Rupankar Dutta

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Summary

- B.Tech student at KIIT University specializing in Embedded Systems, Internet of Things (IoT), and Edge Artificial Intelligence (Edge AI), with hands-on experience designing decentralized real-time systems on ESP32. Experienced in sensor-integrated firmware development, low-latency wireless communication, and deploying lightweight machine learning models for on-device inference. Also proficient in full-stack software development combining hardware, backend systems, and data-driven logic.

Education

Kalinga Institute of Industrial Technology (KIIT), Bhubaneswar, India — 2023 – 2027
Bachelor of Technology (B.Tech) — CGPA: 8.4 / 10.0

Experience

Research Intern – IIT Bhubaneswar — Dec 2025 – Feb 2026
School of Mechanical Sciences – Embedded Systems & PCB Design (Hybrid)

- Designed and validated a multi-sensor UAV flight controller integrating IMU, GPS, barometer, and motor-control interfaces for autonomous flight, as part of a 4-member research team under faculty supervision over a 12-week internship.
- Engineered a multi-layer PCB layout for the flight controller and completed board bring-up testing across 80 test cycles to validate signal integrity and hardware reliability.
- Integrated multiple onboard sensors and embedded hardware interfaces for real-time motor control, applying hardware-software co-design across the embedded stack.

Technical Skills

- **Languages:** Python, C, C++, JavaScript, SQL
- **Embedded Systems / IoT:** ESP32-WROOM-32, ESP32-CAM, ESP-NOW, MPU-6050, I2C, Sensor Integration, Embedded Firmware, IMU, GPS, Multi-Layer PCB Design, EasyEDA
- **Machine Learning / Edge AI:** TensorFlow, TensorFlow Lite, TFLite Micro, Edge Impulse, Model Quantization, MobileNetV2, LSTM Autoencoders, Facial Recognition, TinyML
- **Backend Development:** FastAPI, Flask, Node.js, Express.js, REST APIs, JWT Authentication, Socket.IO
- **Web / Databases:** React, MySQL, PostgreSQL, Redis
- **Tools & Platforms:** Arduino IDE, PlatformIO, Git, Docker, VS Code

Projects

- **Intelligent Decentralized Home Automation System** — ESP32, Edge AI — GitHub
  Architected a fully decentralized smart home system using 4 ESP32 nodes communicating via ESP-NOW, enabling real-time sensing and offline automation with 2ms average response latency and zero cloud dependency. Deployed embedded firmware for DHT11, MQ-135, PIR, and sound sensors with noise filtering and threshold-based alert logic, reducing false alerts by 73%. Built a MobileNetV2-based TinyML facial recognition model achieving 92% accuracy for secure on-device access control on ESP32-CAM.
- **Edge AI Anomaly Detection System** — ESP32, TinyML — GitHub
  Built a real-time vibration anomaly detection system running entirely on an ESP32 with an MPU-6050 sensor, processing 8 sensor readings per second. Trained an LSTM autoencoder in TensorFlow and quantized it to int8 for TFLite Micro, cutting model size by 80% while maintaining 95% detection accuracy, and added a fault-type classifier. Created a Flask + JavaScript dashboard with live reconstruction-error charts, adaptive EWMA thresholding, and CSV-exportable anomaly event logs.
- **Fork & Clone – One-Click GitHub Fork + Local Clone** — Chrome Extension, PowerShell — GitHub
  Built a Chrome Manifest V3 extension paired with a Windows native-messaging companion in PowerShell that forks any GitHub repository and git-clones it locally in a single click. Implemented GitHub API orchestration with asynchronous fork-readiness polling and a strictly validated native host: pinned extension origin, GitHub-only clone URLs, path-traversal blocking, and argument-array git invocation immune to shell injection.
- **TheRUPOgate – Microservices API Gateway** — Node.js — GitHub
  Engineered a production-style API gateway handling JWT authentication with role-based header injection, Redis sliding-window rate limiting (100 req/min, HTTP 429 on breach), and path-prefix proxy routing across backend microservices. Added structured JSON logging and a live monitoring dashboard streaming request metrics over Server-Sent Events.
- **CookMind AI – AI-Powered Recipe Recommendation Platform** — GitHub
  Developed a full-stack AI application using React, FastAPI, PostgreSQL, and the OpenAI API delivering personalized recipe recommendations, conversational cooking assistance, and image-based ingredient recognition via Google Vision. Built a modular REST backend with JWT authentication, pantry persistence, and chat memory; containerized with Docker and CI, reducing deployment time by 62%.
- **Real-Time Multiplayer Quiz Platform** — React, Node.js, Socket.IO
  Designed and built a full-stack multiplayer quiz application supporting 8 concurrent players across private room-based sessions, with timed rounds, live score tracking, and leaderboard generation over low-latency state synchronization.