


ESWAR BADRI BASINA

JUNIOR FIRMWARE ENGINEER

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 [Linkedin Profile](#)

SUMMARY

Embedded Firmware Engineer with over 2 years of experience in firmware development, hardware bring-up, and debugging. Proficient in C and Embedded C programming, with expertise in C2000, ESP32, and MAX7800x series microcontrollers and experienced in bare-metal programming on C2000. Experienced in SDLC, including design, development, testing, and deployment. Strong background in communication protocols (UART, I2C, SPI, ADC, BLE, Wi-Fi) and real-time debugging. Hands-on experience in GUI development using PyQt and Tkinter libraries in python, power electronics testing, and MAX78000-based CNN model deployment. Passionate about solving complex embedded challenges and optimizing system performance.

TECHNICAL SKILLS AND EXPERTISE :

Firmware Development & Programming:

- Hands-on experience in developing firmware for C2000, ESP32, MAX7800x microcontrollers and experience in baremetal programming on C2000 controllers .
- Proficient in C and Embedded C programming with a strong focus on real-time performance.
- Experience in device driver development.
- Basic knowledge of FreeRTOS implementation in ESP32.
- Experience with MAX78000-based CNN model deployment and validation.
- Knowledge of Software Development Life Cycle (SDLC) processes, from design to deployment.
- Familiar with version control systems, primarily Git, for source code management.

Microcontrollers & Communication Protocols:

- Expertise in programming microcontrollers and implementing real-time debugging techniques.
- Strong understanding of on-board communication protocols including UART, I2C, SPI, and BLE.
- Experience in configuring and handling MCU peripherals such as PWM, TIMER, ADC, and DAC.

Development Tools & Environments:

- Experience working with multiple Integrated Development Environments (IDEs) including:
 - ESP-IDF for ESP32 firmware development.
 - Eclipse IDE for general firmware projects.
 - Arduino IDE for quick prototyping and IoT applications.
 - Code Composer Studio (CCS IDE) for C2000 microcontroller development.

Debugging, Flashing & Testing Tools:

- Proficiency in using debugging and flashing tools such as Segger J-Link and XDS110.
- Hands-on experience with testing and debugging equipment including:
 - Oscilloscopes for waveform analysis and signal verification.
 - Logic analyzers for digital signal debugging and protocol verification.
 - Signal generators for hardware validation and testing.

Hardware & PCB Development:

- Ability to read and understand schematics.
- Ability to understand functionality and design through reverse engineering.
- Experience in PCB board bring-up, unit testing, integration testing, and debugging.

Requirement Analysis & Soft Skills:

- Strong ability to analyze and understand project requirements for optimized firmware solutions.
- Quick learner, adaptable to new technologies, and effective team player with problem-solving skills.

WORK EXPERIENCE

Jr. Firmware Engineer
Smart Rotamach Pvt. Limited
June 2023 – Present

PROJECTS INVOLVED

30kW Electric Vehicle (EV) Charger

The 30kW EV Charger is a high-power charging solution designed for efficient AC to DC conversion, integrating a 3-Phase Power Factor Correction (PFC) stage and an LLC resonant converter to enhance efficiency and power quality. The PFC stage converts AC to DC while improving power factor and reducing harmonic distortion, whereas the LLC resonant converter ensures stable DC output with optimized energy conversion, making the system highly reliable for fast EV charging applications.

Smart Earbud

The Smart Earbud for Hands-Free Device Control is designed to enable hands-free interaction with electronic devices using EEG signal detection and an Inertial Measurement Unit (IMU). The EEG sensor captures brain signals for gesture recognition, while the IMU tracks head movements to control devices such as PCs and IoT systems. Real-time signal processing ensures accurate gesture detection, and wireless communication (BLE) allows seamless connectivity for applications like smart home automation, gaming, and assistive technology.

Earbud-Controlled Wheelchair

The Earbud-Controlled Wheelchair is a smart mobility solution that enables wheelchair control using IMU-based head movements and EEG gesture detection from smart earbuds through BLE. IMU data from the earbuds and the wheelchair's onboard IMU are processed to determine movement direction based on head tilts, such as tilting left to turn left. EEG-based gesture detection enables mode switching between different wheelchair functionalities. Wireless BLE communication ensures real-time response, providing smooth and efficient hands-free navigation for users with mobility impairments.

High-Speed Data Logger

This device is designed for high-speed data transmission and recording in power testing boards without data loss. It ensures reliable logging for accurate analysis, debugging, and performance evaluation. The system captures real-time measurements from sensors and power modules, supporting high sampling rates and low-latency data transfer. Efficient memory management prevents data corruption, ensuring data integrity. It interfaces with communication protocols such as UART and USB, allowing seamless integration with various testing environments.

Wi-Fi-Based Data Logger

This device enables high-speed data transmission from power testing boards over Wi-Fi without data loss, accessible via a LAN address. Users can connect through a serial terminal on a PC or laptop within the same network for real-time monitoring. It supports UART and SPI interfaces for seamless integration with sensors and power modules. With efficient buffering and data management, it ensures reliable operation even at high speeds. The wireless design allows remote access, making it ideal for power electronics testing, debugging, and performance evaluation.

RESPONSIBILITIES DURING PERIOD

- Analyzed product requirements and created documentation like SyRS, SDD, Test Plan, and Test Report.
- Organizing and participating in design reviews, including flowcharts, RCA, and test results.
- Developed and optimized firmware for microcontrollers with a focus on efficiency and low power consumption.
- Implemented and debugged communication protocols (UART, I2C, SPI, BLE) for real-time data transfer.
- Performed hardware bring-up, unit testing, and integration testing.
- Developed MCU peripherals (PWM, TIMER, ADC, DAC) for embedded applications.
- Used debugging tools (Segger J-Link, Uniflash, XDS110) for troubleshooting and firmware flashing.
- Designed GUI applications using PyQt and Tkinter for embedded system testing.
- Conducted power electronics testing and validation.
- Deployed ML models in Embedded Systems and IoT, including MAX78000-based CNN.
- Managed BOM and component selection for embedded projects.
- Used oscilloscopes, logic analyzers, and signal generators for system testing.
- Collaborated with hardware engineers, analysts, and client representatives to deliver high-quality embedded solutions.

EDUCATION

S.no	Qualification	Name of institution	University/Board	Year of passing	%/CGPA
1	B.Tech(ECE)	GMR Institute of Technology, Rajam	JNTU-Kakinada	2023	8.2
2	Intermediate	Sri Chaitanya Junior College, Eluru	Board of Intermediate Education, Andhra pradesh	2019	10
3	SSC	S.E.S.D.M.C.High School, Eluru	State Board of secondary Education	2017	9.2

PERSONAL DETAILS

- Date of Birth: 16-July-2001
- Nationality: Indian
- Gender: Male
- Marital Status: Unmarried
- Languages Known: English, Telugu
- Hobbies: Listening Music, Editing videos & Photos.

DECLARATION

I here by declare that the details above are correct and true to the best of my knowledge.

Place: Hyderabad

Date:

Eswar Badri Basina

Signature