

Akhil Gupta

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SUMMARY

Embedded Systems Engineer skilled in ESP32 firmware development, real-time sensor interfacing, and communication protocols, with a focus on building reliable, low-power embedded solutions.

WORK EXPERIENCE

Embedded System Engineer-Avquint Innovation Technology Pvt. Ltd., Pune Feb 2025 – present

- Developed **ESP32/ESP32-S3 firmware** for wearable systems with IMU (I2C) integration, real-time data processing, and **interrupt-driven architecture (GPIO, timers)**.
- Implemented **Wi-Fi connectivity, low-power optimization**, and performed **hardware-software integration** including debugging, validation, and modular firmware design.

Electrical Engineering Intern-Northern Eastern Railway, Gorakhpur, UP Jun 2022 – Aug 2022

- Performed inspection, troubleshooting, and maintenance of railway electrical systems, including fault diagnosis, circuit support, preventive maintenance, and documentation while ensuring safety and reliability.

PROJECTS

1)- Memorable Pendant + Android App (ESP32 + Edge AI System): Jan 2026-Present

- Developed an **ESP32-S3 wearable system** with real-time firmware (state-machine) for multimodal data capture (image, audio, QR) using TFT, I2C touch, RTC, and SD storage.
- Implemented **Wi-Fi (HTTP) and BLE (GATT)** with Android app integration, and built an **IoT + Edge AI pipeline** for audio processing and LLM-based memory retrieval.

2)-Pupil Tracking System: Jan 2026- Present

- Developed a **real-time pupil tracking system** using a custom-trained **YOLO11 model (~99% mAP50)** with optimized dataset design and preprocessing.
- Built a **gaze-controlled system** with dual-camera tracking, calibration (ArUco, RBF), and integrated **SAM-based detection, Gemini API (TTS)**, and real-time smoothing/mapping.

3)- IMU-based mouse controller Feb 2026-Present

- Developed an **ESP32-based motion-controlled mouse** using MPU6050 IMU, implementing **Madgwick sensor fusion** for accurate roll, pitch, and yaw estimation with real-time data acquisition (~50 Hz) and serial communication.
- Built a **Python (PyAutoGUI) interface** for cursor control, integrating **calibration, drift correction, dual-layer smoothing**, and angle-to-screen mapping (360° wraparound) with robust communication and **low-latency performance (~40–60 ms)**.

4)- Address Book Management System: Oct 2024

- Developed a **menu-driven Address Book application in C** using structures and arrays, implementing full CRUD operations (Create, Search, Edit, Delete, List) with **data validation** to prevent duplicate entries.
- Designed a **modular, CLI-based system** with custom data structures, efficient search/update logic (linear search, indexing), and scalable architecture supporting **future file handling and persistent storage**.

TECHNICAL SKILLS

- Embedded & Firmware:** ESP32/Arduino, I2C, SPI, UART, real-time systems, state machines, driver development, sensor interfacing
- Programming & Tools:** C, Embedded C, Python, Wi-Fi/BLE/HTTP, ESP8266, sensor fusion, basic CV, PlatformIO, Arduino IDE, PySerial

EDUCATION

B.Tech (Electrical Engineering), MMMUT Gorakhpur (2019–2023, CGPA: 8.35) | Class XII (85.6%) | Class X (CGPA: 10)

CERTIFICATION

NPTEL – Linear Dynamical Systems | NPTEL – Electrical Distribution System Analysis | AutoCAD Certification (Autodesk)