

Siddarth S

Embedded Software & Firmware Engineer
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Professional Summary

Embedded Software & Firmware Engineer with hands-on experience in Embedded C, STM32, ESP32, ARM Cortex-M and FreeRTOS through internships, technical training, and embedded systems projects. Familiar with bare-metal programming, embedded communication protocols, firmware debugging, and embedded Linux fundamentals. Looking for an entry-level Embedded Software Engineer role.

Technical Skills

Programming Languages	C, Embedded C, C++, Python, ARM Assembly, Shell
Microcontrollers	STM32 (ARM Cortex-M), ESP32, PIC16F877A, Arduino AVR
Embedded Concepts	Bare-Metal Programming, Interrupts, Memory Mapping, Startup Code, Linker Script, Boot Sequence, GPIO, Timers, PWM, ADC, DMA, NVIC, EXTI, Watchdog Timer
Communication Protocols	UART, SPI, I2C, CAN, BLE, Wi-Fi, MQTT, TCP/IP
RTOS	FreeRTOS (Tasks, Queues, Semaphores, Mutexes, Timers)
Embedded Linux	Embedded Linux Fundamentals, System Calls, IPC, Process Management, Shell Scripting
Debugging	GDB, OpenOCD, JTAG, SWD, UART Logging, Logic Analyzer, Oscilloscope, HardFault Analysis
Development Tools	ESP-IDF, STM32CubeIDE, MPLAB X IDE, VS Code, Git, CMake, Makefile, Renode, QEMU, KiCad
Version Control	Git, GitHub

Education

Chennai Institute of Technology Bachelor of Engineering (B.E.) – Electronics and Communication Engineering CGPA: 7.75/10	Graduated: April-2026
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Professional Experience

Embedded Systems Trainee <i>Emertxe Information Technologies, Bengaluru, India</i>	Dec 2025 – Present
- Completed 300+ hours of hands-on training in Embedded C, Data Structures, Linux System Programming, ARM Cortex-M architecture, and Embedded Linux. - Delivered 5 technical projects including Address Book, LSB Image Steganography, MP3 Tag Reader, Car Black Box, and Microwave Oven by applying structured programming, modular design, and debugging techniques. - Practiced peripheral interfacing, interrupt handling, EEPROM, RTC, ADC, UART, timers, and event-driven firmware development through embedded projects.	
Embedded Engineer Intern <i>Climate Groomers Pvt. Ltd., Chennai, India</i>	May 2025 – Oct 2025
- Contributed to the development of embedded firmware for HVAC monitoring and control systems during a 6-month internship. - Integrated and validated UART and I2C communication between multiple controller boards, supporting reliable hardware-software interaction. - Diagnosed firmware and peripheral issues using oscilloscopes, UART logs, and logic analyzers throughout the testing and validation of the system. - Prepared firmware validation records, test reports, and engineering documentation to support development and verification activities.	

Projects

Secure IoT Firmware & Device Authentication System <i>ESP32 — Embedded C — ESP-IDF — FreeRTOS — mTLS — OTA</i> github.com/SIDDUSPACE/Secure-IoT-Firmware-Device-Auth	
- Implemented a secure OTA firmware update mechanism for ESP32 using dual-slot partitions with automatic rollback support for failed firmware updates. - Configured firmware integrity verification using SHA-256 hashing and mutual TLS (mTLS) authentication with X.509 certificates for secure device communication.	

- Built the firmware using ESP-IDF, FreeRTOS, Wi-Fi, and MQTT with separate application and communication modules to simplify maintenance.
- Tested OTA update, rollback, and authentication workflows using QEMU simulation and fault-injection scenarios before deployment.

Firmware Crash Analyzer for ARM Cortex-M *STM32 — Embedded C — ARM Assembly — Renode — GitHub Actions*

- github.com/SIDDUSPACE/firmware-crash-analyzer
- Created a HardFault debugging framework for ARM Cortex-M to capture CPU registers, stack frames, and SCB fault status registers after runtime exceptions.
 - Automated crash location analysis using addr2line to map program counter values directly to source code locations during debugging.
 - Archived crash information across resets to simplify post-fault analysis without requiring a live debugging session.

Bare-Metal CLI Firmware for STM32F103 *ARM Cortex-M3 — Embedded C — ARM Assembly — UART — Bare Metal*

- github.com/SIDDUSPACE/bm-cli-cortexm3
- Enhanced a bare-metal firmware application for STM32F103 without using HAL or RTOS, starting from the reset vector through the execution of the application.
 - Wrote the startup code, linker scripts, interrupt vector table, and memory initialization for Flash and SRAM.
 - Configured UART communication using direct register programming and built a serial command-line interface for user interaction and Validated firmware execution using Renode, UART logs & register-level debugging during peripheral initialization.

Zone-Based BLE Indoor Localization System Using ESP32 *ESP32 — BLE — Embedded C — RSSI — IoT*

- github.com/SIDDUSPACE/BLE-Indoor-Localization
- Designed an ESP32-based indoor localization system using BLE beacons and RSSI measurements for real-time zone identification.
 - Applied RSSI averaging and Kalman filtering to reduce signal fluctuations and improve distance estimation.
 - Implemented BLE scanning, beacon detection, and zone classification for indoor navigation in multiple test locations.
 - Evaluated localization performance by comparing the measured RSSI values with predefined zone thresholds during experimental testing.

Certifications

- Embedded C Programming - Emertxe
- FreeRTOS and RTOS Fundamentals
- Transducers for Instrumentation - NPTEL
- Embedded System Design - Maven Silicon
- ARM Cortex-M Architecture
- C Programming: Using Linux Tools and Libraries
- C++ Programming Professional Certificate from the OpenEDG C++ Institute

Additional Information

Areas of Interest	Embedded Software Development, Firmware Development, Low-Level Driver Development, Embedded Linux, Automotive Embedded Systems, Industrial IoT
Languages	English, Telugu, Tamil, Hindi
Soft Skills	Problem Solving, Analytical Thinking, Debugging, Technical Documentation, Team Collaboration, Communication