Adarsh Roy

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EDUCATION

Indian Institute of Technology, Delhi
B.Tech in Mathematics and Computing — *May 2024*
8.24 / 10.0

St. Xavier's Sr. Sec. School, Delhi
AISSCE — *May 2020*
96.6%

Relevant Coursework: Operating Systems, Data Structures, Analysis and Design of Algorithms, Computer Networks, DBMS, Computer Architecture, Discrete Mathematical Structures, Theory of Computation, Linear Algebra, Calculus, Data Mining, NLP, Deep Learning.

SCHOLASTIC ACHIEVEMENTS

- **JEE Advanced 2020: All India Rank 285** (amongst 250k+ candidates) | ISFO Maths Olympiad: State Rank 1, International Rank 19
- **JEE Mains**: **All India Rank 570** (amongst 1.1 million candidates) | **BITSAT**: **Top 0.1%** (amongst 300k+ candidates).
- **KVPY Scholar**: **AIR 445** (accorded **Fellowship by DST, Govt. of India**) | **NSEA**: **Top 1% Merit Award**

EXPERIENCE

Dragonfruit AI — Remote
Software Engineer - ML Platform (2 months) and Apps Platform (11 months) | Python, Flask, Distributed System — *July 2024 - Present*

- Enhanced the point-of-sale transactions data ingestion pipeline for a **checkout loss detection system**. Analyzed the data to identify patterns contributing to false positives, **fine-tuned** thresholds, and refined detection logic, increasing the **precision by 15-20%**.
- Added major performance optimizations reducing latency from $>$ 60 seconds to $<$ 3 seconds ($>$ **95%** improvement) in multiple APIs.
- Accelerated S3 URL pre-signing by **40x** by developing **Rust bindings** for the Python backend drastically reducing streaming latency.
- Owned backend development of core features such as an internal **access-controlled** asset management system, and a dynamic drop-down system for user frequency based personalized options, leveraging **Redis** caching and **async** computation for lightning-fast performance.
- Improved observability by instrumenting with **Opentelemetry** and adding custom automatic log prefixes. Boosted dev productivity by enforcing **ruff**, adding central error handling for **critical** DB events and creating **custom pre-commit hooks** to **enforce code quality**.

Amazon — Gurgaon
Software Development Intern | Java, AWS, Serverless Architecture — *May 2023 - July 2023*

- Adapted a warehouse delivery fraud detection system, which saved $60 million in NA region, for its launch in the EU region. Automated infrastructure deployment using **AWS CloudFormation** and handled real-time event processing with **AWS SNS**.
- Enhanced the automated payment service to process ad-hoc invoices, eliminating a time-consuming manual workflow. Integrated new payment types into the existing **serverless architecture**, modifying the workflow across **DynamoDB, SQS,** and **Step Functions**.

</> PROJECTS

Slice-Based Surrogate Model for Aerodynamic Drag Prediction [GitHub] [Live Demo] [Research Paper] — *July 2025*

- Developed a novel **geometric surrogate model** featuring a **custom-designed lightweight PointNet2D encoder** and a **Bi-LSTM** as the temporal encoder, achieving **state-of-the-art accuracy** (**R^2=0.9525, MAE=0.0061**).
- Architected an MLOps pipeline spanning training to deployment, using **PyTorch Ignite** and **Docker** for reproducible, live inference.
- Implemented a **slice-based architecture** processing 3D geometry as sequential 2D slices, bypassing expensive 3D convolutions and enabling longitudinal aerodynamic interpretability, cutting analysis time from hours (CFD) to seconds during the initial design phase.

RAG Q&A Bot for Resident Evil Lore — *March 2025*

- Developed a pipeline to scrape and process 5,000+ wiki pages (**Selenium**), leveraging **LangChain** and **Qdrant** for context-aware Q&A.

Image Denoising with Non-Local & Fractional PDEs [GitHub] [Thesis] — *Feb 2024*

- Implemented Partial and Fractional Differential Equation models from academic research on image-graphs using **PyTorch-Geometric**
- Enhanced the model's performance by adapting the graph's weight function to incorporate local patch-based distances. This led to **superior** quantitative results (**PSNR=29.59**) in **preserving edge and texture details**, **outperforming** the existing DE approaches.

Low-Level OS Components in C — *Oct 2023*

- Developed a **thread-safe** AVL-tree using **custom dynamic memory allocator** with heap tracking to evaluate **concurrency trade-offs**.

TECHNICAL SKILLS

Languages: Python, C/C++, Rust, Java, SQL, Bash, Lua| **Tools:** CI/CD, Github Actions, Git, Pre-commit hooks, Docker, Coding Agents
AI/ML: LangChain, Vector DBs (Qdrant), RAG, MCP, PyTorch, Scikit-learn, NumPy, Modelkit, W&B, Prompt Engineering, Local LLMs
Cloud & Backend: AWS: S3, EC2, SNS, DynamoDB, SQS| Flask, GraphQL, REST, JWT, Celery, RabbitMQ, Redis, Grafana, ELK stack

EXTRACURRICULAR / LEADERSHIP

- **Teaching Assistant, IITD:** Volunteered as a Teaching Assistant for the undergrad course Linear Algebra and Differential Equations.
- **Won Enactus National Competition 2021:** Conceptualized and created the presentation video working with a team of 50+ members.