

SUBHAM KUMAR

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 Subham400 —  Subham Kumar — [Portfolio](#)

EDUCATION

Institute of Engineering and Management, Kolkata <i>B.Tech in Electrical and Electronics Engineering; SGPA (Up to 7th Sem): 7.43 / 10.0</i>	2026 <i>Salt Lake Sector-V</i>
Agrasain Boys' School <i>Higher Secondary (Class 12), Percentage: 88%</i>	2020 <i>Liluah, Howrah</i>
Agrasain Boys' School <i>Secondary (Class 10), Percentage: 91.6%</i>	2018 <i>Liluah, Howrah</i>

EXPERIENCE

- Internship at School Of Mechatronics & Robotics, IEST, Shibpur** *June-September, 2025*
- Worked on the project “**Flight Odometry Data Smoothing using Kalman Filter**”, involving hands-on drone calibration and flight operations.
 - Implemented and tested Kalman filtering algorithms on real-time flight data to improve odometry accuracy and data stability.
 - Gained practical experience in sensor data processing, estimation techniques, and autonomous system workflows, completing all assigned tasks with diligence and strong performance.
- Internship at ElectroMeter Corporation (EMC)** *January-February, 2025*
- Spearheaded an end-to-end project, developing both the hardware and software independently.
 - Designed custom PCB boards for IoT applications.
 - Developed a full-stack website(frontend and backend) for project deployment and Integrated IoT devices.

PROJECTS

Local Retrieval-Augmented Generation (RAG) System | *Python · PyTorch · Transformers*

Personal Project · 2026 · [local-rag](#)

- Built an end-to-end RAG pipeline from scratch — PDF ingestion, sentence-level chunking with spaCy, embedding generation using all-mpnet-base-v2, and dot-product semantic retrieval
- Ran inference locally using Google Gemma 2B-It in 4-bit NF4 quantization (BitsAndBytes), eliminating API costs and keeping all data on-device
- Engineered prompts with chain-of-thought context injection; the system retrieves top-k chunks, formats them as grounded context, and generates cited answers
- Identified and documented improvement path: swapping CSV embedding store → ChromaDB, adding BM25 hybrid retrieval, and a cross-encoder reranker for precision

AI Voice Keyboard — Android IME | *Python · Kotlin · FastAPI · CUDA*

Personal Project · 2026 · [whisper-voice-keyboard](#)

- Built a speech-to-text Android keyboard integrating OpenAI Whisper (faster-whisper, large-v3-turbo) and Google Gemma 4 E2B for intelligent transcript cleanup
- Designed a client-server architecture with a FastAPI inference server (CUDA-accelerated) and a native Android IME (Kotlin + OkHttp) communicating over local WiFi
- Implemented voice activity detection via Silero VAD for automatic recording termination
- Models run in quantized GGUF format via llama.cpp for efficient GPU inference on consumer hardware
- Stack: Python, Kotlin, FastAPI, faster-whisper, llama-cpp-python, Silero VAD, Android IME API, OkHttp

Custom Flight-Controller–Based Quadcopter (ESP32 & STM32 | **Embedded Systems & Robotics**)

Internship Project · 2025-2026

- Designing and developing a **custom quadcopter platform with an in-house flight controller** built around ESP32 and STM32 microcontrollers, handling sensor interfacing, real-time control, and onboard computation.
- Implementing advanced **state-estimation algorithms** using IMU and auxiliary sensor data to enable reliable navigation in **GPS-denied environments**, with a focus on robustness and accuracy.
- Integrating magnetic sensors and data-logging pipelines to support **aerial magnetic mapping**, enabling spatial analysis and post-processing for geophysical and navigation applications.

Full-Stack Course Selling Website | [Live](#) · Full-Stack Web Development

Client Project · 2025

- Designed and developed a **fully functional, production-ready website** for an individual to sell and manage online courses, handling both frontend and backend development end-to-end.
- Implemented course listings, and secure checkout functionality, and **integrated Razorpay payment gateway** to enable seamless online transactions.
- Deployed the website to a live environment, ensuring responsive design, secure data handling, and smooth user experience across devices.

Hand Gesture–Based Virtual Mouse | Python · OpenCV · MediaPipe

Personal Project · 2025

- Developed a real-time, camera-based virtual mouse system using Python that tracks hand movements through the laptop's webcam.
- Implemented MediaPipe hand landmark detection and OpenCV to translate specific hand gestures into mouse actions such as cursor movement, clicking, and scrolling.

Hand Gesture Based Door Lock | MediaPipe · Arduino

Personal Project · 2025

- Engineered a secure, keyless entry system by integrating Mediapipe's hand-tracking technology with an Arduino-controlled locking mechanism.
- Built a robust computer vision pipeline with OpenCV to recognize specific, pre-defined hand gestures for user authentication.

TECHNICAL SKILLS

AI / ML:

RAG, LLM, inference, model, quantization, semantic search, prompt engineering, embeddings, backpropagation, neural networks, transformer architecture, chain rule/autograd

Languages:

Python, Kotlin, Java (Basics), HTML, CSS, JavaScript, SQL, PHP

Libraries/Frameworks:

PyTorch, HuggingFace Transformers, sentence-transformers, BitsAndBytes, spaCy, PyMuPDF, OpenCV, TensorFlow, Keras, MediaPipe, React, Next.js, FastAPI

Tools/Platforms:

Git, GitHub, VS Code, CUDA, llama.cpp, faster-whisper, Android Studio, MATLAB-Simulink, Tinkercad, EasyEDA

Concepts:

forward pass, gradient descent, MLP, transformer architecture, on-device AI deployment, REST API design, LLM inference, optimization (GGUF, quantization, CUDA)

Domains:

AI/ML, Computer Vision, IoT, Web Development, PCB Design, Embedded Systems, Android Development

CERTIFICATIONS

Machine Learning Foundations: Probability : [Check Credential](#)

Introduction to Data Analytics : [Check Credential](#)

Excel Basics for Data Analysis : [Check Credential](#)

Data Visualization and Dashboards with Excel and Cognos : [Check Credential](#)

Introduction to Databases with SQL : [Check Credential](#)

Java: Algorithms : [Check Credential](#)

Cyber Security Fundamentals : [Check Credential](#)

Ethical Hacking with Kali Linux : [Check Credential](#)