

Mahmoud Abdelhamid

AI Engineer

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WORK EXPERIENCE

AI Engineer

ThinkTech Company

jun 2025 - Ongoing

Designed and deployed a production-grade Retrieval-Augmented Generation (RAG) service that ingests PDFs/XLSX/docs (local or Google Drive), runs OCR + embedding pipelines, and serves structured financial insights via FastAPI APIs.

Implemented a job queue architecture with background threads to handle multi-analysis requests, stream progress, and persist results as JSON for polling endpoints.

Built modular pipelines for document ingestion, OCR (YOLO + PaddleOCR + Tesseract), and LangChain-based chunking, feeding embeddings into Qdrant vector stores.

Standardized outputs with Pydantic schemas and prompt templates to ensure multi-lingual, structured JSON responses for downstream systems.

Integrated Tavily/Exa web agents and financial-specific analyses (ratios, entity background, bank statements) into RetrievalQA chains.

Dockerized and CI/CD-enabled (Azure Pipelines) deployment, with configurable concurrency, monitoring hooks, and storage cleanup utilities.

Tools & Technologies:

- Python, FastAPI, Uvicorn, Pydantic, LangChain, LangSmith, Langfuse, OpenAI GPT-4.1/GPT-5 APIs, OpenAI embeddings, Qdrant, FAISS, PyMuPDF, Unstructured, pdfplumber, PaddleOCR, Ultralytics YOLO (DocLayNet), OpenCV, Tesseract, Pandas, openpyxl, Tavily, Exa, Google Drive API, Docker, Azure Pipelines, RotatingFileHandler logging.

Remote AI & ML Engineer

Upwork, Direct Clients, Udemy, Udacity

July 2022 - Ongoing

- Worked on diverse AI & ML projects for global clients, covering predictive modeling, NLP, and computer vision.
- Led small teams and collaborated directly with clients to deliver tailored AI solutions.
- Built and deployed practical end-to-end applications in machine learning and generative AI.
- Transitioned into teaching, delivering AI courses and workshops with Udemy and Udacity to mentor aspiring engineers.

TECHNICAL SKILLS

Programming Languages: Python, R

Generative AI & LLMs: LangChain, LangGraph, CrewAI, Phidata Framework Transformers (BERT, GPT, LLaMA, Mixtral), RAG, LLM APIs, Pydantic

Deep Learning & NLP Frameworks: TensorFlow, PyTorch, Scikit-learn, Keras, OpenCV, spaCy, NLTK

Data & Visualization: Pandas, NumPy, SciPy, Matplotlib, Seaborn

Evaluation & Monitoring: Langfuse, Ragas, LangSmith

Technologies & Tools: Docker, Linux, Git, GitHub, Streamlit, Flask, FastAPI

Databases: SQL, MySQL, PostgreSQL, SQLite3, SQLAlchemy, Database Design, Query Optimization

Core Concepts: Neural Networks, CNN, RNN, LSTM, Computer Vision, NLP, Deep Learning, RAG, API Development, OOP

PROJECTS

- **Enterprise-Grade RAG Platform:** Developed a FastAPI-based Retrieval-Augmented Generation system for ingesting and validating TXT/PDF/XLSX files. Built modular pipelines with LangChain for chunking, async MongoDB for persistence, and Dockerized deployment with Postman test coverage.
Tools: Python, FastAPI, LangChain, MongoDB, Docker, Postman [GitHub](#)

- **Medical RAG Chatbot:** Flask-based chatbot for clinical PDFs using LangChain retrieval and FAISS search. Added conversational memory, hallucination control, telemetry with Langfuse, and a responsive UI; deployed with Docker and CI/CD pipelines.
Tools: Python, Flask, FAISS, LangChain, OpenAI, Langfuse, Jenkins [GitHub](#)
- **LangChain Chat with SQL DB:** Enabled natural language access to databases using LangChain and Groq Cloud. Users query in plain English while the system dynamically translates into SQL and returns results.
Tools: Python, Streamlit, LangChain, SQLAlchemy, Groq [GitHub](#)
- **Plant Disease CNN Classifier:** Built a CNN model to detect plant diseases from images with high accuracy. Delivered via an interactive Streamlit app for farmers and researchers.
Tools: Python, TensorFlow, Keras, Streamlit [Try it!](#)
- **Multi-Agent Financial Research Assistant:** Designed a Phidata-based multi-agent system where Groq LLMs coordinate web and finance agents. Delivered Markdown-formatted insights with tables, news context, and market analysis.
Tools: Python, Phidata, Groq LLMs, YFinance, DuckDuckGo [GitHub](#)
- **Graduation Project – MOA Prediction:** Built a full-stack ML platform predicting drug mechanisms of action (Kaggle Lish-MOA). Integrated autoencoder-based deep learning, ensemble models, and a Flask API with a Next.js frontend.
Tools: Python (TensorFlow, XGBoost, scikit-learn), Flask, Next.js, PostgreSQL [GitHub](#)
- **AnimeGPT-LLMOps (Personal Project):** Created a retrieval-augmented anime recommender using ChromaDB and Groq LLMs. Added Streamlit UI, Langfuse observability, Docker/K8s deployment, and Grafana Cloud monitoring.
Tools: Python, Streamlit, LangChain, ChromaDB, Groq, Docker, Kubernetes, Grafana [GitHub](#)

EDUCATION

Menoufia University
B.S. in Computer Science

Egypt – Menoufia
May 2020 - May 2024

GPA: 3.65/4.0 Achieved Excellent with Honors Ranked **7th** in the college

EXTRACURRICULAR ACTIVITIES

- **Kaggle Expert:** Gained expert-level skills by competing in data science challenges, specializing in NLP, ML, Gen AI, Computer Vision, and Deep Learning.
- **Egyptian Collegiate Programming Contest (ECPC):** Participated from 2020 to 2024, then transitioned to coaching in 2024 to mentor aspiring programmers in the competition.
- **Problem-Solving Training:** Solved 1,000+ problems on platforms like Codeforces and Leetcode, with a focus on algorithms and data structures. Regularly competed in 20+ high-level contests, achieving a top 10% placement in several.

PERSONAL INFORMATION

- **Date of Birth:** 23 December 2002.
- **Military Status:** Exempted.
- **Marital Status:** Single.
- **Nationality:** Egyptian