

C Kaustubh

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EDUCATION

B.Tech in Computer Science & Engineering at PES University 2023 – 2027
CGPA: 8.56 **Dr. CNR Rao Scholarship** (Sem 1) **DAC Distinction Scholarship** (Sem 2 – Sem 5)

EXPERIENCE

Research Intern @ Center for Information Security, Forensics and Cyber Resilience (C-ISFCR) Jun '25 – Jul '25
Under Prof. Preet Kanwal

- Designed and evaluated four multi-modal architectures (YOLOv11 + Optical Flow + LLaVA-Next + LLaMA-3) for unsupervised video anomaly detection, achieving **75.48% classification accuracy** on the NWPU Campus Dataset across 16.5 hours of footage.
- Developed a novel keyword-free composite anomaly scoring framework combining semantic (SBERT), visual (ResNet-50), object distribution (Jensen-Shannon divergence), and temporal dynamics signals; F1 scores of **0.845 – 0.895** across all test categories.
- Built a three-tier adaptive summarization engine supporting arbitrary-length video via hierarchical divide-and-conquer LLM summarization; GPU-accelerated inference on RTX 4090 with CUDA 12.1, PyTorch 2.1, and FFmpeg achieving real-time frame processing.
- Benchmarked architecture against Gemini-2.5-Flash on five NWPU context anomaly videos; comparable anomaly scores with significantly lower serving cost.

LEADERSHIP & ACTIVITIES

Tech Lead @ Shunya PESU Jan '26 – Present
Head of Sponsorship @ Nexus PESU : Organised NexGen 1.0 & 2.0; raised **INR 4L+** in sponsorships. Jan '24 – Jul '25
Board of Directors @ ECell PESU : Conducted E-Summit 2024. Feb '24 – Jul '25

SKILLS & TECHNOLOGIES

Languages & Frameworks: Python, Rust, C/C++, Go, TypeScript, Next.js, PyTorch, Bash

Infrastructure & DevOps: Docker, Kubernetes, GitHub Actions (CI/CD), Linux, Git, Redis, Kafka, Spark

ML & Data: PyTorch, CUDA, OpenCV, Sentence-BERT, YOLOv11, LLaVA, LLaMA, Flower (Federated Learning)

PROJECTS

- **cluster-simulator** — Memory-safe distributed system simulator in Rust implementing core Kubernetes cluster management: node registration, pod scheduling, health monitoring, and leader-follower control plane logic. CI via GitHub Actions.
- **MediChain-FL** — HIPAA-compliant federated learning system for medical imaging using PyTorch and Flower. Integrated CKKS homomorphic encryption (TenSEAL) and Ethereum smart contract audit trail; achieved **93% accuracy** on pneumonia detection without exposing raw patient data. CI via GitHub Actions.
- **redis-from-scratch** — Redis-compatible in-memory key-value store in Go with full RESP3 protocol support and Pub-Sub. Deployed as backing store for a REST API-based Kafka clone. CI via GitHub Actions.
- **YAK** — Kafka-clone in Python implementing Pub-Sub, log replication, leader-follower architecture, and offset-based message delivery. CI via GitHub Actions.
- **orderbook** — High-performance financial order book in C++20. Benchmarked `std::map` vs `std::vector` matching engines achieving **nanosecond-level latencies** across x64 and ARM using custom timing utilities.
- **CodeRonin** — AI-powered Python debugging game where an agent injects realistic bugs to build library and debugging mastery. **Agentathon '26 Winner**.
- **InsightInvest** — Agentic investment research chatbot performing multi-source analysis on publicly traded companies to generate structured investment outlook reports.