

Shambhu Kumar

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PROFESSIONAL SUMMARY

Embedded Firmware Engineer with over 2 years of experience in designing, developing, and optimizing firmware for 8-bit and 32-bit MCU, including ARM Cortex-M platforms.

Hands-on experience with GPS, GSM/GPRS, BLDC motor tuning, RF/IR remote protocols, and self-capacitive touch sensing.

Proficient in linker script, startup file, context switching, exception handling, makefile, static analysis, bare-metal/FreeRTOS-based development, and low-level HW/SW debugging.

Working knowledge of ARM Cortex-M4 architecture, ARM CoreSight architecture, reset-to-main flow, compilation and linking concepts, memory organization, instruction handling, and engineering mathematics.

Experience in developing a round-robin scheduler from scratch for ARM Cortex-M4 in ASM/C and porting FreeRTOS to projects from the ground up. Also worked on handwritten mathematical modeling of a quadcopter. Interested in building expertise in Bootloaders, low-level device drivers, BLE/Wi-Fi stacks, RTOS, DSP, BLDC FOC.

TECHNICAL SKILLS

Languages: C, C++, GNU Assembly, basic python

MCU: ARM Cortex-M, ESP32, ATmega32

RTOS & OS: FreeRTOS, bare-metal development

Protocols: I2C, SPI, UART

Version Control: Git, Tortoise SVN

Tools & Equipments: Oscilloscopes, Logic Analyzers, JTAG/SWD, gdb multiarch, Git, CMake, STM32CubeIDE, openOCD, st-link, makefile, keil uvision, vs code, microchip studio, Linux CLI, QEMU, DOXYGEN.

MISC.: Schedulers, Context Switching, Mutex, Semaphore, Event flags/groups, Task notification, Priority inversion, Queue, deadlock, Exception Handling.

PROFESSIONAL EXPERIENCE

Embedded Engineer | Semiconic Devices Pvt. Ltd.

Noida, UP | July 2025 – Present

Collaborated with hardware engineers during board bring-up to verify custom PCB functionality and validate power sequencing. Developed and maintained bare-metal C firmware for a BLDC FOC motor driver, including RF/IR remote control, smart LED features, and motor tuning improvements. Integrated the Tuya T13S module for IoT connectivity. Debugged complex hardware-software integration issues using oscilloscopes, logic analyzers, and JTAG-based hardware debuggers. Worked on self capacitive touch sensing.

Embedded Software Engineer | Atlanta Systems Pvt. Ltd.

Cannaught Place, Delhi | Oct 2021 – Dec 2022

Implemented an over-the-air (OTA) firmware update mechanism using Quectel MC25 with inbuilt GPS Unicore UC6226 module and GSM/GPRS Unisoc RDA8955 module enabling remote patching of devices in the field. Managed version control using tortoise SVN. Developed LL I2C, UART driver.

PROJECTS

4W RC CAR | OCT 2024 – NOV 2024

A remote controlled 4-wheeler car + Remote is designed and developed from scratch, both hardware and firmware. NRF24L01+ is used for wireless controlling via remote. Hardware used: atmega328p, NRF24L01+, BO motor, stepper motor etc. The steering mechanism is designed from scratch. Software and Tools used: microchip studio, avrdude programming tool, serial monitor.

EDUCATION

MASTER'S DEGREE Electronics University of Delhi	2023 – 2025
BACHELOR'S DEGREE Electronics Science University of Delhi	2018 – 2021