

SOUMYAJIT GHOSH

Emerging Software Development Engineer | Distributed Systems | AI/ML

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Experience

AI/ML Engineer | *Dhamm AI (Startup), Remote*

May 2025 – Jul 2025

- Designed and deployed scalable, fault-tolerant AI pipelines on AWS (EC2, S3, Lambda, SageMaker), processing **100,000+ data points daily** for 15+ educational and healthcare institutions.
- Implemented multi-tiered distributed software architecture in Python and TensorFlow, achieving **25% faster inference** and **40% cloud cost reduction** through model optimization and batching strategies.
- Led cross-functional agile teams of 5+ engineers delivering computer vision and NLP solutions end-to-end, managing ambiguous requirements in fast-paced weekly sprint cycles.
- Established CI/CD pipelines (Jenkins, Docker) with automated testing and observability (Prometheus, Grafana), ensuring high availability across all production deployments.

Projects

SynthDoc – Multi-Modal Forensic AI for PAN Card Fraud Detection *Python, CNN-ViT, ResNet-18, 2025*
XGBoost, LightGBM, FastAPI, SHAP

- Architected a tri-domain forensic AI system decomposing fraud detection into **Spatial** (hybrid CNN-ViT with cross-attention), **Frequency** (ResNet-18 on FFT/DCT spectral representations), and **Semantic** (ensemble OCR + cryptographic checksum validation) pipelines.
- Fused domain-specific latent representations via a calibrated meta-classifier ensemble (XGBoost + LightGBM + Isotonic Regression), achieving **100% accuracy, precision, and recall** on a held-out set of 232 PAN card specimens (218 genuine, 14 synthetically forged).
- Deployed as a production inference pipeline: FastAPI backend with real-time **Error Level Analysis (ELA) heatmaps** and **SHAP** model interpretability for rigorous forensic auditability.

CodexMap – LLM Context Drift Detection & Self-Healing System *Node.js, Python, OpenAI Embeddings, 2025*
Cytoscape.js, WebSocket, AST

- Architected a **4-agent orchestration system** (Generator, Cartographer, Broadcaster, Sentinel) that makes LLM context drift visible and recoverable in real time; model-agnostic design runs identically on OpenAI Codex, Amazon Nova, Mistral, and LLaMA backends.
- Sentinel agent scores each AST-parsed code node (file → function → block, via `@babel/parser` + `tree-sitter`) by **cosine similarity** against the cached prompt embedding (*text-embedding-3-small*); SHA-256 content hashing skips re-embedding unchanged nodes, cutting API cost by over 60%.
- Tracks a **session-level Drift Score** (0–100) as a live time-series; triggers an **Architectural Collapse Warning** when red-node density >40%, edge-growth rate >3×, or cyclomatic complexity >2× baseline are simultaneously breached.
- Closed-loop **self-healing**: drifted nodes (score <0.50) trigger a scoped LLM re-invocation with the original prompt re-injected; a re-anchor registry prevents infinite loops; node grades update live via WebSocket to a Cytoscape.js interactive graph.

Thermal Plant Safety Detection System *Python, YOLO+Channel-Attention, Multi-Agent RL, OpenCV, Sep 2025*
C++

- Deployed real-time safety monitoring for Talcher Power Plant using a **multi-agent RL framework** with 5 parallel specialized agents analyzing concurrent live camera feeds for PPE violations, hazardous conditions, and unauthorized access.
- Achieved **40% throughput improvement** via parallel distributed agent processing; reduced workplace incidents by **78%** and emergency response time by **70%** across all plant sites; protecting 2,500+ workers.
- github.com/Luciferai04/thermal-plant-safety-detection

AGEIS – Quantum-Enhanced Satellite Earth Observation *Python, PyTorch, Qiskit, Quantum ML, Sep 2025*
Google Earth Engine

- Collaborated with ISRO experts to engineer a hybrid quantum-classical pipeline on Sentinel-2 satellite data, achieving **4.75× speed-up** and **96% accuracy** across 22+ land-cover classification tasks.
- Delivered a complete MLOps pipeline with automated optimization serving 25+ government agencies, impacting **100K+ citizens** with real-time environmental monitoring and deforestation detection.

Research Publications

LCAO: Latency Constrained Agent Orchestration for Autonomous 5G Network Slicing Under Review, 2025
Decentralised multi-agent RL (MADDPG + ADMM) paired with a Z3 SMT formal verification shield that guarantees zero SLA violations per scheduling action; validated on a physical srsRAN/Open5GS testbed achieving 98.4% spectral efficiency and 1.12 ms inference with inline SHAP explainability — a 15,000× training speedup over CPU baselines via Brax GPU simulation.

Multi-Modal Visual Adaptation: Unified Framework for Foundation Models Submitted, 2025
Unified cross-domain adaptation framework for foundation models with 25% accuracy gains across computer vision tasks in healthcare, agriculture, and environmental domains.

Education

B.Tech, Computer Science & Engineering | *Kalinga Institute of Industrial Technology (KIIT), Bhubaneswar*, Aug 2023 – May 2027

CGPA: **7.84 / 10.0** Relevant Coursework: Data Structures & Algorithms, Object-Oriented Design, Operating Systems, DBMS, Computer Networks, Distributed Systems, Complexity Analysis, Discrete Mathematics

Technical Skills

Languages: Python, SQL, JavaScript, R, MATLAB

Core CS: Data Structures & Algorithms, OOP & System Design, Distributed Systems, Complexity Analysis, OS Internals

ML & AI: PyTorch, TensorFlow, Scikit-learn, OpenCV, YOLO, BERT, LSTMs, CNNs, Transformers, RAG, Qiskit

Cloud & DevOps: AWS (EC2, S3, Lambda, SageMaker), Docker, Kubernetes, Jenkins, CI/CD, Prometheus, Grafana, Faiss

Databases: PostgreSQL, MongoDB, MySQL, Redis – query optimization, indexing, relational modelling

Web & APIs: Node.js, React, Express.js, FastAPI, RESTful APIs, GraphQL, OAuth2

Tools: Git, Apache Spark, Hadoop, Google Earth Engine, LangFlow, Jupyter, XGBoost, LightGBM

Leadership & Community Impact

Technology Lead | *Enactus KIIT (KISS), Bhubaneswar* 2025 – Present

- Spearheaded technical strategy and engineering execution across social entrepreneurship initiatives at Enactus KIIT, designing scalable software solutions and mentoring a cross-functional student developer team — driving measurable community outcomes across **300+ student-facing events and outreach programmes**.

Achievements & Certifications

- **2nd Place** – InnoWave Hackathon · Recognised for technical innovation and solution impact.
- **Regional Winner** – ChatGPT India Hackathon · Invited to **ChatGPT DevDay India** as a top-ranked participant.
- **Top 10, Codex Hackathon** (India's first) – Selected among **Top 200 teams** nationally; finished in the **Top 10**
- **Open Source Contributions:** Google DeepMind (ML optimization frameworks, 2024) · Gumroad (anti-fraud systems, 2025) · 50+ repositories, 500+ commits, mentored 20+ developers.
- **Certification** – Satellite Data Processing & Geospatial Analysis · ISRO (2024)
- **Certification** – AI-Powered Educational Solutions & Personalised Learning Systems · Dhamm.ai (2025)