

RAMKUMAR M

AI, Databases & Distributed Systems

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Education

Chennai Institute of Technology - CIT

B.E CSE (Artificial Intelligence and Machine Learning) (CGPA: 9.08)

2024-2028

Chennai, Tamilnadu

Projects

Arcux - Distributed Transactional Database

GitHub

Rust, tokio, tonic (gRPC), prost (protobuf), LSM-tree, Raft, MVCC, Percolator 2PC, HLC

- Built a range-sharded, Raft-replicated transactional KV store from scratch in Rust with a hand-rolled LSM engine, WAL, MVCC, and Percolator 2PC, using no external storage or consensus libraries (no raft-rs/RocksDB).
- Designed per-table tunable consistency: CP (Percolator + Raft + TSO for Snapshot Isolation) vs AP (leaderless W=1 with HLC last-write-wins), selected by schema.
- Validated reliability and durability under failure, with zero acknowledged-write loss across a 3-node leader-kill failover, a SIGKILL recovery oracle, and a Snapshot Isolation bank-transfer invariant, backed by 170+ tests.

Zero-Trust Payment Authorization for AI Agents

GitHub

Python, FastAPI, SQLite, Razorpay API, Groq LLM, PyNaCl

- Built an authorization layer letting an AI agent execute purchases against Razorpay's API within merchant-defined spending mandates, enforcing per-transaction limits, item allowlists, and velocity caps entirely in logic the agent cannot influence.
- Guaranteed exactly-once execution via a database-enforced idempotency key and an append-only audit log protected by SQL triggers, so no request can be executed twice, even if replayed, and no entry can be altered or deleted.
- Validated with a self-built adversarial suite simulating a hostile agent attacking the live API: 14 of 14 attacks defended (replay, price tampering, race conditions, compromised-LLM bypass) with zero unintended charges.

Interview Twin - Voice-Based Mock Interview Platform

GitHub

Python, LLM (Llama-3.3-70B), React, TypeScript, FastAPI, Whisper (large-v3-turbo), librosa, spaCy, VADER

- Built an LLM, NLP, and speech-analytics evaluation module scoring communication and technical correctness, with on-screen camera presence analysis surfacing candidate strengths and improvement areas.
- Engineered a low-latency pipeline running speech-to-text and audio analysis in parallel on Groq-hosted Whisper and Llama models for real-time feedback.

Spatial AI - Real Time Assistive Navigation for the Visually Impaired

GitHub

Python, PyTorch, YOLO-World, Depth Anything V2, Phi-3 Mini, OpenCV, NumPy, TTS

- Built a multi-threaded pipeline fusing object detection (YOLO-World) and metric depth (Depth Anything V2) into 3D scene graphs, generating on-device navigation cues via Phi-3 Mini.
- Optimized edge inference via INT4 quantization, object tracking, and temporal smoothing, achieving real-time, flicker-free performance on consumer hardware.
- Delivered spoken guidance through an on-device TTS layer, keeping the entire pipeline local with no cloud or network dependency, so the system works offline and captured video never leaves the user's device.

Experience

Winter Program Intern | Artificial Intelligence CoE, CIT Chennai

Oct 2025 - Dec 2025

- Built IntelliLearn, a retrieval-augmented study assistant answering questions over user-uploaded notes and scanned PDFs, grounded in the user's own documents via an OCR, embeddings, FAISS, and LangChain pipeline served through FastAPI.
- Built Machine Guard AI at a hackathon with a team, an IoT predictive-maintenance pipeline streaming ESP32 sensor data over MQTT into a Flask and Firebase backend, with Isolation Forest anomaly detection pushing alerts to an Android app.

Achievements

AI for Sustainability, UAE (Winner – \$125 + AED 300) – Designed a scalable application addressing environmental challenges.

TI Forge Hackathon (2nd Runner-up – 50,000 INR) – Architected and presented an innovative IoT-driven solution.

TGF 2.0 Techsprint (Top 5 Finalist) – Selected from a highly competitive pool, showcasing AI and project architecture skills.

H@CIT Codeathon (Top 20 Finalist - 2025 & 2026) – Placed in the top 20 out of 2,600 students in a college-wide competitive programming event.

Technologies

Programming Languages: C++, Python, Java, Rust, SQL

AI & Machine Learning: Computer Vision, NLP, LLMs, RAG, Generative AI, Agentic AI

AI Frameworks & Tools: Scikit-learn, TensorFlow (Keras), LangChain, LangGraph, CrewAI, MCP, AWS Bedrock AgentCore

Databases: PostgreSQL, Redis, Vector DBs, Distributed Databases, Storage Engines(LSM-tree/WAL), MVCC, ACID Transactions, Raft/Paxos Consensus

Core Computer Science: Data Structures & Algorithms (DSA), OOPS, DBMS, OS, CN, Distributed Systems

Platforms

LeetCode: Knight Badge (Max Rating - 2046), 1300+ Problems solved [Link]

CodeChef: 3 Star at CodeChef (Max Rating - 1624) [Link]

CodeForces: Newbie at CodeForce (Max Rating - 1057) [Link]

Certifications

- NPTEL:** Introduction to IOT (Topper 5%)
- NPTEL:** Data Analytics with Python (Topper 5%)
- CodeBasics :** GenAI to Agentic AI with Business Projects
- Cisco:** CCNA: Introduction to Networks
- AWS:** AWS Cloud Practitioner Essentials