Animesh Lohar

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LinkedIn | Github | Portfolio

ACADEMIC DETAILS

Degree	University/Board	Institute	Year
M.Tech in C.Tech	*Indian Institute of Technology, Delhi*	Indian Institute of Technology, Delhi	2024 - 26
B.Tech in IT	*MAKAUT, West Bengal*	RCC Insitute of Information Technology	2020 - 24
12th	*West Bengal Board (WBCHSE)*	Rangamati Kironmoyee High School	2019 - 20
10th	*West Bengal Board (WBBSE)*	Hoomgarh Chandabila High School	2017 - 18

PROJECTS

- **Decorder Only Transformer Model From Scratch (1 Million Parameters)** [Aug’25–Nov’25]
  (Advanced LLMs - Project | Prof. Tanmoy Chakraborty) - Github Link
  - The complete implementation of a decoder-only transformer language model from scratch, trained on the TinyStories dataset. The implementation includes all core components of the transformer architecture, training with teacher forcing, and various inference enhancements, including beam search, KV caching, gradient accumulation, and gradient checkpointing. All components are implemented using only basic PyTorch operations as required by the assignment constraints.
- **Analyzing In-Context Learning in Language Models using Counterfactuals** [Jul’25– Present]
  (Ongoing M.Tech Thesis - Project | Prof. Sougata Mukherjea) - Github Link
  - This research project systematically investigates the mechanisms of in-context learning (ICL) in transformer-based language models through controlled counterfactual experiments.
  - Designed factual vs. counterfactual prompt experiments; compared open-source (GPT-2, LLaMA) vs. closed-source (GPT-3.5, GPT-4); Analyzed LLM failure modes in factual recall vs. counterfactual reasoning.
- **Deep Learning for MRI Reconstruction** [Jun’25–Present]
  (Image Processing Project | (Prof. Monika Agrawal)
  - Worked on India’s first govt-developed MRI (AIIMS Delhi & SAMEER); Built pipeline from raw K-space → IFFT → MRI; Applied Fourier Neural Operator to predict missing datapoints and enhance image quality.
- **Robust Aggregation for Federated Learning** [Jan’25 - May’25]
  (Security Mechanism in Machine Learning - Project | Prof. Harshan Jagadeesh) - Github Link
  - Implemented robust aggregation against Byzantine clients; used Weiszfeld algorithm for geometric median; Ensured secure aggregation & communication efficiency; Evaluated on non-IID datasets.
- **Counterspeech Generation & Factuality Analysis** [Jan’25 - May’25]
  (NLP - Project | Prof. Tanmoy Chakraborty) - Github Link
  - Built end-to-end counter-speech system; implemented n-gram LM, CRF, and Transformer-based GEC from scratch; Trained seq2seq with attention visualizations; Factual Analysis in LLM-generated counterspeech and applied Inference-Time Intervention to improve reliability; Evaluated via BLEU/ROUGE/BERT Score & toxicity reduction.
- **Transformer for Image from scratch** [Mar’25 - May’25]
  (Deep Learning - Group Project | Prof. Sumantra Dutta Roy) - Github Link
  - Implemented Transformer from scratch (patch embedding, multi-head attention, positional encodings); Reduced attention complexity via Linformer; Introduced multi-scale patch embeddings.
- **Reinforcement Learning with Policy Iteration & Value Iteration** [Aug’25 - Sept’25]
  (Reinforment Learning - Project | Prof. Raunak Bhattacharyya)) - Github Link
  - Applied DP-based RL in Football Simulation, Online Knapsack, Portfolio Optimization environments.
- **Text Summarizer - End to End Pipeline** [Jun’25–Jul’25]
  (MLOps - Project | Prof. Souagata Mukherjea) - Github Link
  - Built abstractive text summarisation with Transformers (Hugging Face). Developed full MLOps pipeline with DVC, MLflow, FastAPI, Docker, CI/CD for reproducible deployment.
- **Video Summarization & Background Segmentation** [Jan’25–Mar’25]
  (Computer Vision - Project | Prof. Sumantra Dutta Roy) - Github Link
  - Implemented keyframe-based video summarisation using eigen-analysis; background subtraction via GMM.
- **Fibonacci Heap Tree from Scratch with DMA** [Aug’24–Oct’24]
  (Advanced Data Structure - Project | Prof. Sumantra Dutta Roy) - Github Link
  - Implemented fully functional Fibonacci Heap. Ex: insert, union, delete-min, decrease-key, consolidate in C++.

- **Enhanced Shell, System Call Controls & Signal Handling in MIT-xv6 os** [Feb'25–May'25]
  (Unix Operating System - Project | Prof. Smruti Sarangi) - Github Link
  - Extended xv6 with authentication-gated shell, syscall block/unblock, and new chmod syscall; implemented signals SIGINT, SIGBG, SIGFG, SIGCUSTOM with job control and user handlers.
- **Matrix Inversion using Gaussian Elimination Method** [Aug'24–Sep'24]
  (RISC-V Assembly Programming Language - Project | Prof. Smruti Sarangi) - Github Link
  - This RISC-V assembly program performs matrix inversion using the Gaussian elimination method. The program is designed to handle a 5x5 floating-point matrix. It includes several key modules for matrix operations, such as copying matrices, swapping rows, performing Gaussian elimination, checking for matrix invertibility, and verifying the computed inverse.
- **AES & RSA Cryptography Algorithms from Scratch** [Feb'25–May'25]
  (Network Security - Project | Prof. Harshan Jagadeesh) - Github Link
  - Implemented a functional AES encryption and decryption system for images. It correctly implements the core AES transformations and handles image data conversion and padding.
  - Implemented a library-free RSA encryption and decryption system for images, including prime generation, modular inverse, and modular exponentiation.
- **Fast Fourier Transform from Scratch** [Aug'25–Sep'25]
  (Verilog - Project | Prof. Kaushik Saha) - Github Link
  - Implemented and verified a hardware module for computing a 64-point Fast Fourier Transform (FFT) using the radix-2 Cooley-Tukey algorithm. The implementation was done in Verilog using fixed-point arithmetic with Q8.8 (8 integer bits, 8 fractional bits) format. The assignment consisted of two parts: a basic FFT butterfly unit and a complete 64-point FFT module.
- **ALU Design for the SimpleRISC Core** [Sep'25–Nov'25]
  (Verilog - Project | Prof. Kaushik Saha) - Github Link
  - implemented and analysed of a high-performance Arithmetic Logic Unit (ALU) for the SimpleRISC processor. The ALU supports 14 operations (ADD, SUB, AND, OR, XOR, SLT, SLL, SRL, SRA, PASS, NOT, MUL, DIV, MOD) as specified in the SimpleRISC ISA and is optimised to meet a target operating frequency of 250 MHz. The design employs modular architecture with separate multiplier and divider units, critical path optimization, and efficient resource sharing. Synthesis results demonstrate successful achievement of timing constraints with balanced area-power trade-offs.

TECHNICAL SKILLS

- **Programming Languages :** Python, C++, Java
- **ML/DL Frameworks :** PyTorch, TensorFlow, Scikit-learn, Hugging Face, LangChain, YOLO, OpenAI Gym
- **MLOps :** FastAPI, Pydantic, Docker, MLflow, DVC, Airflow, CI/CD, DAGsHub, LLMOps, ETL pipelines
- **Web Development :** HTML5, CSS3, Vanilla JS, React.js, Node.js, Express.js, REST API, SQL, MongoDB
- **Tools & Technologies :** LaTeX, Git, VS Code, PyCharm, Postman, Oracle DB, MySQL
- **Soft Skill :** Communication (Bengali, Hindi, English), Time Management, Team Work

POSITIONS OF RESPONSIBILITY

- **Placement Volunteer, OCS IIT Delhi, 2024–25**
- **Organized a Coding Competition for 181 Students in 2023 – 24 at RCC Institute of Information Technology**

COURSES UNDERTAKEN

- Database Management System, Operating System, Data Structure & Algorithms, Computer Networking, Engineering Mathematics & Discrete Mathematics, Optimization Techniques & Numerical Methods, Computer Organization & Architecture, Web Technology, Network Security, Linux OS, Object Oriented Programming (Java, C++ & Python), Machine Learning & Deep Learning, Reinforcement Learning, Natural Language Processing, Large Language Model

CERTIFICATIONS

- **GATE CS 2023 - Qualified**
- **GATE DA 2024 - Qualified**
- **UDEMY Courses - DSA in Java, DSA in Python, MLOps & Deployment, Computer Vision, React Native**
  (70 hours, 60 hours, 80 hours, 50 hours, 30 hours)
- **Web Development - MERN Stack**
  (2 Months Training Program | National Institute of Industrial Training) (Nov'23 - Dec'23)