

Sk Sahil

+91-8617580624 • sk.sahil.ece@gmail.com • [Linked In](#)

SUMMARY

Firmware Engineer with 3+ years of expertise in baremetal programming and RTOS development on ARM Cortex-M platforms. Specialized in FreeRTOS kernel optimization, interrupt-driven architectures, and low-level C/C++ hardware interfacing. Delivered robust, MISRA-compliant firmware across 40+ SKUs with focus on deterministic real-time performance, secure bootloaders, and memory optimization for resource-constrained embedded systems.

SKILLS

Languages: C, C++, Assembly (ARM), Python, Shell Script

Platforms: Bare-metal Programming, FreeRTOS (Task Scheduling, Kernel Optimization), Secure Bootloader, OTA Updates

Microcontrollers: STM32, Renesas RL78/I1C, PIC16F877A, ARM Cortex-M, ISR, DMA Operations, Memory Management

Protocols & Hardware: UART, SPI, I2C, CAN, USB, PCIe, DLMS/COSEM, HDLC, ADC/DAC, PWM, Timers, GPIO, HAL

Tools & Practices: GDB, JTAG/SWD, Logic Analyzer, Oscilloscope, GCC Cross-compilation, Makefile, Git, Jenkins, MISRA C, Memory Optimization, Unit Testing, Data Structures, Algorithms, Bitwise Operations

EXPERIENCE

Firmware Engineer

Iskraemeco India Pvt. Ltd. - Kolkata, India

Mar 2023 - Present

Designed and optimized baremetal embedded firmware for smart meters using ARM Cortex-M platforms, implementing FreeRTOS task scheduling with priority inheritance and interrupt-driven architectures for deterministic real-time performance.

- **Memory & Performance:** Achieved 25% memory efficiency through custom EEPROM wear leveling with block remapping; architected secure bootloader with CRC32 verification, dual-bank flash management, and delta compression reducing OTA payload by 40% across 40+ variants with fail-safe recovery.
- **Real-Time Processing & Integration:** Developed FFT-based harmonic analysis using ARM CMSIS-DSP with custom ISRs handling 4kHz ADC sampling at microsecond precision; implemented DMA circular buffers with ping-pong architecture and DLMS/COSEM protocol stacks using finite state machines achieving 96% transmission success.
- **Advanced Communication & Power Management:** Built UART/RS485 drivers with automatic baud rate detection and collision avoidance; implemented multi-stage power sequencing with brown-out detection, watchdog integration, and sleep mode optimization reducing power consumption by 30% while maintaining $\pm 10\text{ppm}$ RTC accuracy.

Apprentice Embedded Engineer

Emertxe Information Technologies - Bangalore, India

Apr 2022 - Feb 2023

Developed foundational expertise in baremetal embedded systems and low-level programming, gaining hands-on experience with ARM Cortex-M microcontrollers and system-level integration.

- **Core Programming & Baremetal Development:** Built strong foundations in C/C++ with embedded-specific concepts including pointer arithmetic, memory management, and optimized data structures; developed low-level firmware for ARM Cortex MCUs implementing UART, SPI, I2C drivers, ADC sampling, timer-based PWM, and interrupt-driven systems with priority handling.
- **System Programming & Debugging:** Explored embedded system internals including bootloader sequences, memory mapping, and hardware abstraction layers; gained experience with linker scripts, custom Makefiles, cross-compilation toolchains, and performed low-level debugging using JTAG/SWD interfaces with performance optimization in constrained systems.

PROJECT

Car Black Box | PIC16F877A | UART, I2C, EEPROM, ISR, ADC

[GitHub Link](#)

- Designed embedded data recorder capturing crash and sensor data to EEPROM using interrupts and keypad interface.
- Serial data monitored via CuteCom terminal; built on MPLAB X IDE and XC8.

Inverted Search | C, Hashing, Linked List

[GitHub Link](#)

- Implemented a CLI-based file indexer and reverse search engine using hashing and linked list structures.

Mini Shell | Linux Syscalls, IPC, Process Control

[GitHub Link](#)

- Built a custom shell handling child processes, pipes, and IPC for real-time embedded Linux applications.

EDUCATION

B.E. – Electronics & Communication Engineering | UIT Burdwan | 2017-21