Omar Hassan

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Skills

- **ML/AI**: PyTorch, TensorFlow, Scikit-learn, AutoML (H2O), PEFT, SFT, ONNX, CTranslate2, NLP, Google-ADK, Computer-vision, Computational Biology, Agentic-AI
- **Languages & Tools**: Python, REST/FastAPI, Gradio, Pydantic, Git, DVC, LFS, Docker, Conda

Education

- **Alexandria university** — Alexandria, EG
  Bachelor of Engineering in Biomedical Engineering; GPA: 3.13 — *Aug. 2022 – Dec. 2027*

Experience

- **SmartCI center FOE** — Alexandria, EG
  TinyML research intern — *Oct 2025 - Present*
  - **Caption-LSTM**: Researching the use of Lstms in Vision tasks such as image captioning and deployment on resource constrained devices as a lightweight alternative to Vision transformers.
- **Made in Alexandria (M.I.A) Robotics** — Alexandria, EG
  AI Engineer — *Sep 2025 - Present*
  - **Benchmark Nllb200**: Added benchmarking support of ARZ Egyptian Arabic text translation to English and vice versa to (LM Evaluation Harness) with Meta's Nllb200 measuring BLEU, CHRF and BERT scores.
  - **Benchmark Whisper**: Expanded upon an already establish Speech to Text models evaluation and benchmarking framework (Pico-Voice) to benchmark OpenAI's Whisper capabilities in Transcribing ARZ Egyptian Arabic speech into Arabic and English text measuring RTF, WER and BLEU scores.
  - **Spatial Awareness System**: Architected a stateless, zone-based mapping framework using YOLOv8, replacing complex tracking with a 5x3 grid system for high-reliability detection during frequent occlusions.
  - **HRI & Debouncing**: Engineered a 3-Stage Priority Debouncing Pipeline scoring detections via spatial relevance and confidence; filtered 83% of visual noise to deliver clear, non-fatiguing audio feedback.
  - **RGB-D Fusion**: Fused multi-modal depth data to map objects into precise distance bands (Close, Medium, Far), providing real-world orientation and critical obstacle avoidance cues for navigation.
  - **Edge Optimization**: Developed a hybrid architecture (FastAPI/Docker + Native MPS GPU) to bypass containerization bottlenecks, achieving a 5.7x inference speedup on Apple Silicon hardware.
- **Scientific innovation dynamics (SID)** — Alexandria, EG
  Applied ML and AI researcher — *July 2024 - Sep 2025*
  - **Pytorch data pipeline**: Transferred a mainly Scipy signal processing pipeline applying various filters, preprocessing techniques and normalization to PCG signals to a Pytorch dataset class leveraging Gpu acceleration (P100) speeding up processing times from 5 hours on 8000 PCG's to 40 minutes .
  - **PCG Data collection**: Collected and Curated 8000 PCG audio recordings spanning multiple sources that later got fed to the Pytorch data pipeline.
  - **CNN MFCC baseline model**: Built a baseline CNN classifier for unhealthy heartsounds detection using MFCCS achieving an F1 score of 0.7.
  - **Microfluidic live cell separation**: Designed end to end a Microfluidic cell separator using live cell imagery detecting the target cell using Yollov11 replacing cell staining and tagging.
  - **Yolov11 baseline**: Pretrained Yolov11 on 1.8 mil+ phase contrast cell imagery, achieving mAP50 0.702, mAP50–95 0.436, Precision 0.813 and Recall 0.581. Considering the imbalanced dataset and high overlap of cells in most imagery.
- **ESRI North Africa** — Cairo, EG
  GIS Intern — *June 2025 - July 2025*
  - **Presto-GeoAI**: Fine tuned Presto a foundational GeoAI model for the task of Classifying 3 crop types across Africa as my internship project and as part of a global competition on Zindi, achieving position 37 on the leaderboard, finally I added an export layer that integrates the model's output into Esri's ArcGIS suite where you can view the results as a feature layer.

- **Faculty of Dentistry STDF Grant Proposal** Alexandria, EG
  Research Intern *May 2025 - June 2025*
  - **AI-Assisted Modeling and Optimization of 3D Bioprinted Grafts for Wound Healing**: Proposed a novel AI solution to model patient and task specific Bioink formulations and wound healing scaffolds ensuring maximum compatibility and potency.

Projects

- **Shato Robotic Assistant**: A voice controlled robotic assistant that can navigate its environment. Built using microservices architecture and at its core a Gemma-3 270M LLM fine-tuned on a custom instruction dataset (SFT LORA with Unsloth).
- **XAI with CNNs**: Fine tuned pre-trained ResNet-34 and MobileNetV2 on Caltech 101 dataset. Implemented adversarial attacks, systematically evaluated model robustness against FGSM attacks using torchattacks; applied Grad-CAM and vanilla gradient saliency mapping for explainability. Also implemented and evaluated defensive strategies against adversarial attacks.
- **Virtual Cell challenge 2025 CAPE-model**: Cape is a virtual cell model aimed at accurately predicting cell state after CRISPRi gene perturbation. I was responsible for implementing multiple loss functions including Wasserstein loss using geomloss.
- **ACE-Hallucinations**: Built hallucination-resistant LLM for Russian hallucination detection (Codeforces) using an agentic context engine (ACE). Trained Gemma-3 270M as Generator with Gemini Flash 2.5 as Reflector/Curator on a SberQuAD-derived dataset; developed 83 anti-hallucination strategies; deployed via llama.cpp BF16 GGUF for GPU inference.
- **HireWorkflow AI**: As part of an Agentic AI Hackathon with IBM watsonx Orchestrate. HireWorkflow is a multi-agent recruitment automation system using IBM watsonx Orchestrate that screens candidates through CV analysis and GitHub code quality assessment. Architected 4 collaborative agents (Orchestrator, CV Parser, GitHub Analyzer, Grading) with React/Planner patterns. Integrated MCP tools (GitHub Toolkit, PDF Toolkit) and built custom tools for Google Drive OAuth. Deployed with Node.js/Express backend, achieving 80% reduction in screening time.
- **Simple Protein Agent**: As part of Google AI Agents Intensive. Built an agentic system to democratize protein engineering by converting natural language into validated protein designs. Orchestrated Gemini 2.5 for biological reasoning and Apple's SimpleFold for structure prediction using Google ADK. Engineered a novel sequential loading pipeline for ESM-3B and SimpleFold that reduces peak memory requirements by 50% (24 GB $\rightarrow$ 12 GB) to enable execution on standard consumer GPUs.