HAMZA MOORAJ

AI Engineer — Multimodal & Generative Systems | Research-Oriented Engineering
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SUMMARY

AI Engineer specialising in multimodal and retrieval-augmented systems, with research experience in generative AI. Built and evaluated end-to-end RAG pipelines using PyTorch, LoRA, Milvus, and FAISS across healthcare and education domains. Combines research-grade evaluation with applied engineering.

PUBLICATIONS & PROJECTS

A Systematic Exploration of Architectural Trade-offs for Crop Disease Classification - Lead Author
Manuscript in Preparation (2026) — Dataset released on HuggingFace
- Created AgriPath-LF16, a 65-class benchmark with explicit lab/field domain separation.
- Implemented and compared CNN baselines (ResNet-50), contrastive VLMs (SigLIP, CLIP-L/14), and generative VLMs (SmolVLM-500M, Qwen2.5-VL 3B/7B).
- Evaluated zero-shot, partial transfer-learning, linear-probing, and LoRA fine-tuned variants under unified protocols across full, lab-only, and field-only training regimes
- Built reproducible training and evaluation pipelines with W&B experiment tracking and metric logging.

Medical Question-Answering (QA) Conversational Agent (Course: F21CA) - Project Lead
January 2025 – April 2025
- Led a team in building a RAG-enabled medical QA system (Llama-3.1-8B, FAISS over 411 NHS records).
- Designed a custom tri-modal pipeline integrating text, speech (Whisper), and vision (Qwen2-VL-2B).
- Evaluated performance with and without RAG using BLEU, ROUGE, BERTScore (+5.6% semantic similarity with RAG).
- Independently assessed multimodal variant; analysed grounding–usability trade-offs and authored report.

EXPERIENCE

AI "Learning Buddy" Project Intern — Heriot-Watt University
July 2025 – September 2025
- Built end-to-end RAG pipeline (LlamaIndex + Milvus) with custom ingestion, chunking, and metadata-aware embeddings.
- Generated embeddings with BAAI/bge-small-en-v1.5 and configured course-specific retrieval.
- Deployed backend via Docker Compose on university server and exposed Streamlit demo via ngrok.

Data Science & Machine Learning Intern — Love For Data
August 2023
- Designed a log-scaled popularity index over 1,970 US/Pakistan Play Store apps.
- Trained a Random Forest regressor using sklearn with One-Hot encoding to analyse feature importance.

Software Engineering Intern — Folio3
June 2023 – July 2023
- Contributed to development of a TypeScript-based Visitor Management System in a team environment.
- Participated in sprint planning and agile product development workflows.

EDUCATION

BSc Computer Science (Artificial Intelligence) — First Class Honours
Heriot-Watt University, 2025 — 3x Deputy Principal's Award (2022/23 – 2024/25)

SKILLS

Languages: Python, Java, C#, TypeScript, C
AI & Infrastructure: PyTorch, Transformers, PEFT (LoRA), RAG, Vision-Language Models, Milvus, FAISS, Docker, Linux, Git, Weights & Biases