Surya R

Embedded Software Engineer

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Driven by a passion for continuous learning, I thrive in fast-paced, dynamic environments where I can solve complex engineering problems in real-time systems. My curiosity and technical expertise empower me to deliver impactful solutions and contribute to organizational growth.

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++, Python, STM32 (F-series), CAN, GPIO, I2C, 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, 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 (6 months)*
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