

# Mohamed Essam Fayed

Website

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Github

## EXPERIENCE

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### • Applied Innovation Center (AIC)

Alexandria

*NLP Assistant R&D Engineer*

Jan 2021 - Now

Worked on various NLP tasks to produce high quality models, such as:

- Instruction Fine-tuned LLMs on Arabic for Document Level Machine Translation and Chat applications using Parameter Efficient Fine-tuning techniques (LoRA & MeZO)
- Built guardrails system using a mix of agentic AI to generate high quality data, train a culture sensitive classifier and a set of heuristics.
- Developed expertise in currently available LLM inference frameworks, and LLM benchmarking tools for multimodal and multilingual settings.
- Trained speech-to-phoneme system for Modern Standard Arabic, which ranked first on IqraEval 2025 competition in ArabicNLP conference. Description of the system could be found in our paper here.
- Worked on Machine Translation project to build multilingual model with focus on low resource Egyptian Colloquial Arabic.
- Exposed to other NLP tasks to serve the main problems such as data indexing/quering to/from Elasticsearch for LLM applications.
- Tuned encoder models on token classification task, specifically sentence punctuation (inserting punctuations to an unpunctuated sentence) in many languages.
- Mentored new comers and interns.
- Collaborated with HPC department in setting up SLURM and Kubernetes cluster, testing them, and documenting Machine Learning Engineering process starting from pushing code to gitlab, automatically build docker image using gitlab CI/CD, pushing the new image to docker registry and pulling it to kubernetes deployment.

### • Inova LLC

Alexandria

*Ruby on Rails backend developer (Internship)*

Aug 2018 - Sep 2018

- Learned backend development using rails.
- Developed a RESTfull API and DB Schema in MySQL.

## EDUCATION

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### • College of Computing, Georgia Institute of Technology

Online

*Masters of Science Computer Science; GPA: 3.62*

Spring 2023 – Fall 2026 (expected)

### • Faculty Of Engineering, Alexandria University

Alexandria, Egypt

*Bachelor Of Science In Computer And Communication Engineering; GPA: 3.44 Fall 2014 – Spring 2020 (5 years + 1 year off)*

## PUBLICATIONS

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- **AraS2P: Arabic Speech to Phonemes System:** This paper describes AraS2P, our speech-to-phonemes system submitted to the Iqra'Eval 2025 Shared Task. We adapted Wav2Vec2-BERT via Two-Stage training strategy. In the first stage, task-adaptive continue pretraining was performed on large-scale Arabic speech-phonemes datasets, which were generated by converting the Arabic text using the MSA Phonetiser. In the second stage, the model was fine-tuned on the official shared task data, with additional augmentation from XTTS-v2-synthesized recitations featuring varied Ayat segments, speaker embeddings, and textual perturbations to simulate possible human errors. The system ranked first on the official leaderboard, demonstrating that phoneme-aware pretraining combined with targeted augmentation yields strong performance in phoneme-level mispronunciation detection.

## PROJECTS

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- **Neural Machine translation:** The aim of this project is to develop high quality machine translation system for low resource Egyptian Colloquial Arabic.

- Automated and participated in building highly parallelizable data pipeline including data gathering, cleaning and preprocessing, and automated a lot of repetitive tasks including model evaluation, and scores calculations using either Shell Scripts or Python Scripts with libraries such as Pandas in SLURM environment.

- Investigated the usage of pre-trained models and LLMs in low resource MT.
- Implemented transformers variations and made some edits in different components in internal version of fairseq framework.
- Mastered the skill of planning tasks and setting priorities to experiments to transfer research to production and to balance between both goals.

- **TerminalNB:**

- Designed and Programmed this project to be a terminal alternative to Jupyter Notebook for the blind users since the edit boxes there were not accessible.
- Runs within iPython sessions on terminal.

## ACHIEVEMENTS

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- **CITI Training:** This is the PDF for certificate of completion of Group 2 Social / Behavioral Research Investigators and Key Personnel. You can also verify the certificate here. Sep 2023
- **NVAccess:** NVDA Expert Certification July 2023
- **LinkedIn:** For full list of certificates related to accessibility, Data Science and Soft Skills, please check "License and Certification" section of my linkedin profile.

## PROGRAMMING SKILLS

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- **Languages:** Python 3, Shell Scripting, LaTeX, C/C++, R, Ruby, Swift, SQL, Java
- **Frameworks:** pytorch, fairseq, hugging face transformers, LangChain, ollama, vllm, lm-eval-harness, numpy, pandas, regex
- **Technologies:** Docker, Kubernetes, SLURM, Google Cloud Platform, Microsoft Azure, Screen Readers (NVDA & VoiceOver), Vim, Jupyter Notebook