

Gaurav Papnoie

Embedded Systems Engineer

"Innovating embedded solutions that bridge hardware and software, now stepping into Linux-powered systems."

Contact:

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LinkedIn: linkedin.com/in/gaurav-papnoie-722772195 | GitHub: Using it, but no public projects to showcase.

Profile Summary

Embedded Systems Engineer with 5+ years of experience in **real-time firmware development** and **multitasking architectures** on 8-bit to 32-bit MCUs (ARM Cortex-M, AVR, STM, ESP, PIC). Expertise in **FreeRTOS (CMSIS V2)**, **UART**, **USB**, **BLE**, **RS232/485**, **TCP/IP**, and **flash memory interfaces**. Strong background in **RFID protocols (ISO 16000-6C, ISO 16000-6D)** and **hardware-software co-design** using **Proteus** and **Altium Designer**. Skilled in **OTA firmware updates**, **system debugging**, and **performance optimization** for industrial-grade embedded products.

Currently expanding into **Linux-based embedded development** for **next-generation IoT and connected systems**.

Core Skills

- Programming & RTOS:** Embedded C, C, Python, FreeRTOS (CMSIS V2), Super-loop Architecture
- Microcontrollers:** ARM Cortex-M (STM32F1/F4/W0/C6), AVR, ESP, PIC, Attiny | Microprocessors: Raspberry Pi 4
- Interfaces & Protocols:** UART, SPI, I2C, USB Host/OTG, RS232/485, Wiegand, TCP/IP, BLE, RFID (ISO-6C/6D)
- Hardware Co-Design:** Logic design, sensor integration (Temp, Humidity, IR, Ultrasonic, Analog sound sensor), multiplexing
- Tools & IDEs:** STM32CubeIDE, Debug Terminals, Keil uVision, Arduino IDE, Proteus, Altium, KiCAD, GitHub
- Soft Skills:** Team leadership, mentoring, client support, product execution, documentation

Professional Experience

SpanIdea Systems Pvt. Ltd. – *Sen. Embedded Engineer*

Aug 2025 – Present(6months)

Client Location- AMD, Hyderabad

- Worked on **Linux-based Virtual Desktop Infrastructure (VDI)** environment for development and testing workflows
- Managed source code using **Git Enterprise**, including branching, merging, and version control for collaborative development
- Performed functional and integration testing on **C-based models**, identifying defects and ensuring system reliability
- Analysed and modified existing C codebases **to fix bugs, improve performance, and enhance maintainability**
- Collaborated with cross-functional teams to debug issues across software layers (application ↔ system level)
- Contributed **to code optimization and refactoring, improving execution efficiency and code quality.**

ID Tech Solutions Pvt. Ltd. – *Embedded Engineer*

Aug 2023 – Aug 2025 (2 years)

- Developed **industrial RFID and BLE-enabled embedded systems** for access control, railway, and logistics applications using **FreeRTOS (CMSIS V2)** on 32-bit MCUs.
- Implemented **multi-interface communication stacks** (LAN, RS232/485, UART, Wiegand) to support real-time data transfer across enterprise and field environments.
- Designed **modular task scheduling frameworks** and implemented **OTA firmware updates** with robust **error handling** and inter-task communication.
- Co-designed **custom hardware** and validated circuits for low-power, continuous-operation embedded devices in industrial conditions.

- Engineered **sensor-based vehicle positioning systems** integrating **ultrasonic/IR sensors** with **LAN/Wi-Fi local web server hosting** for weighbridge and automation solutions.
- Supervised **documentation, testing, and production handover**; mentored junior engineers and initiated structured **knowledge transfer** for long-term support and maintainability.

ITG Telematics Pvt. Ltd. – *R&D Engineer*

Jan 2021 – Aug 2023 (2 years 8 months)

- Developed low-level USB host drivers on 32-bit microcontrollers for **direct smartphone-to-MCU communication**, including **USB stack implementation, endpoint handling, and enumeration management** using Embedded C.
- Engineered secure electronic lock systems on 8-bit MCUs for **transit goods protection**, including **firmware framework design, safety mechanisms, and PCB development** using Proteus and Altium.
- Designed multi-sensor wireless monitoring systems (temperature, humidity, gate sensors) for **real-time data acquisition and remote server integration** using modular firmware and API communication.
- Reverse-engineered and redesigned legacy embedded products to improve performance, multiplexing logic, and reliability; executed full revalidation with **manual testing and hardware redesign**.
- Implemented RFID-based user counting systems with **repetition blocking**, optimizing accuracy through custom logic design and embedded C development.
- Managed **end-to-end product lifecycle** including **logic design, circuit simulation, PCB layout, testing, and deployment support** for industrial embedded solutions.

CGC Jhanjeri (Innovation Cell) – *Mentor*

Jan 2020 – Jun 2020 (6 months)

- Mentored students on **robotics, electric mobility, and IoT-based prototypes**, guiding them from **concept to functional prototypes**.
- Oversaw the development of **foldable high-torque electric bicycles** (350 kg torque, 40 km/h speed, 1-hour backup) optimized for portability and off-road applications.
- Supported creation of **self-balancing electric bikes** with **voice control and gyroscopic stabilization**, integrating **motion sensors** for autonomous navigation research.
- Led **IoT-driven hygiene management systems** for public infrastructure, enabling real-time monitoring and automated maintenance.
- Guided design of **wirelessly controlled robotic caterpillar tanks** for rugged terrain adaptability, suitable for **defense and industrial automation applications**.
- Prepared teams for **national innovation competitions**, focusing on **design, documentation, and execution strategies**.

Key Projects

- **Industrial RFID Reader (32-bit MCU, FreeRTOS)** – Multi-interface (LAN, RS232/485, Wiegand) real-time RFID system with OTA updates and modular task scheduling.
- **USB Host Driver (32-bit MCU)** – Low-level USB stack implementation enabling smartphone-to-MCU communication for data transfer and control.
- **Secure Electronic Lock (8-bit MCU)** – Remote unlocking system with custom firmware, hardware co-design, and safety mechanisms for transit security.
- **Wireless Multi-Sensor Monitoring (8-bit MCU)** – Temperature, humidity, and gate sensors integrated with server API for real-time environmental data.
- **Vehicle Positioning System (32-bit MCU, FreeRTOS)** – Sensor-driven weighbridge automation with LAN/Wi-Fi communication and audio guidance.
- **Electric Mobility Prototypes** – Foldable off-road e-bike (350 kg torque) and self-balancing voice-controlled e-bike with gyroscopic stabilization.

- **IoT Hygiene Management System** – Automated odor control for public infrastructure with real-time monitoring and scalable IoT integration.
 - **Robotic Caterpillar Tank (Wireless)** – Rugged terrain robotic platform for defense and industrial automation research.
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Education

- **MBA (Pursuing)** – Delhi University (School of Open Learning)/ (2026)
 - **B. Tech (ECE)** – IKGPTU/ (2020) – 7.32 CGPA
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Languages

Hindi, English, Punjabi, Pahadi (Kumauni)

Motto

"Engineering efficient systems today, shaping future technologies tomorrow."