Ahmed Karim

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Education

- **BSc(Hons) Computer Science (First Class)** Sep 2020 - June 2023
  Queen Mary University of London *UK, London*
  Project: *Model based Reinforcement learning curiosity driven exploration (First)*

Research Scientist

Hassana Labs (Part-time) *Jun 2025 - Ongoing*

- **Compression-based Reliability**: Co-authored research framing LLM hallucinations as compression artefacts; contributed to the Expectation-level Decompression Law (EDFL) analysis and empirical validation.
- **Procedural Hallucinations**: Joint work with Oxford Torr Vision Group on attention-based routing failures; developed stagewise decomposition of slot-population errors and information-theoretic framework for diagnosing "present but not used" failures.
- **Information Sufficiency Ratio (ISR)**: Implemented pre-generation risk scoring with ISR ≥ 1 decision rule; experiments report 0% hallucination with accuracy preserved on attempts.
- **Open-source Tooling**: Co-built the OpenAI-compatible Hallucination Risk Calculator; **1.6k+ GitHub stars**.
- **Publications**: *Predictable Compression Failures: Why Language Models Actually Hallucinate* - ArXiv
  Attention Deficits in Language Models: Causal Explanations For Procedural Hallucinations - GitHub

Machine Learning Engineer

London Stock Exchange (Full-time) *Sep 2024 - Ongoing*

- **Advanced Data Analytics**: ADA team within LSEG focused on driving innovation in the financial markets through advanced engineering solutions.
- **MLOps**: Applied machine learning for operational efficiency, including model deployment, monitoring, and automated retraining to improve lifecycle management in financial markets.
- **Time series Algorithm Development**: Developed ARIMAP, a proprietary algorithm integrating ARIMA and Prophet models for enhanced time series forecasting on Control M data resulting in a 20% reduction in RMSE. ARIMAP outperforms traditional models in specific contexts; publication in progress to document and share results.
- **Enigma – Internal Chatbot for Data Accessibility**: Contributed to Enigma, an internal chatbot using Retrieval-Augmented Generation (RAG) and Amazon SageMaker for LLM evaluation.
- **Incident Intelligence Pipeline**: Built a hybrid NLP + LLM workflow (regex/gazetteer, TF-IDF+DBSCAN, local Llama-3 via Ollama) to auto-tag incidents, infer Topics, and compute per-tag TTR; now being automated on Amazon SageMaker (Pipelines + EventBridge/Step Functions)

Researcher

King's College London (Full-time) *Jun 2024 - Sep 2024*

- **Automated Essay Scoring (AES)**: Developed uncertainty–calibrated AES with Llama-3 8B & Qwen-2.5 3B, achieving 90% conformal coverage across ASAP, TOEFL11 and Cambridge-FCE.
- **Uncertainty Quantification in LLMs**: Integrated conformal prediction with the UAcc metric to balance accuracy and prediction-set compactness for reliable high-stakes marking.
- **ASAP Dataset Experiments**: Benchmarked models on ASAP, TOEFL11 and FCE, surpassing prior open-weight baselines in quadratic-weighted κ and UAcc.
- **EMNLP 2025 Main Conference**: "Beyond the Score: Uncertainty-Calibrated LLMs for Automated Essay Assessment"

DevOps Engineer (Internship)

London Stock Exchange (Full-time) *Jun 2023 - Aug 2023*

- **Cloud Migration**: Utilized cutting-edge technologies such as Helm, Terraform, and Kubernetes to streamline cloud migration processes. Collateral Management System applications were migrated to the cloud.
- **AWS**: Demonstrated commitment to professional development by participating in an AWS training day focused on large language models, acquiring skills relevant to modern cloud computing.

Undergraduate Researcher (UROP)

Imperial College London (Full-time) *Jul 2022 - Oct 2022*

- **Leverhulme Centre for Wildfires Environment and Society (LCWES)**: Received £2500 in funding. Supervised by Dr Ramesh Ningthoujam (Department of Life Sciences) and Dr Sibo Cheng (Department of Computing).
- **Quantum GIS Software**: Analysed satellite-derived data (MODIS, Global Fire Atlas, Forest Fragment dataset) to investigate how forest fragmentation influences burn areas and fire propagation.
- **Machine Learning for Wildfires**: Implemented CNNs, ANNs and Random Forests to explore wildfire duration
- **Results/Output**: Identified how wildfires affect; and are affected by forest fragmentation, helping define fire regimes.

Activities/Leadership

- **YouTube Channel**: Created tutorial on Insertion Sort Algorithm and plan to make teaching videos on Deep Learning and Reinforcement Learning.
- **Campaigns and Events Manager:** ABSOC at QMUL - Organised events and campaigns.
- **Volunteer:** Al Ayn Charity sponsors Iraqi orphans. General Volunteer helping assemble charity boxes to be distributed.
- **Other Interests:** Research, General Artificial Intelligence, Robotics, Open Ended AI, Evolutionary algorithms, Applying AI to Physics, MineRL, Economics and Finance.
- **Technical Skills:** Proficient in Python, Java; RL/DL (PyTorch, OpenAI Gym), Numpy, Pandas, Docker, Git, and AWS.