex-M3 & M4 Programming — Udemy
• Industrial, IoT & Consumer Microcontrollers — Infineon Technologies
• C & Python Programming — Udemy
• Realtime Programming for QNX OS – PI-Square Technologies
• PALS Innowah Cluster Finals (IIT ALUMNI) — Competition Certificate