SHUBHAM MOHAPATRA

Embedded Systems Engineer

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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 (like STM32, ESP32, nRF52) and communication protocols. Proven ability to deliver production-ready code and prototypes, with a strong foundation in hardware integration and testing. Passionate about crafting efficient, reliable firmware to power innovative hardware products.

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.

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.

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.

EDUCATION
B. Tech in **Electrical and Electronics Engineering** *- 2012 - 2016*
Gandhi Institute for Technological Advancement (GITA), Bhubaneswar

Higher Secondary Education - **Science**   *- 2011-2012*
Kendriya Vidyalaya, CRPF Campus, Bhubaneswar

SELECTED 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.

RFID Based Music Player for Kids
Designed HW architecture and FreeRTOS-based C firmware for an ESP32 RFID music player with SD card, DAC+Audio Amp output, and physical controls. Integrated AWS IoT Core(MQTT), Lambda, and S3 for data sync, usage tracking, OTA updates, and secure media downloads.

Smart EV GPS Tracker
Designed hardware and firmware for a GPS tracking system tailored for electric vehicles, compatible with both new and retrofitted models.

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.

Smart UHF RFID Security System
Designed and developed a FreeRTOS-based UHF RFID security system with BLE-controlled EM locks and Wi-Fi breach alerts. Built firmware in C, managed component selection, and delivered a functional prototype with smartphone control and real-time reporting.

Smart Weighing Scale
Designed & developed a compact, high-accuracy BLE-enabled weighing scale with extended battery life. Developed test firmware for validation and calibration.

SenseBe – Active Infrared Beam Sensor
Developed a long-range Active IR Beam sensor with STM32-based transmitter and BLE-configurable nRF52 receiver for DSLR triggering and virtual fencing. Handled complete HW design, component selection, debugging, and 3D-printed enclosure fabrication for field deployment.

SensePi – PIR Motion Sensor
Engineered a BLE-configurable PIR sensor using nRF52 to trigger DSLR cameras with adjustable range, modes, and timers for wildlife and farm security. Designed low-power HW for 1+ year battery life, handled full HW stack, enclosure design, and field testing.