

# Sandeep Kadam

Embedded AI and Intelligent Systems Engineer

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## Profile

Embedded AI and intelligent systems engineer with experience building production and pilot systems across IoT, computer vision, edge AI, firmware, full stack applications, and applied LLM workflows. Delivered centralized intrusion detection infrastructure across 600+ branches, built Raspberry Pi based face attendance systems with liveness and HRMS integration, and developed AI driven automation products spanning FastAPI, LangChain, OpenAI APIs, and real time device to dashboard pipelines. Combines hardware, backend, and applied AI skills to ship practical systems from prototype to deployment.

## Professional Experience

### Project Engineer

Ernakulam, India

MITS-CIDRIE Foundation, Muthoot Institute of Technology & Science

08/2023 - Present

- Own end to end product delivery for a live security platform across 600+ branches of a publicly listed NBFC, promoted from Intern to Project Engineer through four product iterations.
- Make architecture and technology decisions across embedded firmware, custom hardware design, cloud infrastructure, and field deployment, with direct accountability for uptime and reliability.
- Define security and operational requirements for IoT control panels in a regulated financial environment, coordinating between hardware, software, and deployment teams.
- Scoped and led two AI driven workflow automation projects from problem definition through to pilot delivery, covering intelligent analytics and process optimisation.
- Tech Stack: Embedded C/C++, Python, AWS, TensorFlow, OpenCV, MQTT, REST APIs, Git, Docker.

### National CoE Consultant – Cybersecurity Startups

Remote

Data Security Council of India (DSCI)

10/2022 - 04/2023

- Provided mentorship to early stage cybersecurity startups on product strategy, go-to-market planning, and security infrastructure aligned with national initiatives.
- Facilitated connections between startups and investors, industry mentors, and potential enterprise clients to accelerate ecosystem growth.
- Contributed to the National Centre of Excellence program, supporting next-generation cybersecurity solution development within India's startup landscape.

### Software Developer

Kerala, India

StudioBot LLP

11/2019 - 08/2022

- Delivered 3 large scale and 10+ smaller full stack web applications for SME and enterprise clients across retail, logistics, and services sectors using React.js, Node.js, PHP, and MySQL.
- Led a team of 5 developers, coordinating task allocation, code reviews, and delivery timelines across concurrent client projects.
- Took ownership of complete project cycles from requirements through deployment, maintaining direct client communication and managing delivery independently.
- Integrated third party payment gateways, REST APIs, and WebSocket based real time features across multiple production applications.
- Managed cloud deployments and CI/CD pipelines, ensuring consistent release quality and minimal downtime for live client systems.

### Junior Embedded Systems Engineer

Bengaluru, India

Xrevel Technologies

05/2018 - 02/2019

- Developed an IoT enabled anti theft tracking system integrated into a custom built briefcase using GPS, GSM, and microcontroller based hardware.
- Designed and tested embedded firmware in C/C++ for Arduino and ESP based devices.
- Collaborated on PCB prototyping, sensor integration, hardware validation, and field testing to improve real world reliability.

### Android Application Developer, Contract

Cheshire, England

Cronovo Inc.

02/2017 - 07/2017

- Developed, debugged, and optimized the Android application for the Cronovo Smartwatch, with focus on Bluetooth connectivity, notification synchronization, and battery optimization.
- Worked on wearable application UI/UX and Android system integration for custom hardware environments.

## Android Application Developer

**Cherthala, Kerala, India**

*Inoltro Technologies*

*03/2016 - 02/2017*

- Built an end to end e commerce Android application for Kottonkappy Clothing with secure checkout, product catalog browsing, and real time inventory updates.
- Integrated payment gateways, push notifications, and location based services to improve user engagement and transaction flow.

## Selected Projects

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### Centralized Intrusion Detection and Security Management System

**MITS-CIDRIE Foundation**

*Production IoT*

*2023 - Present*

- Built a dual-ESP32 security platform with FreeRTOS multitasking (50 Hz zone scanner, UART, and comms tasks pinned across cores) to keep sensor response deterministic independent of network and I2C activity.
- Implemented 8-zone intrusion logic with day/night modes, per-zone bypass, staged buzzer-then-hooter escalation, dual-transport networking (W5500 Ethernet over WiFi fallback), offline JSON queuing, and MQTT publishing to AWS.
- Added OTA firmware updates via GitHub with semantic version checking, NVS-backed persistent state across reboots, DS3231 RTC with NTP sync, and a hardware watchdog for 24/7 uptime.

### NL2SQL Agent

**Personal Project**

*Applied LLM*

*2025*

- Built an NL2SQL system using LangChain, OpenAI, MySQL, FastAPI, and FAISS for natural language querying over structured databases.
- Implemented semantic example retrieval, relevant table selection, conversational memory, and prompt pipelines to improve SQL generation accuracy and answer quality.
- Structured the application with API layers, modular services, configuration management, and production oriented backend design.

### Face Attendance and Liveness System

**MITS-CIDRIE Foundation**

*Edge AI*

*2025 - Present*

- Built an offline first attendance platform on Raspberry Pi with face recognition, liveness detection, local enrollment, and HRMS integration support.
- Designed the system with local FastAPI services, modular inference backends, local database storage, and deployment oriented packaging for field environments.
- Extended the platform for secure attendance capture and branch level deployment workflows with edge processing and optional synchronization.

### ESP32-S3 Drowsiness Detection

**Embedded AI Project**

*Embedded AI*

*2025*

- Developed an ESP32-S3 based TinyML drowsiness detection prototype for on device inference in resource constrained environments.
- Worked on embedded sensing, real time signal handling, and efficient inference logic suitable for edge deployment scenarios.
- Demonstrated practical edge AI capability by moving inference closer to the device instead of relying on cloud only pipelines.

### IELTS AI Mock Test Platform

**TechEmbers**

*EdTech*

*2024 - 2025*

- Built an AI assisted IELTS preparation platform with mock test workflows, evaluation features, and product oriented backend and frontend components.
- Worked on speaking and writing automation, structured test generation, and user journey design for an applied education technology use case.
- Combined product ownership with full stack implementation across APIs, interfaces, and iterative feature delivery.

## Publications and Intellectual Property

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### Book Chapter

- Kadam, S., et al. *Blockchain Integration with Low-Power IoT Devices*. In *Handbook of Research on Blockchain Technology*, Academic Press, 2020.  
<https://doi.org/10.1016/B978-0-12-819816-2.00008-3>

### Conference Papers (6 IEEE publications)

- High Torque Capability Non-Permanent Magnet Hybrid Excited Switched Reluctance Motor for Electric Vehicle

Application. *IEEE ECCE*, 2023.

- Visual-based Malware Clustering Using Convolution Neural Network. *IEEE ICITIIT*, 2023.
- Ethereum-based IoT Architecture. *ICCNCT*, 2019.
- 3 additional IEEE publications on hybrid topologies for EV motor drives.

## Intellectual Property

- **Trademark registered:** TechEmbers.
- **Copyright application submitted:** Integrated Embedded Software System for Intrusion Detection and Security Management Using ESP32.

## Entrepreneurial and Advisory Roles

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### Managing Partner & Product Lead

**Kerala, India**

*TechEmbers Enterprises*

*08/2024 - Present*

- Leading development of an AI-powered IELTS mock test platform with adaptive question generation and automated speaking and writing evaluation using NLP techniques.
- Built and launched MVP web application currently in closed beta with 10+ real IELTS candidates, overseeing product roadmap, UI/UX, and AI integration.
- Managing full product lifecycle across Python, Django, React, OpenAI APIs, and cloud deployment.

### Startup Mentor & Technical Consultant

**Kerala, India**

*Thrinnova Engineering Pvt. Ltd.*

*11/2024 - Present*

- Advising an early stage EV motor R&D startup on IoT, control systems, and real time system integration for motor testing environments.
- Supporting hardware-software interfacing, embedded systems architecture, and sensor data workflows for prototyping and validation pipelines.

## Education

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### M.Tech in VLSI & Embedded Systems

**Saintgits College of Engineering, Kerala, India**

*APJ Abdul Kalam Technological University*

*08/2017 - 06/2019*

- Thesis: Blockchain integration with low power IoT devices
- CGPA: 8.25/10

### B.Tech in Electronics & Communication Engineering

**Saintgits College of Engineering, Kerala, India**

*Mahatma Gandhi University*

*08/2011 - 06/2015*

- CGPA: 6.63/10

## Technical Skills

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- **Languages:** Python, C, C++, JavaScript, TypeScript, SQL
- **Embedded and Edge:** ESP32, STM32, Raspberry Pi, Jetson Nano, FreeRTOS, I2C, SPI, CAN, UART, MQTT, Bluetooth, Ethernet, KiCad
- **AI and ML:** TensorFlow, OpenCV, YOLO, LangChain, OpenAI APIs, Gemini APIs, Vertex AI, Hugging Face, Face Recognition, TinyML
- **Backend and Data:** FastAPI, Django, Node.js, REST APIs, WebSockets, PostgreSQL, MongoDB
- **Cloud and DevOps:** AWS, GCP, Docker, Git, CI/CD

## Professional Engagements

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Invited speaker, judge, and workshop facilitator across 4 engineering colleges from 2023 to present, including 4 hackathons, 2 startup pitching competitions, and multiple technical seminars.

### Judging and Evaluation

- Evaluation Committee Member, Generative AI Hackathon, ICRC MITS in collaboration with INP Toulouse, 2026
- Judge, IEDC Ernakulam Cluster Hackathon AgriNext, MITS, 2026
- Panel Judge, IEEE WIE Lumira Hackathon, IEEE WIE AG MITS, 2025
- Evaluation Committee Member, Texcell 2025, IEDC MITS
- Evaluation Committee Member, SHRISTI 2025, Saintgits College of Engineering
- Panel Member, LaunchPad Pitching Competition, Sreshta 25, MITS

### **Talks and Resource Sessions**

- Resource Person, RUBY Cohort 2026 – science, technology, engineering, and research for real world solutions
- Resource Person, Introduction to Swarm Robotics, AKRASC 2025, IEEE RAS Kerala Chapter
- Resource Person, IEEE Sponsored Workshop on Blockchain and Cryptocurrency, KMEA Engineering College

### **Workshops and Training**

- Workshop Facilitator, Startup Zero to 1 – startup development, pitching, and product lifecycle, Saintgits College of Engineering
- Trainer, ROS and SkyCraft Drone Workshop

## **Mentorship and Leadership**

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- Technical Mentor for BTech and MCA student projects in embedded systems, IoT, software development, and innovation.
- Startup Mentor for Cervezey Innovations, a social-impact platform improving job access for migrant blue-collar workers, providing guidance on technology selection, MVP definition, and mobile-first deployment strategy.
- Startup Mentor for SkillFi, providing technical and product guidance at early stage.

## **Awards and Honors**

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- 1st Prize, Big Idea Competition, IETE Students Forum, 2018
- Appreciation Award, IEEE Student Branch, for serving as SSCS Chairperson, 2017 to 2019
- Recognition of Service, Chairman, IEEE Student Chapter, 2014 to 2015
- Honored as Treasurer, IETE ISF, 2014 to 2015
- Recognized for leadership contributions across technical and non technical events, 2011 to 2015