

# KAREEM ELSAWAH

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## OBJECTIVE

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Computer Engineering student with a passion towards machine learning and robotics. My most recent interests have been generative modeling, causal inference, and LLMs. I am currently interested in applied research opportunities in these fields.

## EDUCATION

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**Bachelors of Computer Engineering**, Ain Shams University, Faculty of Engineering Expected 2023  
Major in Computer Engineering and Software Systems GPA: 3.88  
Minor in Data Science  
Thesis: Swarm of Autonomous Drones for Environment Mapping

## EXPERIENCE

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**AI Team Leader** Nov 2019 - Now  
ASU Racing Team *Cairo, Egypt*

- Led Formula AI and Shell AI teams for the 2021 season where we won several awards
- Designed and Implemented a novel deep learning architecture capable of detecting the types and 3D positions of cones at speeds exceeding 40 fps (a modified version of LaserNet).
- Developed and tested a graph-based SLAM algorithm for the Formula AI problem
- Created low-level control on a real-life car and tested the system using it
- Held a summer AI & Robotics workshop with over 200 applicants filtered to over 40 attendees
- Wrote a [research gate article](#) on the system developed in 2021

**Internship** July 2022 - October 2022  
Microsoft, Advanced Technology Lab *Cairo, Egypt*

- Worked on low-resource machine translation and speech recognition
- Used language models to implement basic rescoring algorithms and improved the baseline by 4% (BLEU) using rescoring during training rather than inference (language model prior)
- Started work on transfer learning between languages in the embedding space using contrastive learning approaches

**Perception Internship** Jan 2021 - Sep 2021  
ARL, Autotronics Research Lab *Cairo, Egypt*

- Worked on the perception system for a self-driving car, especially object detection and tracking
- Used LiDAR and RGB Cameras to detect objects in 3D using PVCNN
- Tracked objects in 2D and 3D using SORT, DeepSORT, and similar 3D variants.
- Created a visualizer in Unreal Engine to view all of the cars' perceptions (surrounding cars, lanes, traffic lights, path planning, pedestrians, etc.)

**Junior ML Engineer** Aug 2021 - Oct 2021  
Omdena

- Contributed to data wrangling, data analysis, and modeling on a real-world time series problem
- Tested early baselines using SARIMAX
- Built a Bayesian AR model using PyMC3 with a learned prior (to have few-shot learning)

## AWARDS

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Shell Eco-Marathon, Pitch the future, Global 1st place 2022

Shell Eco-Marathon, Autonomous Programming, 5th place 2022

Machathon 1.0, 2nd place 2020

AI Crowd, AI Blitz 3, 4th place 2020

## PROJECTS

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**GANVAS**: PyTorch implementation of various generative models including: Autoregressive models, Normalizing Flows, Variational Autoencoders, and Denoising Diffusion models.

**Zeta**: Implementation of REINFORCE, A2C, and PPO from scratch using only NumPy including an implementation of a deep learning framework with CNNs. Trained on several OpenAI gym environments: continuous and discrete action spaces as well as some with images as inputs instead of states. We also created a 3D physics engine from scratch to create custom environments such as a walking spider and a drone to train PPO.

**BROS**: Bandwidth Reduction for Online Streaming. A computer vision and deep learning tool to reduce the required bandwidth for streaming lectures by removing the lecturer (while showing where he/she is pointing) and discretizing the shown board.

## EXTRA-CURRICULAR ACTIVITIES

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### Technical Team Leader, STP

Oct 2020 - Now

- Helping organize the Machathon 4.0 competition with a focus on self-driving vehicles
- Led three teams to deliver workshops on Machine Learning, Web & Cloud, and Python & Arduino with a focus on projects and implementing algorithms from scratch.
- Organized Macathon 3.0 with a focus on computer vision: reading car license plates.
- Delivered advanced sessions on Machine Learning with a focus on Natural Language Processing to prepare participants for the Macathon 2.0
- Organized the Macathon 2.0 competition with a focus on Arabic NLP

### Music Team Member

October 2018 - Now

- Play the piano and guitar, currently the lead pianist. Check us out at [facebook.com/musicasufoe](https://facebook.com/musicasufoe)
- Member of the faculty team where we won every university competition announced starting from 2018.
- Member of the university team where we won 1st place in the national competitions of 2020 and 2021.