

# HARI CHANDANA PASUPULETI

## JUNIOR FIRMWARE ENGINEER



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### SUMMARY

Motivated and detail-oriented Junior Firmware Engineer with 1 year and 6 months of hands-on experience in embedded systems development, power electronics, and firmware design. Proficient in programming languages such as C and Embedded C, with a strong focus on optimizing system performance. Experienced in utilizing development and debugging tools to test, troubleshoot, and enhance firmware functionality. Demonstrated expertise in power electronics and the integration of machine learning techniques within embedded systems to drive innovation. Well-versed in the Software Development Life Cycle (SDLC) process, from requirement analysis to deployment, ensuring efficient project execution. Eager to contribute technical knowledge and problem-solving skills to a dynamic team while continuing to expand expertise in firmware development and embedded technologies.

### KEY AREAS OF FOCUS AND HANDS-ON EXPERIENCE:

- Electric Vehicle Chargers
- EEG signal processing in Earbuds
- IMU in Earbuds
- Controller development for various embedded systems
- Working on Hearing Aids
- Machine Learning in Embedded Systems
- Creating desktop applications using python

### TECHNICAL SKILLS AND EXPERTISE :

- **Programming Languages:** C, Embedded C, Python (for ML applications and developing desktop applications in Embedded Systems)
- **Embedded Systems Development:** Firmware development for microcontrollers, bootloaders, and low-level system initialization
- **Hardware and Interfaces:** Working knowledge of microcontrollers; communication protocols like I2C, SPI, UART.
- **Power Electronics:** Development and testing of power converters, motor drivers, and switching circuits
- **Machine Learning in Embedded Systems:** data preprocessing, and deployment on edge devices
- **Debugging and Testing:** Debugging tools like JTAG, oscilloscopes, logic analysers, unit testing, integration testing experience with debugging firmware, hardware-related issues, and power electronics circuits, memory analysis and optimization.
- **Design Tools:** Schematic Design and Netlist management.
- **Development Tools & IDEs:** IDEs like CCS, Eclipse, Arduino IDE, python IDLE, QT designer.
- **Documentation & Standards:** Writing and maintaining technical documentation; familiarity with industry standards (ISO, IEC, etc.) for embedded systems
- **Product Development:** Embedded software development, digital electronics, power electronics, and sensors

## WORK EXPERIENCE

Jr. Hardware Design Engineer  
Smart Rotamach Pvt. Limited  
June 2023 – March 2025

## PROJECTS INVOLVED

### 30kW Electric Vehicle (EV) Charger

- **Description:** Designed and developed an LLC resonant converter module for a 30kW EV Charger as part of my initial training.
- **System Design:** The charger comprises two key modules:
  - **PFC (Power Factor Correction) Module:** Converts AC power to a DC level of 800V.
  - **LLC Converter Module:** An isolated DC-DC converter featuring a resonant circuit (L-LC), which adjusts the output voltage and current.
- **Functionality:** The LLC converter module provides an adjustable output, allowing for charging of electric vehicle batteries within a range of 200V to 1000V and currents from 30A to 100A.

### Gesture-Controlled Earbud

- **Description:** Development of AFE sensor (MAX86176 and MAX86178) used in Earbuds for EEG signals.
- **Application:** Utilized in wearable devices and health trackers to capture high-precision optical signals for heart rate, SpO<sub>2</sub> (blood oxygen), and PPG (photoplethysmogram) measurements.
- **Functionality:** The sensor detects EEG signals with the help of electrodes placed in the Earbud. It was further used for gesture detection.

### IMU in Earbud

- **Description:** Development of IMU sensor (BHI160B) used in Earbuds for motion tracking.
- **Application:** Utilized in wearables, smartphones, and IoT devices for detecting motion, orientation, and environmental interactions.
- **Functionality:** The sensor detects Earbud movements and tap status.

### BLE Architecture

- Designed and developed BLE packets and transmission mechanisms from Earbud to the application. This implementation aimed to minimize packet loss during data transmission.

### Embedded Machine Learning

- Embedded ML for Gesture Recognition: Trained and deployed ML models for real-time gesture detection on embedded devices.

### Advanced BLE Logger Development:

- **Description:** Development of Advanced BLE Logger involves building a system for BLE data capturing, quality analysis, ML model training, and deployment via OTAP to enhance communication.
- **Application:** Utilized for EEG and IMU data capturing, data analysis, and deployment in the testing and development phases of earbuds.
- **Functionality:** The Advanced BLE Logger enables comprehensive BLE data capturing, quality analysis, and ML model training to enhance performance and diagnostics. It also supports OTAP (Open the Air programming) for seamless deployment, ensuring intelligent and adaptive BLE communication.

### Hearing Aids:

- Hearing aid electronic medical device BTE Model with invisible design, rechargeable battery, Bluetooth, natural sound, automatic noise cancellation, and multiple program settings. Unique self-tuning feature uses BAER test data, uploadable via a mobile app, for personalized hearing loss diagnosis and adjustment.

### Fitting Software for hearing aid programming:

- **Description:** Developing fitting software for hearing aid programming involves building a Python-based application that interfaces with hearing aids using both I2C via Hi-Pro and Noahlink Wireless communication protocols.
- **Noahlink Wireless** is a Bluetooth Low Energy (BLE)-based programming interface for wireless hearing aid fitting. It enables seamless communication between hearing aids and fitting software, eliminating the need for wired connections.
- **Functionality:** This software's functionality encompasses protocol handling, device discovery, data transmission, parameter adjustment, and real-time feedback to ensure precise and efficient programming.

### RESPONSIBILITIES DURING PERIOD

- Understanding product requirement specifications provided by customers and creating documents like SyRS, SDD, Test Plan, and Test Report.
- Organizing and participating in design document reviews, including flowcharts, SDD, RCA, and test result reviews.
- Schematic drafting up to netlisting
- Supporting software testing and capturing ADC data for debugging.
- Conducting unit testing, integration testing, system testing, and customer acceptance testing.
- Proficient in the development and testing of IMU sensors, EEG sensors, BLE transmission, power electronics circuits, and filters such as low-pass, high-pass, notch, and Madgwick filter.
- Involved in testing circuits like ZCD, LLC, PWM switching, ADC, and DAC.
- Responsible for EEG data collection for ML model training.
- Worked with controllers like ESP32, QCC5141, TMS320F280039C and IDEs like Eclipse, Arduino IDE, and CCS IDE.
- Proficient in the development of desktop application in python environment using Qt Designer, PyQT and Tkinter.

### ACHIEVEMENTS

- Received multiple commendations from clients for timely delivery of high-performance in the earbud project, contributing to overall product success.

### EDUCATION

| S.no | Qualification | Name of institution                | University/Board                                | Year of passing | %/CGP A |
|------|---------------|------------------------------------|---|-----------------|---------|
| 1    | B.Tech(ECE)   | Ramachandra college of Engineering | JNTU-Kakinada                                   | 2023            | 7.0     |
| 2    | Intermediate  | NRI junior college                 | Board of Intermediate Education, Andhra pradesh | 2019            | 9.8     |
| 3    | SSC           | ST. Threasa's Girls High School    | State Board of secondary Education              | 2017            | 7.8     |

## PERSONAL DETAILS

- Date of Birth: 02/01/2002
- Nationality: Indian
- Gender: Female
- Marital Status: Unmarried
- Languages Known: English, Telugu
- Nationality: Indian
- Hobbies: Listening Music, Crafts and Arts.

## DECLARATION

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

Place:

*Hari Chandana.P*

Date:

Signature