Surya R

Embedded Software Engineer

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Motivated by a passion for continuous skill development, I thrive in dynamic environments tackling complex engineering challenges in embedded systems and robotics. My curiosity drives ongoing growth, and my technical expertise enables me to make meaningful contributions to organizational success.

Professional Summary

- 4.5 years of embedded firmware development experience on STM32 and PIC MCUs.
- Strong in bare-metal programming, RTOS (FreeRTOS), and peripheral driver development.
- Hands-on with UART, I2C, SPI, CAN, ADC, PWM, Timers, DMA, and interrupt-driven design.
- Experienced in hardware bring-up, PCB-level debugging, and production firmware delivery.
- Skilled in using oscilloscopes, logic analyzers, and JTAG/SWD for debugging.
- Good understanding of control systems, motor control, and sensor interfacing.
- Familiar with Robot Operating System (ROS).
- Strong background in Hardware–Software Integration.

Technical Skills

Programming Languages	Embedded C, C++
Microcontrollers	STM32FEXXX, PIC family
Development Boards	Jetson Nano, Toradex Colibri i.MX
RTOS / Threading	FreeRTOS, POSIX
Development Platforms	KiCad, MPLAB IDE, Keil µVision, STM32CubeIDE, Visual Studio Code, Vim
Hardware Interfaces	Sensors, Actuators, EEPROM, ADC, DAC
Protocols	UART, I2C, SPI, CAN, TCP/IP, UDP, Socket Programming
Debug Tools	gdb, Oscilloscope, Logic Analyzer, Multimeter, LCR Meter
Version Control	GitHub
Build Systems	Makefile, CMake
Others	ROS, Python, Shell Script, MATLAB/Simulink

Professional Experience

Sibay Techno Solutions Pvt Ltd *Oct 2023 – Aug 2025*

Project 1 : Embedded Firmware for 6-DOF Motor Control System *12 months*

Role Software Engineer – Firmware & Integration

Description Developed bare-metal and interrupt-driven firmware for STM32-based multi-axis motor control system, integrated with ROS-based communication modules for monitoring and control via CAN interfaces.

Tools/Platforms Embedded C, C++, STM32 (F-series), CAN, GPIO, Timers, ADC, PWM, SWD, ROS (nodes & threads), Oscilloscope, Logic Analyzer Visual Studio Code

Responsibilities

- Developed low-level STM32 firmware, including custom drivers for CAN, PWM, Timers, ADC, GPIO, and peripheral initialization.
- Implemented interrupt-driven control loops and real-time feedback processing for multi-axis stepper motor control.
- Integrated limit switches, encoders, current sensors, and safety interlocks to ensure robust fault detection and protection.
- Developed ROS nodes and middleware interfaces for motor status monitoring, command handling, and real-time telemetry.

- Utilized ROS CAN communication layers for reliable data exchange, diagnostics, and system-level coordination.
- Debugged control signals, electrical noise issues, and communication timing using oscilloscope and logic analyzer tools.
- Optimized motor response latency, improved control loop determinism, and enhanced overall firmware performance.
- Executed board bring-up, peripheral validation, and system-level integration of firmware with hardware prototypes.

Project 2 : Warehouse Robotics Automation *7 months*

Role Software Engineer – Sensor & Communication Modules

Description Developed planning and control algorithms for AMRs in dynamic warehouse environments, ensuring collision-free navigation and reliable trajectory tracking.

Tools/Platforms Embedded C, STM32, UART, SPI, I2C, Timers, FreeRTOS (basic), ROS, Oscilloscope, Visual Studio Code

Responsibilities

- Developed UART, SPI, and I2C firmware drivers for sensor modules and controller communication on embedded MCUs.
- Integrated proximity sensors, IMUs, and status indicators with robust, real-time data acquisition pipelines.
- Implemented periodic tasks, hardware timers, and interrupt service routines to ensure stable and deterministic control execution.
- Developed ROS nodes for high-frequency sensor data streaming, system monitoring, and diagnostics.
- Established reliable MCU-to-ROS communication pathways for navigation and perception modules.
- Debugged sensor interfaces, timing issues, and signal integrity problems using oscilloscope and logic analyzer during board bring-up.
- Supported system testing, calibration, and hardware validation of embedded sensor and communication modules.

P2F Semiconductors Pvt Ltd *Feb 2023 – Sep 2023*

Project 1 : Post-silicon Validation *7 months*

Role Software Engineer – ARM Cortex-M4

Description Designed and optimized firmware for ARM Cortex-M4 based embedded products, ensuring reliable hardware interfacing and high system stability.

Tools/Platforms Embedded C, ARM Cortex-M4, STM32CubeIDE, Keil µVision, Oscilloscope, Logic Analyzer

Responsibilities

- Developed and validated peripheral drivers for GPIO, UART, SPI, I2C, ADC, Timers, and interrupt routines in bare-metal environments.
- Performed post-silicon validation and hardware bring-up using oscilloscope, logic analyzer, SWD, and low-level debugging tools.
- Implemented register-level configurations, memory-mapped I/O access, and interrupt-driven execution flows for deterministic operation.
- Diagnosed and resolved timing violations, communication failures, and signal integrity issues at the board and firmware level.
- Delivered production-ready bare-metal firmware with integrated fault detection, exception handling, and recovery mechanisms.
- Optimized execution time, peripheral response latency, and overall communication throughput for stable and high-performance operation.

Techmatiks Engineering Pvt Ltd *Aug 2020 – Jun 2022*

Project 1 : Hydraulics Automation *14 months*

Role Embedded Systems Engineer – Hardware, Software & Integration

Description Developed an STM32-based embedded control system for automated hydraulic equipment, integrating sensors, solenoids, expanders, and power electronics for industrial automation.

Tools/Platforms Embedded C, STM32, Qt, KiCad, Toradex Colibri i.MX, Visual Studio Code

Responsibilities

- Developed real-time STM32 firmware for controlling solenoids, valves, and hydraulic actuators using interrupt-driven and deterministic control logic.
- Implemented ADC acquisition pipelines, PWM generation, digital I/O handling, and embedded safety mechanisms for actuator protection.
- Performed hardware–software integration with sensors, power stages, feedback loops, and system monitoring modules.
- Designed and tested custom PCBs; validated analog/digital circuits; and executed signal debugging using oscilloscope and logic analyzer.
- Developed a Qt-based Linux GUI for system monitoring, calibration, data visualization, and diagnostic workflows.

Project 2 : Voltage & Current Monitoring *5 months*

Role Embedded Systems Engineer – Hardware, Software & Integration

Description Developed a PIC16-based measurement and protection module for monitoring voltage/current with real-time display and peak protection circuitry.

Tools/Platforms Embedded C, PIC16, ADC, CLCD, Op-amps, Shunt sensors, KiCad, MPLAB X IDE

Responsibilities

- Designed and validated analog front-end circuits using op-amps, filtering stages, and shunt-based current/voltage sensing for accurate signal conditioning.
- Developed PIC16 firmware for ADC sampling, protection logic, threshold-based fault alerts, and real-time signal processing.
- Integrated a CLCD interface for real-time measurement display, system status indication, and user interaction.
- Performed end-to-end product testing, calibration, environmental validation, and reliability verification of embedded hardware.

Also designed and validated analog and digital circuits supporting embedded system functionality, including high-voltage DC–DC converter modules (12/24 VDC to 180–230 VDC) and PIC-based automotive hazard-light controllers. Developed actuator-control circuitry using proximity-sensor buffer cards, relay-driver interfaces, and protection modules. Additionally engineered current-control and safety-protection circuits for reliable device operation, including implementations on AVR microcontroller platforms.

Technical Training

Emertxe Information Technologies, Bangalore *Jul 2022 – Jan 2023*

Completed intensive hands-on training in C, C++, Data Structures, Shell Scripting, and Microcontroller Programming, with a focus on embedded systems development and real-time applications.

Education

Bachelor of Engineering (ECE)	Bannari Amman Institute of Technology, Erode	66%	2019
Higher Secondary Certificate	Sri Vijay Vidyalaya, Hosur	72.5%	2015
Secondary School Certificate	Sishya, Tiruvannamalai	87.8%	2013