SHUBHAM MOHAPATRA

Embedded Systems Engineer

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Skilled Embedded Systems Engineer with over 8 years of experience in designing, developing, and debugging Embedded Systems and IoT solutions. Proficient in Embedded C, Assembly, and real-time operating systems like FreeRTOS, with extensive hands-on expertise across microcontrollers (STM32, ESP32, nRF52) and communication protocols (I2C, SPI, UART, BLE).
Passionate about crafting efficient, reliable firmware to power innovative hardware products. Proven ability to deliver production-ready code and prototypes, with a strong foundation in hardware integration and testing.

TECHNICAL SKILLS

- **Programming Languages**: Embedded C/C++, Assembly, Python
- **MCUs/SoCs**: STM32, ESP32, nRF52, ESP8266, Atmega328, ATtiny
- **Firmware Development Platforms**: FreeRTOS, nRF SDK, ESP IDF, Cube IDE(STM32), Arduino IDE, CircuitPython.
- **Communication Protocols**: I2C, SPI, UART, USB, CAN, BLE, MQTT, Modbus, RS-485.
- **Other Tools**: Git, JTAG, Logic Analyser, Oscilloscope,
- **Additional Skills:** Rapid Prototyping, PCB Design, Circuit Design, Component Selection/Procurement, Hardware Testing & Debugging, Technical Documentation

PROFESSIONAL EXPERIENCE

CTO & Embedded Systems Engineer

Hictros Industries PVt. Ltd., Bengaluru, Karnataka *(October 2023 - April 2025)*

- Design & Development of IoT Products
- Led Firmware Architecture Design, Cloud Integration(AWS, Blynk, HiveMQ) and Firmware Programming for custom IoT Controllers in industrial automation.
- Developed FreeRTOS based firmware for ESP32 & STM32 platforms, integrating BLE, WiFi & LoRa-WAN.
- Managed Hardware Design & Development, Circuit Design, PCB Design & Development.

Embedded Systems Engineer

Self Employed, Bengaluru, Karnataka *(July 2021 - September 2023)*

- Design & Development of IoT Products, and other custom Embedded Systems.
- PCB Design, Schematic Design, Prototype Fabrication & Assembly.
- Firmware Development - ESP32(Xtensa Dual-core), STM32(Arm Cortex-M3), Raspberry Pi(Zero W & Pi-4).

Electronics Engineer

IoTReady Technology Solutions Pvt. Ltd, Bengaluru, Karnataka *(January 2020 – June 2021)*

- Lead Hardware Designer and Developer
- Firmware Development & Testing for ESP32 and nRF52 based Systems.
- Digital and Analog Circuit Design.
- Schematic design & PCB layout in KiCAD.
- **Projects: Smart UHF RFID Security System, RFID Solutions for Smart Factories, Smart Weighing Scale, Industrial Current Measurement System, and Instruments for Electrical Cable/Wire Insulations.**

Hardware Design Engineer

Zazu Wildlife Technologies Pvt. Ltd, Bengaluru, Karnataka *(November 2017 – December 2019)*

- Schematic Design & PCB Layout in KiCAD, Digital and Analog Circuit Design.
- Prototype Development, Component Selection, Hardware Testing & Debugging.
- 3D Enclosure Design in FreeCAD & Fusion360.
- **Projects: SenseBe, SensePi, and Arduino & Raspberry Pi based internal projects.**

Trainee (Hardware Design Engineer)

Expert Global Solutions Pvt. Ltd, Aurangabad, Maharashtra *(April 2017 – September 2017)*

- Schematic Design & PCB Layout in Altium Designer.
- Hardware Testing & Debugging, Prototype Development, Component Selection, Inventory Management.
- **Projects: Automatic Welding Machine, Hand Held Remote.**

Trainee Engineer

Automation and Control Systems, Pune, Maharashtra *(August 2016 – March 2017)*

- Technical Documentation.
- PLC and SCADA Programming.

EDUCATIONAL QUALIFICATIONS

B. Tech in Electrical and Electronics Engineering

Graduated in 2016 from Gandhi Institute for Technological Advancement (GITA), Bhubaneswar with a CGPA of 7.99 out of 10.

Higher Secondary Education (Science, CBSE Board)

Passed out in 2012 from Kendriya Vidyalaya, CRPF Campus, Bhubaneswar with 70.60%.

Secondary Education (CBSE Board)

Passed out in 2010 from Kendriya Vidyalaya, CRPF Campus, Bhubaneswar with 81.70%.

PROJECTS

IoT Data-Loggers, Controllers and Gateways

Led the design and development of a scalable IoT system comprising Data-Loggers, Controllers, and Gateways for industrial monitoring and control. Architected hardware and firmware for all three device types, enabling flexible deployment with Wi-Fi, ESP-NOW, 4G, and LoRaWAN connectivity. Devices could either connect directly to AWS IoT Core or sync via mesh networking.

Designed modular FreeRTOS-based firmware in C/C++, including support for MQTT, ESP-NOW, OTA updates, BLE provisioning, and power-efficient sensor polling. Built robust cloud communication pipelines using AWS IoT Core, Lambda functions, DynamoDB, and S3 for real-time monitoring and remote control.

Managed a small hardware team, reviewed schematics/PCB layouts, and handled component selection for reliable field operation. Designed a unified system architecture that supported low-power data logging, remote control of actuators, and seamless integration with industrial equipment.

RFID Based Music Player for Kids

Designed hardware architecture and developed FreeRTOS-based firmware (in C) for an ESP32-based smart music player for kids. The device plays playlists stored on an SD card, triggered by RFID card taps, with audio output via DAC and amplifier. Integrated AWS IoT Core for MQTT-based device communication, AWS Lambda for user data processing and playlist management, and Amazon S3 for secure media storage. Implemented real-time playlist syncing, OTA updates, and download via signed URLs. Designed modular hardware using off-the-shelf components on a custom PCB and added support for physical playback controls.

Smart EV GPS Tracker

Designed hardware and firmware for a GPS tracking system tailored for electric vehicles, compatible with both new and retrofitted models. The system acquired location data via GPS/GNSS modules and transmitted it to Blynk IoT servers over 4G. Integrated 4G module using AT commands for cloud connectivity. Supported both battery-powered and EV-supply-powered configurations. Delivered a compact, production-ready solution for fleet tracking and remote monitoring

Smart EV Control System

Designed hardware and developed firmware for a CAN-based control system used in an agricultural electric vehicle (pesticide/fertilizer spraying machine). The system coordinated multiple subsystems including motor controllers, BMS, battery charger, and a central control unit via the CAN bus. Designed custom hardware for all major EV subsystems. Developed embedded firmware for the Main Control Unit in C. Implemented remote control via high-range RF joystick (drone-style) and a smart remote interface with Web-App-based control for driver usability and diagnostics.

Smart UHF RFID Security System

Designed and developed a prototype security system integrating a UHF RFID reader with a BLE-based facility lockdown mechanism using electromagnetic door locks. Enabled real-time breach alerts with timestamp and damage reports over Wi-Fi to customer servers. Users could monitor and control the system via smartphone using BLE/Wi-Fi. Developed Firmware in C using FreeRTOS. Component selection and hardware procurement. Delivered a fully functional demo prototype for client presentations.

Smart Weighing Scale

Developed a compact, high-accuracy BLE-enabled weighing scale with extended battery life. Designed to transmit measured data to a mobile app in real time. Designed custom PCB hardware and Developed test firmware for validation and calibration.

SenseBe – Active Infrared Beam Sensor

Created a long-range Active Infrared Beam sensor system with STM32-based IR Transmitter and nRF52-based IR Receiver. The receiver was BLE-configurable via mobile app and capable of triggering DSLR cameras for wildlife photography and virtual fencing applications. Contributed in complete hardware development: circuit, schematic, PCB design. Component selection, procurement, and hardware debugging. Designed, fabricated and assembled 3D-printed enclosures for field testing.

SensePi – PIR Motion Sensor

Engineered a BLE configurable PIR motion sensor using nRF52, capable of triggering DSLR cameras with configurable features such as sensitivity (2–25 meters), angle modes, timer, and day/night operation. Designed for wildlife photography, surveillance, and farm security. Designed low-power circuit and PCB (battery backup: 1+ year on 2xAA batteries). Developed complete hardware stack including component selection, assembly, and enclosure design. Supported feature testing and optimization for power efficiency and field reliability.

DECLARATION

I hereby declare that the above information is true and correct to the best of my knowledge.

Place : Bengaluru, Karnataka
Date : **Shubham Mohapatra**