

ASHISH KUMAR NANDA

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— Portfolio — leetcode.com/ashishnanda19 — codechef.com/ashishnanda19

Education

Manipal University Jaipur

Aug 2023 - Jul 2027

B.Tech in Computer Science and Engineering

CGPA: 9.12

Core Fundamentals: Operating Systems, Data Structures & Algorithms, OOP, DBMS, Software Engineering, Computer Networks, Computer Architecture

Experience

Indian Institute of Technology (IIT) BHU

Dec 2025 - Present

Research Intern

Remote

- Developed a **MILP** optimization model in **Gurobi** for a **4-tier, 20+ node** MSME supply chain, achieving **5.1% lower cost** and **33% lower CO₂** through optimized production, energy, transport, and technology decisions.
- Modeled **6+ green technologies** across **3 MSME categories**, integrating government subsidies to identify cost-effective technology adoption and scalable **decarbonization strategies**.

Projects

VidFlow - Distributed Video Transcoding Platform

[Demo] [GitHub]

Node.js, Express.js, AWS, MongoDB, Redis, Docker, ffmpeg

- Built a **distributed, event-driven video transcoding platform** that automatically generates multi-resolution (**360p, 480p, 720p, 1080p**) outputs with **leaky bucket rate-limiting** and a **Redis job queue** for efficient concurrency.
- Utilized **AWS S3, Lambda, EventBridge, and ECS** for seamless event handling, container orchestration, and scalable backend operations with **signed URLs** for secure media access control.

Prism - Deep Packet Inspection Engine

[GitHub]

C++, CMake, Multi-threading, TLS/JA3-JA4 Fingerprinting

- Built a **DPI engine** in **C++** that identifies applications inside encrypted **HTTPS** traffic via **TLS, SNI, JA3, and JA4** fingerprinting, using a two-tier **multi-threaded pipeline** for lock-free processing, sustaining **496K packets/sec** at **2s per-packet latency** with rule-based blocking.
- Ensured reliability with **69 unit tests, 7 fuzz harnesses**, and a **CI pipeline**, giving every worker thread exclusive ownership of its own connection state to **eliminate race conditions** under load.

HyperRAG-X - Enterprise Hybrid RAG Platform

[Demo] [GitHub]

Python, FastAPI, LangChain, LangGraph, Groq API, Qdrant, NetworkX, React, Supabase

- Designed a **4-agent LangGraph pipeline** with **hybrid retrieval** across **Qdrant, NetworkX**, and memory cache, enabling multi-hop reasoning with **70B parameter LLM** inference via Groq.
- Developed an async **Macrophage Agent** for continuous LLM-based contradiction detection and shipped a full-stack product with **FastAPI, Supabase** auth, and a React-based interface with live **force-graph** knowledge visualization.

SafeTrail - Emergency Response Platform

[Live] [GitHub]

Node.js, Express.js, Socket.IO, PostgreSQL (PostGIS), Redis, BullMQ

- Architected a real-time **emergency response platform** with live location sharing at **under 200ms latency** and **async SOS workflows** via Redis and BullMQ, maintaining **API response under 150ms** during concurrent usage.
- Implemented a **geospatial intelligence system** using **PostGIS** to identify nearest services within a **50km radius** in **under 50ms** with **70% faster lookups**, and integrated **voice-triggered SOS detection** with confidence thresholds.

Skills

Languages: C++, Java, Python, JavaScript, SQL

Frontend: React, Tailwind CSS, HTML

Backend & APIs: Node.js, Express.js, FastAPI, REST APIs

Databases: MongoDB, MySQL, PostgreSQL, Redis, ChromaDB

AI/ML & GenAI: LangChain, LangGraph, Hugging Face, NumPy, Pandas

Cloud & Tools: AWS, Docker, Jenkins, CI/CD, Git, GitHub, Supabase

Achievements

- LeetCode** – Solved **750+** problems with a peak contest rating of **1,832 (Top 6.68%)**.
- CodeChef** – **3 star** on CodeChef with a max contest rating of **1600**.
- Codeforces** – **Pupil** on CodeChef with a max contest rating of **1094**.
- Achieved **Global Rank 311** in Starters 247 and **Global Rank 481** in Starters 253.
- Finalist - International Innovation Challenge (IIC) 2.0** Among 1,100+ participants across India. [Certificate]
- National Semifinalist - Flipkart GRiD 7.0** Ranked among 160,000 participants nationwide. [Certificate]
- 4X Dean's List of Excellence:** Recognized for academic excellence. [Certificate]
- Technical Team (GDG):** Organized coding contests and workshops for a 250+ student community.