



Hassaan Muhammad Khan

Location: Karachi, Pakistan

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Portfolio: <https://hassaanmk.github.io/my-portfolio/>

Scholar: [Hassaan Muhammad Khan - Google Scholar](#)

EDUCATION

BE ELECTRICAL ENGINEERING

NATIONAL UNIVERSITY OF SCIENCES AND TECHNOLOGY

Karachi, Pakistan

Nov 2021 - June 2025

- Projects: Voice Controlled Prosthetic Hand, Auto Cut Off Battery Charger, 5KW generator manufacturing and testing.
- Relevant Coursework: Microprocessor System, Electronic Devices & Circuits, Digital Logic Design, Object Oriented Programming, Linear Circuit Analysis, Artificial Intelligence, Machine Learning, Computer Communication and Networks, Computer Vision, Data Structures and Algorithms.
- Cumulative GPA: 3.89/4.0

BEACONHOUSE COLLEGE (A-Levels) | Physics A* Math A Chemistry A

BEACONHOUSE SCHOOL (O-Levels) | 5A* 4A

EXPERIENCE

BYTECORP

ML ENGINEER

Cambridge, UK | Karachi

Dec 2025 – Present

- Implemented a multimodal pipeline integrating person recognition (Yunet, OpenCV) with Whisper-based audio transcription.

DOAZ

AI ENGINEER (NLP-FOCUSED)

Seoul, S-Korea | Remote

Oct 2025 – Dec 2025

- Developed a multilingual AI Risk Checker (LangChain based RAG system) based on Korean chemical data from Doosan.
- Led AI team on Geotechnical AI Agent project from POSCO.

AI INTERN

Jun 2025 – Oct 2025

- Conducted a comparative analysis of RAG, CRAG, and GraphRAG, developing LangChain architectures from scratch.
- Deployed a FastAPI server to serve Hugging Face LLMs using custom ChatCompletion methods for efficient interaction.
- Leveraged open-source Vision language models with VLLMs for scaled deployment for multi-lingual data extraction from pdfs (Posco).

MUHAMMAD BIN ZAYED UNIVERSITY OF ARTIFICIAL INTELLIGENCE

VISITING RESEARCHER (Remote-based)

Abu Dhabi, UAE | On-Site

Aug 2024– July 2025

- Implemented direct preference optimization on Llama fine-tuned model.
- Developed open-source DRAG framework for evidence-based retrieval through knowledge graph, inspired by Graph Rag from Microsoft.
- Evaluated DRAG framework for knowledge distillation from LLMs to SLMs, improving accuracy on datasets and benchmarks by 10–27%.
- Published the research in ACL 2025, getting accepted for ACL Main conference

UNDERGRADUATE RESEARCH INTERN

May 2024– June 2024

- Selected for a highly competitive program with a 4% acceptance rate globally, being the only Pakistani intern.
- Conducted research under the supervision of Prof. Zhiqiang Shen, focusing on prompt optimization for foundation models.
- Fine-tuned Llama 7B on a curated dataset, leveraging AWS cloud infrastructure.
- Improved model performance, boosting accuracy by ~10% on key benchmarks including MMLU, HellaSwag, and TruthfulQA.

ADDITECH-SIM (German-based startup)

MACHINE LEARNING RESEARCHER

Stuttgart, Germany | Remote

Sept 2023– Dec 2024

- Integrated pre-trained model with reinforcement learning custom environment, made with stablebaseline3.
- Achieved a 15% increase in pressure value prediction accuracy over previous baselines.
- Analyzed Mercedes-AMG experimental dataset on vehicle structural analysis.
- Enhanced parameter optimization using genetic algorithms and Variational Autoencoders.

COMPUTER SCIENTIST INTERN

July 2023–Aug 2023

- Deployed regression models from scikit-learn to predict the optimum pressure value using a set of input parameters.
- Optimized the provided data through exploratory data analysis before model training.

NUST AIRWORKS (Pakistan's First Student UAV Manufacturing Team to Participate Internationally)

AUTOMATION LEAD

Karachi, Pakistan

Aug 2022–June 2024

- Directed a department of 5 members in an integrated team to develop avionic systems and hardware interfaces for UAVs.
- Optimized avionics and circuitry installation for UAVs (hex copters, fixed wings, hybrid VTOL).
- Led end-to-end automation of X VTOL, winning the Performance Award at Teknofest 2023, Turkey.

SENIOR SOFTWARE EXECUTIVE

Dec 2021– June 2024

- Fine-Tuned yolov8 model for the detection of markers for VTOL (Vertical Takeoff and Landing) UAV.
- Deployed model on Jetson Nano using GStreamer and OpenCV for optimized real-time processing.
- Constructed path planning algorithm and Open CV AI for the project of search and rescue mission using a swarm of decentralized drones.

LIBERTY TEXTILE MILLS (one of the leading Textile mills of Pakistan)

ELECTRICAL INTERN

Karachi, Pakistan

July 2023 – Aug 2023

- Gained hands-on experience in PLC programming, circuit design, and VFDs for industrial automation.

PROJECTS:

- **Reinforcement Learning to improve Finite Element Simulations for Shaft and Hub Connections:** Used stable-baseline 3 to construct custom RL environment that uses supervised regression model for inferences, available on the link: <https://github.com/AddiTechSim/RL>
- **Prompt optimization and fine-tuning of Llama-7B:** Curated a dataset under VILA-LAB using 26 researched principles and fine-tuned Llama 7B model using Amazon Web services. Link: <https://github.com/hwaseem04/Evaluating-Prompts>
- **DRAG Framework:** A knowledge distillation approach implemented with framework and evaluation using SLMs on benchmark datasets such as MMLU, ARC-Challenge, Open-LLM leaderboard etc. Available here: <https://github.com/VILA-Lab/DRAG>
- **Autonomous SLAM – based Interactive Bot:** Final year project under professor Attaullah in which we implemented SLAM algorithms and ROS2 navigation stack with LLM integration to provide interaction capabilities. Deployment done on single board computers (jetson-nano) Link: <https://github.com/Hassaanmk/Autonomous-SLAM-Based-Assistive-robot>
- **Digitain Project:** Analyzed and optimized simulation repositories provided by BMW and Boeing. Applied advanced optimization algorithms to derive insights and optimize simulation parameters. Present here: <https://github.com/AdditechSim/DigitTain>
- **Facial-Emotion Recognition:** A comparative analysis and implementation of facial emotion detection between CNN and VIT trained on FER-2013 and AffectNet datasets. Available on the following link: <https://github.com/Hassaanmk/Facial-Emotion-recognition>
- **RAG Comparative Analysis:** Constructed basic and corrective RAG architectures using LangChain and FAISS vector store. Knowledge graph for GraphRAG was deployed and made through Neo4j for advanced query retrieval through relationship extraction. Link: <https://github.com/Hassaanmk/RAG-Comparative-Analysis>
- **Posco (Drill-Log Application):** Developed an AI-driven platform for geological data extraction and predictive analysis of drilling logs at Doaz, integrating OCR (Tesseract) and fine-tuned yolo with 92% accuracy. Deployed fine-tuned Qwen-2.5-VL to extract data with pydantic models. Available at: <https://github.com/llm-team-org/posco-streamlit/tree/main> , production link : <https://posco.doaz.ai/login>
- **Doosan Safety Checker:** This project provides a multi-lingual RAG system based on Korean regulations, accident records and chemical data (Doosan company) using LangChain with Quadrant vector store. Available here: <https://doosanapp-c8affrrftdgb7thnpj8x.streamlit.app/>

RESEARCH PUBLICATIONS

- Annual Meeting of the Association for Computational Linguistics (ACL 2025):**
Vienna, Austria
- **Paper Acceptance (Main-Conference):** DRAG: Distilling RAG for SLMs from LLMs to Transfer Knowledge and Mitigate Hallucination via Evidence and Graph-based Distillation
Authors: Jennifer Chen, Aidar Myrzakhan, Yaxin Luo, Hassaan Muhammad Khan, Sondos Mahmoud Bsharat, Zhiqiang Shen
Link: <https://arxiv.org/abs/2506.01954>
- Stuttgart Conference on Automotive Production 2024**
ARENA2036, Stuttgart, Germany
- **Paper Acceptance:** Reinforcement Learning to improve Finite Element Simulations for Shaft and Hub Connections
Authors: Hassaan Muhammad, Narmeen Sabah, Jan Falter, Markus Wagner, Boris Eisenbart, Matthias Kreimeyer, Muhammad Saeed
Link: https://link.springer.com/chapter/10.1007/978-3-031-88831-1_26

VOLUNTEER WORK

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| THE CITIZENS FOUNDATION
VOLUNTEER | Karachi, Pakistan
June 2023 |
| • Taught English and Theatre modules to underprivileged students by engaging in learning aid activities. | |
| IEEE WOMEN IN ENGINEERING
SENIOR DESIGN EXECUTIVE | Karachi, Pakistan
Sept 2021–Present |
| • Lead organizer of the inter-university event responsible for the timely execution of events through prompt administration. | |

AWARDS AND CERTIFICATIONS

Supervised Machine Learning: Linear Regression And Classification Coursera July 2023	Advanced Learning Algorithms Coursera Dec 2024	Improving Deep Neural Networks: Hyperparameter, Regularization And Optimization Coursera Jul 2025
Gen AI: Beyond The Chatbot Coursera Aug 2025	Natural Language Processing With Classification And Vector Spaces Coursera Sep 2025	Natural Language Processing with Probabilistic Models Coursera Jan 2026
Structuring Machine Learning Projects Coursera Sep 2025	Rector’s High Achiever’s Award NUST Aug 2022 Aug 2023	Performance Award: International UAV Competition Teknofest April 2023

SKILLS

- **Programming Languages:** Python, C++, SQL
- **Machine Learning Frameworks:** Pytorch, TensorFlow, Keras, SciKit-Learn, Apache, Hugging-Face, YOLO, ONNX, TensorRT, Whisper
- **Cloud/Server Deployment:** Azure, AWS-cluster, Google Cloud, FastAPI, Gradio, Vast-AI, Streamlit, Runprod
- **Data Handling:** Json, Matplotlib, Seaborn, NumPy, Pydantic models
- **NLP Frameworks and Skills:** Fastchat (Fine-tune), LM-evaluation-harness, Transformers, LangChain, Neo4j, Outlines, NLTK, Quadrant, Cohere, n8n