

ADAM KHALD

Artificial Intelligence & Data Science Engineer

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PROFILE

Adam Khald is a final-year student in the Artificial Intelligence and Data Science Engineering program at ENSAM Meknès, Université Moulay Ismaïl, in Meknès, Morocco. He is drawn to research that opens up complex, multi-stage AI systems and asks why they succeed, why they fail, and how their behavior can be made transparent and auditable rather than treated as a black box. This curiosity spans explainable AI, multi-agent systems, and autonomous perception, and is matched by a broader enthusiasm for building working software end-to-end, from first idea to deployed system. Outside of research, he enjoys the process of taking an ambitious technical idea and seeing it through to something real and usable.

EDUCATION

Diplôme d'Ingénieur d'État — Artificial Intelligence and Data Science, Industrial Systems 2022 – 2027 (*Expected*)

École Nationale Supérieure d'Arts et Métiers (ENSAM), Meknès — Université Moulay Ismaïl

Relevant Coursework: Machine Learning, Advanced Machine Learning Techniques, Deep Learning, Reinforcement Learning, Deep Reinforcement Learning, Explainable AI (XAI), Computer Vision, Natural Language Processing (NLP), Neural Networks, Knowledge Discovery & Data Mining, Distributed Systems, Object-Oriented Programming (Java), Database Systems, Data Science Programming, Time Series Analysis, Mathematics for Artificial Intelligence and Data Science.

Mathematical Sciences Baccalaureate

2019 – 2022

Jaber Ibn Hayan High School

RESEARCH PUBLICATIONS

Hierarchical Explanation Graph (HEG): Causal Explainability for Hierarchical LLM Multi-Agent Pipelines 2026

Zenodo — ENSAM Meknès DOI: 10.5281/zenodo.21009192

- Introduced a two-level explainability framework distinguishing intentional self-explanations from causal explanations in hierarchical multi-agent LLM pipelines.
- Designed a dual-orchestrator architecture that executes a pipeline normally while a parallel orchestrator perturbs each layer's intermediate state and measures the resulting shift in the final output via cosine divergence, yielding an experimentally grounded causal weight per layer.
- Evaluated the framework across 7 tasks and 42 perturbation experiments, revealing systematic confabulation: the pipeline's final evaluator layer explained its output with full confidence despite near-zero measured causal contribution.
- Status: published on Zenodo; arXiv submission in preparation.

PROFESSIONAL EXPERIENCE

AI/LLM Systems Intern

June – July 2026

COLFI (Remote, London) — COLFI Back-Office Platform: LLM Monitoring Agent

- Built an LLM-based monitoring agent on top of the platform's existing multi-agent orchestration system to detect and narrate drift in financial models.
- Implemented PPCA-based drift detection, a deterministic cash placement / funding allocation optimizer, and a governed recommendation schema for surfacing model-drift alerts to operators.
- Worked within a React + FastAPI back-office application also covering OCR-assisted document extraction and ISO 20022 payload generation.

- *Technologies:* React, FastAPI, PostgreSQL, OpenAI API, multi-agent orchestration.

Decentralized Application (DApp) Developer Intern

Summer 2025

COLFI (Remote, London) — ColFi: Asset Finance Management DApp

- Built a decentralized asset and collateral management platform on Hyperledger Fabric for a London-based fintech startup.
- Developed smart contract logic (chaincode) for asset state transitions, collateral locking/unlocking, and immutable audit trails.
- Integrated a Next.js frontend with AWS infrastructure (EC2-hosted Fabric network, Amplify-managed API layer) for real-time portfolio tracking and secure financial data management.
- *Technologies:* Next.js, React, Tailwind CSS, AWS (EC2, Amplify), Hyperledger Fabric, Git/GitHub.

Predictive Maintenance Intern

July 2024

Yazaki

- Contributed to continuous improvement of maintenance processes.
- Performed diagnostics to anticipate system failures using sensors and data analysis software.

TECHNICAL PROJECTS

Vehicle Trajectory Prediction with PointNet and BiLSTM-Attention on nuScenes

In progress

Independent research project — ENSAM Meknès

- Developing a trajectory prediction model combining point-cloud feature extraction (PointNet) with a BiLSTM-Attention sequence model, benchmarked on the nuScenes dataset.
- Builds on prior CARLA-simulation-based autonomous vehicle trajectory prediction work.
- Full research pipeline established: exploratory data analysis, baseline benchmarking, model implementation, ablation studies, and manuscript writeup.
- *Technologies:* Python, PyTorch, PointNet, BiLSTM, Attention, nuScenes devkit.

Ciffeer — AI Agent Platform (Solo Founder)

2025 – Present

Independent, under own entity Corarea

- Solo-built a production multi-agent orchestration platform with a multi-layer pipeline (Orchestrator → Planner → Mid-Level Planner → Analyser → Executor → Evaluator): Go orchestrator with a Python/FastAPI AI Brain service.
- 100+ tools across 15 categories, with a semantic memory layer using pgvector and cosine-similarity retrieval.
- Deployed in production on Google Cloud Run (ciffeer.com), with a Next.js frontend and Supabase-backed data layer.
- *Technologies:* Go, Python, FastAPI, Supabase, pgvector, Docker, Google Cloud Run, DeepSeek LLM, Next.js.

Corporate Action Document Parsing Pipeline

2025

Independent project

- Designed a document intelligence system to extract structured financial data from unstructured PDFs.
- Implemented a hybrid strategy combining layout parsing with an LLM-based fallback for scanned documents, including explicit false-positive controls.
- *Technologies:* Python, PyMuPDF, FinBERT, LightGBM, Claude API, FastAPI, Docker, AWS.

Insight-Ray — Chest X-ray Abnormality Detection

2024

Independent project

- Fine-tuned YOLOv5m and YOLOv8 on the VinBigData Chest X-ray Abnormalities Detection dataset (18,000+ images, 14 abnormality classes) for automated thoracic anomaly detection.
- Combined detection with natural-language explanations of findings via the Gemini API, exposed through both a Flask web application and a Tkinter desktop interface.
- *Technologies:* PyTorch, YOLOv8/Ultralytics, OpenCV, Flask, Tkinter, Gemini API.

Dalil AI — Offline Desktop ML Research Platform

2024

Independent project

- Built an offline-first desktop application unifying scikit-learn, PyTorch, TensorFlow, MediaPipe, and Stable-Baselines3/Gymnasium behind a single GUI, enabling users to run ML, deep learning, computer vision, and reinforcement learning workflows locally without cloud dependency.
- Includes a 7-step scikit-learn wizard, a PyTorch transfer-learning lab, TFLite export for edge deployment, real-time MediaPipe vision, and an RL Studio for training PPO/DQN/SAC agents.
- *Technologies:* Python, PyTorch, TensorFlow, scikit-learn, MediaPipe, Stable-Baselines3, Gymnasium.

Breiman CART — From-Scratch CART Implementation 2025
Independent project PyPI: breiman-cart

- Implemented Classification and Regression Trees (CART) in pure Python following the original methodology of Breiman, Friedman, Olshen, and Stone (1984), including cost-complexity pruning and native categorical feature handling.
- Published as an installable, scikit-learn-compatible Python package.
- *Technologies:* Python.

ACHIEVEMENTS & AWARDS

1st Prize — Innov’am 2024, Arts et Métiers Innovation 2024
Winner with Siana company: autonomous robot for TGV train bogie inspection

3rd Prize — Innovathon 2024 2024
Developed a no-code solution demonstrating rapid creation of accessible applications

CERTIFICATIONS & TRAINING

Foundations of Data Science — Google 2024
Introduction to data manipulation, visualization, and fundamental machine learning concepts

Embedded Systems — ENSAM Meknès 2022
Design, development, and deployment of embedded systems across technological sectors

TECHNICAL SKILLS

Programming	Python, Go, C++ , R, Next.js, React, Git/GitHub
AI / ML	Machine Learning, Deep Learning (TensorFlow, PyTorch), Computer Vision (YOLO, OpenCV), LLM Orchestration, Multi-Agent Systems, Time Series
Data Science	Data Analysis, Visualization, PostgreSQL, pgvector, Supabase, NumPy, Pandas
Infrastructure	Docker, Google Cloud Run, AWS, FastAPI, Hyperledger Fabric, Embedded Systems, Linux
Methodology	Testing & QA, Problem Solving, Agile, System Design

LANGUAGES

French: Fluent | English: Fluent | Arabic: Native | Darija: Native | German: B2 (self-studied)