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
Microcontrollers	ARM Cortex-M (STM32, Nation N32L403), AVR, PIC
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(basics)	C++, 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 firmware for Nation N32L403 motor controllers and STM32G431 gateway MCU. Integrated the system with PC-based ROS via CANable USB-to-CAN interface for command, monitoring, and feedback.
Tools/Platforms	Embedded C, C++, Python, Nation N32L403 (Cortex-M4), STM32G431, CAN, GPIO, I2C, PWM, ROS (nodes & threads), CANable, Oscilloscope, Logic Analyzer, Visual Studio Code
Responsibilities	• Developed low-level firmware for the Nation N32L403 motor controller, including custom drivers for CAN, PWM, Timers, ADC, GPIO, and peripheral initialization.
	• Implemented interrupt-driven real-time control loops and feedback processing for precise multi-axis stepper motor control.
	• Developed gateway firmware on STM32G431 for CAN message routing, preprocessing, and ROS integration.
	• Integrated limit switches, encoders, current sensors, and safety interlocks on motor controller boards to ensure robust fault detection and system protection.

- Designed and validated CAN communication between PC (ROS), STM32G431, and Nation N32L403 for commands, monitoring, and telemetry.
- Utilized ROS CAN communication layers with CANable and STM32G431 gateway for reliable data exchange, diagnostics, and system-level coordination.
- Debugged control signals, electrical noise issues, and CAN communication timing using oscilloscope and logic analyzer tools.
- Optimized motor response latency, improved control loop determinism, and enhanced overall firmware performance.

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, 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