Adarsh Kumar

India | kumaradarsh1702@gmail.com | +91-9056344969
adda2003.vercel.app | linkedin.com/in/adarsh-kumar-07b919247 | github.com/Adda2003

AREAS OF INTEREST

Mechanistic Interpretability, Graph Machine Learning, Deep Learning, Large Language Models, Computer Vision, Reinforcement Learning

EDUCATION

Indian Institute of Technology Delhi Jul 2026 – Present
Master's Research, Artificial Intelligence — New Delhi, India

- Research on the mechanistic interpretability of large language models and graphs, advised by Prof. Sayan Ranu.

Indian Institute of Technology Roorkee Dec 2021 – May 2025
B.Tech, Electrical Engineering — Roorkee, India

Bhawan Vidyalaya, Chandigarh 2019, 2021
Class X and Class XII — Chandigarh, India

EXPERIENCE

Data Scientist — Top Coder Jun 2025 – Jun 2026
Vmock India Pvt Ltd — Gurugram, India

- Owned end-to-end backend product development in Python, architecting and maintaining scalable GenAI APIs powering the core resume optimizer platform.
- Designed and built an AI-based job description parser from scratch using Python, LangChain and Langfuse — taking full product ownership from architecture through deployment.
- Engineered resume-to-JD matching algorithms, implementing semantic similarity and NLP techniques to align resume content with job requirements.
- Implemented Retrieval-Augmented Generation (RAG) pipelines for in-house models, significantly improving the accuracy and relevance of AI-generated recommendations.
- Built an AI agent system with LLM orchestration, Mem0 memory layer, PostgreSQL and Langfuse tracing for intelligent automation workflows.

RESEARCH INTERNSHIPS

Research Intern, Department of Mathematics Jan 2024 – Jun 2024
IIT Roorkee — under Prof. Sanjeev Kumar

- Applied signal processing to learn wavelet representations of 2D signals (Python, MATLAB).
- Developed deep learning methods to predict Discrete Wavelet Transform (DWT) coefficients for image compression (PyTorch, TensorFlow).
- Leveraged CNNs to predict custom wavelet filters, optimizing compression by operating in the compressed domain.

Research Intern, Electrical Department Feb 2024 – Apr 2024
IIT Roorkee — under Prof. Soham Chakrabarty

- Worked on dynamic obstacle avoidance for mobile robots using LiDAR and IMU sensors.
- Implemented Bug 0/1/2, Potential Field and Ant Colony Optimization (ACO) algorithms for real-time navigation.
- Simulated and tested using ROS, Gazebo and Turtlebot3.

ACHIEVEMENTS

- **GATE 2026 (Data Science & Artificial Intelligence)** — All India Rank 75.
- **Silver Medalist, Inter IIT Tech Meet 11.0 (2023)** — ISRO Chandrayaan Moon Mapping Challenge; developed high-resolution lunar maps using ESRGANs for super-resolution.
- **JEE Advanced 2021** — All India Rank 1702 among 150,000+ candidates.
- **JEE Mains 2021** — All India Rank 1258 among 1.1 million+ candidates.
- **NTSE Scholar 2019** — National Talent Search Examination Scholar, awarded by NCERT.
- **IIT Bombay Techfest Finalist** — Top-5 in the final round of the Analytics Challenge, weighted F1 score of 0.90.

PROJECTS

Deep RL for IC Macro Placement — B.Tech Project Aug 2024 – Mar 2025

IIT Roorkee, under Prof. G. N. Pillai — github.com/zfyre/placeRL

- Developed a convolutional-encoder reinforcement learning framework for automated macro placement in integrated-circuit design using PPO and DDPG.
- Built a dual-branch convolutional network converting pixel-level masks (position feasibility, wire cost, occupancy) into geometric embeddings for policy and value heads.
- On Ariane RISC-V, DDPG reached 155,811 HPWL vs. PPO's 179,802; on Adaptec-1, PPO led at 914,196 HPWL, both with stable convergence and effective congestion control.
- **Tech Stack:** Python, PyTorch, Gym, Reinforcement Learning (PPO, DDPG), hMETIS.

S-Wave — Learned Sparse Wavelet Representations 2024 – 2025

Collaborative project — github.com/Adda2003/S-Wave

- Learned sparse wavelet bases tailored to a specific signal rather than selecting a fixed basis, in an autoencoder-style formulation.
- Trained a FilterConv model to predict low-pass filters while minimizing reconstruction loss through a differentiable DWT, learning the basis end-to-end.
- Extends Adaptive Wavelet Distillation from Neural Networks through Interpretations (Ha et al., 2021); grew out of wavelet research at IIT Roorkee.
- **Tech Stack:** Python, PyTorch, Wavelet/DWT, Signal Processing.

Chandrayaan Moon Mapping Challenge Feb 2023 – Apr 2023

Inter IIT Tech Meet 11.0 — github.com/Adda2003/ISRO-InterIIT

- Applied ESRGANs to upscale lunar images from 128×128 to 2048×2048 pixels and implemented image stitching to assemble high-resolution lunar maps.
- Secured a Silver Medal at Inter IIT Tech Meet 11.0 for outstanding performance.
- **Tech Stack:** PyTorch, OpenCV, Git.

Analytics Challenge, IIT Bombay Techfest Oct 2023 – Dec 2023

github.com/Adda2003/WeldRight-IITBOMBAY-TECHFEST-

- Built a predictive defect classification model on 800,000+ welder data points using Random Forest, XGBoost and SVM; achieved a weighted F1 score of 0.90.
- Performed EDA and feature visualization using t-SNE; secured a top-5 rank in the final round.
- **Tech Stack:** scikit-learn, TensorFlow, Matplotlib.

Stock Price Forecasting using Time Series Oct 2023 – Dec 2023

github.com/Adda2003/STOCK_PRICE_PREDICTION

- Trained Transformer and LSTM models on 40 years of stock data using Time2Vec embeddings; achieved R^2 scores up to 0.982 (Apple), 0.978 (IBM), 0.970 (Goldman Sachs) and 0.963 (Coca-Cola).
- **Tech Stack:** yfinance, TensorFlow, Keras.

SKILLS

Programming Languages: Python, C/C++, SQL

ML & Deep Learning: PyTorch, TensorFlow, Keras, scikit-learn, OpenCV, NumPy, Transformers

GenAI & LLMs: LangChain, Langfuse, RAG, LLM orchestration, Mem0, RLHF, probing & circuit analysis

Tools & Systems: Git/GitHub, PostgreSQL, ROS, Gazebo, MATLAB

Languages: Hindi, English