

Rao Muhammad Dayan Atif

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Research Interests

Explainable and Trustworthy AI, LLM Interpretability, Neuron-Level Analysis, Causal Intervention, Representation Analysis, Robustness, and Multimodal Learning.

Education

Sir Syed University of Engineering and Technology

Bachelor of Science in Computer Engineering | CGPA: 3.89/4.00

Karachi, PK

Sep, 2023 – Present

- Relevant coursework: Data Structures and Algorithms, Artificial Intelligence, Object-Oriented Programming, Linear Algebra, Calculus

Experience

Research Intern

Dalhousie University – HyperMatrix Lab

Aug, 2026 – Present

Halifax, Nova Scotia, Canada

- Conducting research under the supervision of **Prof. Hassan Sajjad** in the domain of **Explainable AI (XAI)**, with a focus on interpreting the internal behavior of large language models
- Investigating **neuron-level interpretation** methods to understand how individual neurons and neuronal activation ranges encode and represent linguistic concepts
- Exploring **causal intervention** techniques to move beyond correlational neuron attribution and evaluate whether identified neurons causally influence model behavior and predictions

Machine Learning Intern [View Certificate](#)

Elevvo Pathways

Aug, 2025 – Present

Remote, Cairo, Egypt

- Investigated machine learning models for predicting student performance and customer segmentation, analyzing patterns in large-scale datasets
- Designed and validated preprocessing strategies to assess their impact on model robustness and accuracy (15% improvement observed)
- Engaged in collaborative research discussions with engineers and data scientists to refine methodologies and interpret experimental results

Section Leader [View Certificate](#)

Stanford University - Code in Place

Apr, 2025 – Jun, 2025

Remote, Stanford, USA

- Taught the first half of Stanford's CS106A Python course, covering programming fundamentals such as control flow, functions, and data structures
- Led and mentored a diverse cohort of 12 international students, achieving over 90% assignment completion rate
- Provided personalized 1:1 mentorship, helping beginners build confidence in their programming journey

Projects

YouTube Video Assistant (RAG) | *Python, Streamlit, LangChain, Hugging Face, FAISS, Gemini*

[GitHub](#)

- Explored RAG for answering natural language queries on YouTube video transcripts
- Experimented with transcript chunking RecursiveCharacterTextSplitter and embeddings for efficient semantic retrieval
- Evaluated LLM response quality using Hugging Face + Gemini models for accuracy and contextual relevance

LLM Learning Companion | *Python, Streamlit, LangChain, Gemini API*

[GitHub](#)

- Designed an AI-powered research assistant using Gemini LLM through LangChain for personalized learning
- Investigated prompt engineering and memory handling strategies for improved explanation quality
- Deployed for public use, enabling user study and feedback collection on interactive learning with LLMs

Pneumonia Detection from Chest X-Rays using Deep Learning | *Python, PyTorch, ResNet18, CNN*

[GitHub](#)

- Applied transfer learning with ResNet18 for binary classification of chest X-rays (Normal vs Pneumonia)
- Conducted experiments with data augmentation and early stopping to analyze generalization effects
- Achieved **89.7% test accuracy**, with results visualized via actual vs predicted labels

Adversarial Robustness in CIFAR-10 Image Classification | *Python, PyTorch, Foolbox, CNN*

[GitHub](#)

- Trained CNN models on CIFAR-10 and benchmarked performance on clean vs adversarial examples
- Conducted robustness experiments with FGSM (**83% success**) and PGD (**92% success**) attacks

- Investigated adversarial training methods and visualized perturbations through comparative analysis

Image Classifier | *Python, Streamlit, TensorFlow, MobileNetV2, PIL*

[GitHub](#)

- Experimented with transfer learning using MobileNetV2 on real-world images for multi-class classification
- Designed preprocessing (resizing, normalization) workflows to study their effect on prediction performance
- Visualized predictions with confidence scores to interpret model behavior

Global Competitions & Hackathons

Harvard CS50x Puzzle Day 2025 [View Certificate](#)

Cambridge, Massachusetts, USA

Team Lead

Apr, 2025

- Led a four-member international team in solving all nine advanced logical puzzles within the allotted time
- Coordinated team roles, strategy, and time management to maximize efficiency under pressure
- Demonstrated strong analytical skills and collaboration in a highly competitive academic challenge

AI Agents Hack with Lablab & MindsDB [View Certificate](#)

San Jose, CA

Machine Learning Engineer

Sep, 2024

- Developed a Streamlit-based AI application that suggests potential diseases and health tips based on user-selected symptoms, enhancing health awareness through intuitive UI
- Implemented a rule-based symptom-to-disease mapping system, delivering informative non-diagnostic suggestions along with health tips
- Emphasized ethical AI use by integrating a clear medical disclaimer, ensuring responsible communication of limitations and promoting professional consultation

META Hacker Cup 2024 [View Certificate](#)

California, USA

Team Lead

Sep, 2024

- Competed in META Hacker Cup 2024 and successfully qualified for Round 1 among thousands of international participants
- Led the team to tackle competitive programming problems under strict time limits
- Gained experience in global-scale coding competitions, strengthening advanced problem-solving skills

Skills

Programming: Python, Java, C++, C

ML/DL: PyTorch, TensorFlow, Scikit-learn, NumPy, Pandas

LLMs/CV: LangChain, LangGraph, Hugging Face, OpenCV

Tools: Git/GitHub, FastAPI, MySQL, Streamlit, AWS, Google Colab

Certifications

Fundamentals of Reinforcement Learning | University of Alberta [View Certificate](#)

Machine Learning Specialization | DeepLearning.AI [View Certificate](#)

Linear Algebra for Machine Learning and Data Science | DeepLearning.AI [View Certificate](#)

Deep Learning with PyTorch | DataCamp [View Certificate](#)

Fine-Tuning Large Language Models | DeepLearning.AI [View Certificate](#)

Honors & Achievements

Selected for Stanford Code in Place program to teach CS106A to international students

Awarded Merit Scholarship for academic excellence (2023, 2024, 2025)

Solved 200+ problems on LeetCode, achieving 50-day consistency badge

Ranked in the top 5% of engineering entry test among 20,000+ applicants

Delivered webinars and workshops on AI and ML

Projects selected for university exhibitions (Fall 2024, Spring 2025)

Extracurricular Activities

Active member of IEEE Computer Society SSUET and International Association of Engineers (IAENG)

Organized workshops and webinars on AI/ML, contributing to peer learning and knowledge sharing

Assisted faculty and peers during university technical exhibitions and industry delegation visits

Writes articles on AI, ML, and LLMs on Medium | [Medium Profile](#)