



Kavana D

Embedded Firmware Engineer

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Summary

Embedded Firmware Engineer with 2+ years of experience in designing and developing high-performance embedded solutions using C and Embedded C. Skilled in bare-metal programming, low-level system-level debugging across STM32, PIC, and ESP32 platforms. Strong expertise in hardware interfacing, communication protocols, and memory optimization. Strong debugging skills using logic analyzer, UART logs, and network analysis tools, and Experience in identifying and resolving firmware issues at system and communication levels. Demonstrated experience in developing scalable, reliable, and secure embedded firmware for real-time applications.

Professional Experience

04/2024
Bengaluru

Embedded Firmware Engineer

BDGtronix Pvt Ltd, Bangalore

Developed and optimized embedded firmware using C for STM32, PIC, and ESP32-based systems. Designed and implemented peripheral configurations and initialization routines for reliable system operation. Engineered interrupt-driven real-time systems to ensure efficient and deterministic event handling. Integrated hardware components including sensors, communication modules, and control interfaces. Performed system-level debugging and optimization to improve performance and memory efficiency. Collaborated with hardware team during board bring-up and system validation. Executed unit, integration, and system testing across the software development lifecycle (SDLC)

Skills

Programming: C Programming, Embedded C, DSA

Microcontrollers: ARM Cortex-M4 (STM32L4R5ZI-P), ESP32, PIC (8-bit)

Embedded Concepts: Bare-metal programming, Interrupt handling, DMA, Register-level programming

Peripherals Interfaces: GPIO, ADC, PWM, Timers, UART, SPI, I2C

Networking: TCP/IP, TCP Protocol, Socket Programming

Wireless Modules: Wi-Fi (ESP32), nRF24L01 (RF), GSM/LTE (A7672S – 4G)

Security: AES-128 (GCM), Asymmetric Cryptography (ECC, ECDH)

RTOS: Task scheduling, context switching, inter-task communication (queues/semaphores)

Software Development & Testing: SDLC, Unit Testing, Integration Testing, System Testing

Debugging Tools: UART Debugging, Logic Analyzer, ST-Link

Tools and IDEs

TOOLS:

STM32 ST-Link Utility, Proteus, GIT and Github, Logic Analyzer, Docklight, Beyond Compare

IDES:

MPLAB X IDE, MPLAB X IPE, STM32CubeIDE, Keil µVision, Visual Studio Code

Projects

01/2025 – 10/2025

Smart Home Automation

Embedded C, ESP32-C6, TCP/IP, nRF, AES-128, RTOS

Developed a smart switchboard system to control home appliances (lights, fans, sockets) using Wi-Fi, RF remote, and capacitive touch interfaces. Designed and implemented firmware on ESP32-C6 for network communication and real-time device control. Implemented TCP/IP socket communication, including connection establishment using the 3-way handshake mechanism. Configured and worked with AP (Access Point) and STA (Station) modes for flexible wireless connectivity. Integrated AES-128 encryption and asymmetric cryptography to ensure secure data transmission. Designed scalable architecture to support multiple devices over network-based control. Performed system-level diagnostics, debugging, and fault analysis for reliable operation. Implemented RTOS-based task management for handling concurrent operations and improving system responsiveness. Interfaced ESP32 with microcontrollers using UART communication protocol. Worked on RF communication using nRF24L01 modules for remote-based control. Developed interrupt-based GPIO handling for capacitive touch sensors (TTP223) and external inputs. Implemented EEPROM read/write operations for persistent storage of device states. Designed input handling mechanisms for remote key detection and command processing. Improved system responsiveness and communication reliability in real-time operation.

10/2025

3-Phase Motor Controller System

Embedded C, ARM Cortex-M4, GSM, HTTP

Developed a 3-phase motor controller for safe operation based on real-time phase monitoring. Implemented ADC-based voltage sensing to detect phase availability and faults. Implemented ADC-based voltage sensing to detect phase availability and faults. Designed control logic to run motor only under valid phase conditions. Implemented Auto/Manual modes with local switch and GSM-based control, and Integrated SIM800 GSM module using UART and HTTP communication. Worked on STM32L4R5ZI-P (ARM Cortex-M4) for system control and peripheral handling. •Implemented interrupt-based event handling for fast response to critical conditions. Developed relay control and LED indication (PWM for fault), and Implemented EEPROM storage for retaining system state after power loss. Integrated Watchdog Timer (WDT) for system reliability. Exploring MQTT integration using LTE modules (A7672S) for scalable IoT communication. Ensured stable and fail-safe system behavior under varying input conditions.

Education

12/2020 – 05/2023
8.61 CGPA

Bachelor of Engineering | Electronics and Communication Engineering

Government Engineering College K R Pet, Mandya

07/2016 – 04/2019
73%

Diploma | Electronics and Communication

Government Polytechnic Women's Hassan

06/2015 – 04/2016
86.06%

SSLC

Janatha High School Heragu, Hassan