## PERSONAL INFORMATION


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| **Name:** | Abdelrahman Shaker |
| **Date of birth:** | 01/10/1994 |
| **Nationality:** | Egyptian |
| **Residence:** | Masdar City, Abu Dhabi, UAE (Golden Visa Holder) |
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| **LinkedIn profile:** | www.linkedin.com/in/abdel-rahman-shaker-74274b9b |

## PROFILE SUMMARY

I have a mixed experience between conducting pure academic research and contributing to international products in the industry. I have published over 10 research papers with +650 citations and contributed to more than 5 international projects. My research interest is efficient Computer Vision, specially designing accurate, lightweight, and memory-efficient 2D and 3D architectures for edge devices. I am seeking Research Scientist position in the field of Edge CV/ML following the completion of my PhD.

## EDUCATION

**Mohamed bin Zayed University of Artificial Intelligence, UAE** *Aug 2021 – Mar 2025*
PhD. in Computer Vision
CGPA: 3.95/4.0

**Faculty of Computer Sciences, Ain-Shams University, Egypt** *Aug 2017 – Jul 2020*
MSc. in Deep Learning
CGPA: 3.73/4.0

**Faculty of Computer Sciences, Ain-Shams University, Egypt** *Sep 2012 – Aug 2016*
BSc. in Computer Sciences
Excellent with honors grade. Department Rank: 1st (out of 149 students)

## SELECTED RESEARCH PUBLICATIONS

**GroupMamba: Parameter-Efficient and Accurate Group Visual State Space Model** *(Under Review)*

***Abdelrahman Shaker***, *Syed Talal , Salman Khan, Jurgen Gall, Fahad Khan*

We introduce GroupMamba to enhance the computational efficiency and interaction within state-space models and address the challenges of scaling SSM-based models for computer vision, particularly the instability and inefficiency of large model sizes. To address this, we introduce a Modulated Group Mamba layer which divides the input channels into four groups and applies our proposed SSM-based efficient Visual Single Selective Scanning block independently to each group.

**UNETR++: Delving into Efficient and Accurate 3D Medical Image Segmentation** *(IEEE TMI - 2024)*

***Abdelrahman Shaker***, *Muhammad Maaz, Hanoona Rasheed , Salman Khan, Ming-Hsuan Yang, Fahad Khan*

This work introduces a 3D medical image segmentation approach, named UNETR++, that offers both high-quality segmentation masks and efficiency in terms of parameters and compute cost. The core of our design is the introduction of a novel efficient paired attention (EPA) block that efficiently learns spatial and channel-wise discriminative features using a pair of inter-dependent branches based on spatial and channel attention.

**GLaMM: Pixel Grounding Large Multimodal Model** *(CVPR - 2024)*

*Muhammad Maaz, Hanoona Rasheed , Sahal Shaji,* ***Abdelrahman Shaker****, Salman Khan, Hisham Cholakkal, Rao M. Anwer, Eric Xing, Ming-Hsuan Yang, Fahad Khan*

Grounding Large Multimodal Model (GLaMM) is an end-to-end trained LMM which provides visual grounding capabilities with the flexibility to process both image and region inputs. This enables the new unified task of Grounded Conversation Generation that combines phrase grounding, referring expression segmentation, and

vision-language conversations. Equipped with the capability for detailed region understanding, pixel-level groundings, and conversational abilities, GLaMM offers a versatile capability to interact with visual inputs provided by the user at multiple granularity levels.

**SwiftFormer: Efficient Additive Attention for Transformer-based Real-time Mobile Vision Applications** *(ICCV - 2023)*

***Abdelrahman Shaker***, *Muhammad Maaz, Hanoona Rasheed , Salman Khan, Ming-Hsuan Yang, Fahad Khan*

We introduce in this work a novel efficient additive attention mechanism that effectively replaces the quadratic matrix multiplication operations of the self-attention with linear element-wise multiplications. Using our proposed efficient additive attention, we build a series of models called "SwiftFormer" which achieves state-of-the-art performance in terms of both accuracy and mobile inference speed.

**Arabic Mini-ClimateGPT : A Climate Change and Sustainability Tailored Arabic LLM** *(EMNLP - 2023)*

**Sahal Shaji, *****Abdelrahman Shaker***, *Omkar Thawakar, Hisham Cholakkal, Rao M. Anwer, Salman Khan, Fahad Khan*

We propose a light-weight Arabic Mini-ClimateGPT that is built on an open-source LLMs and is specifically fine-tuned on a conversational-style instruction tuning curated Arabic dataset Clima500-Instruct with over 500k instructions about climate change and sustainability. Further, our model also utilizes a vector embedding based retrieval mechanism during inference. We validate our model through quantitative and qualitative evaluations on climate-related queries.

**EdgeNeXt: Efficiently Amalgamated CNN-Transformer Architecture for Mobile Vision Applications** *(ECCVW- 2022)*

**Muhammad Maaz, *****Abdelrahman Shaker***, *Hanoona Rasheed , Salman Khan, Ming-Hsuan Yang, Fahad Khan*

This work is a new hybrid architecture that effectively combine the strengths of both CNN and Transformer models. We introduce split depth-wise transpose attention (SDTA) encoder that splits input tensors into multiple channel groups and utilizes depth-wise convolution along with self-attention across channel dimensions to implicitly increase the receptive field and encode multi-scale features.

**INSTA-YOLO: Real-time Instance Segmentation** *(ICMLW- 2021)*

**Eslam Mohamed, *****Abdelrahman Shaker***, *Ahmad El-Sallab, Mayada Hadhoud*

We propose Insta-YOLO, a novel one-stage end-to-end deep learning model for real-time instance segmentation. Instead of pixel-wise prediction, our model predicts instances as object contours represented by 2D points in Cartesian space. We evaluate our model on three datasets, namely, Carvana, Cityscapes and Airbus. We compare our results to the state-of-the-art models for instance segmentation.

***Generalization of Convolutional Neural Networks for ECG Classification Using Generative Adversarial Networks.*** *(IEEE Access - 2020)*

***Abdelrahman Shaker***, *Manal Tantawi , Howida Shdeed, Mohamed Fahmy Tolba*

We propose a novel data augmentation technique based on generative adversarial networks (GANs) to address the imbalance in the MITBIH dataset for more accurate heartbeat classification. We also introduce two deep learning approaches: an end-to-end method and a two-stage hierarchical method. Our results demonstrate that augmenting the original imbalanced dataset with GAN-generated heartbeats significantly enhances ECG classification performance compared to training the same techniques solely on the original dataset. Results show that our GAN-based augmentation method outperforms other standard data augmentation techniques.

## WORK EXPERIENCE

**Valeo Egypt** *Sep 2019 – Jul 2021*

*Machine Learning / SW Engineer*

I have contributed to the development and enhancement of advanced driver assistance systems (ADAS) and autonomous driving technologies. My role involved integrating cutting-edge deep learning models, improving system accuracy and efficiency, and collaborating cross-functionally to meet stringent customer requirements. Below are some of the key projects I worked on:

- **Driver Monitoring System (DMS):** Integral contributor to the DMS Daimler project, focusing on driver recognition and alertness within an integrity OS framework. Integrated components from ECP, Vision, and Algorithms teams, aligning with customer requirements (SRS).

- **Insta-YOLO:** Developed a novel one-stage end-to-end DL model for real-time instance segmentation, replacing YOLOv3's box regression with polygon regression in the localization head and proposing a new localization loss. The proposed model is 1.75x faster than YOLACT with comparable accuracy.
- **Seat Occupancy Detection:** Improved safety by detecting and classifying car seats to optimize airbag deployment. Increased the Average Precision (AP) by 4.0% for different versions of YOLO through a new data augmentation method based on mixing image normalization techniques.
- **Object Recognition using Radar:** Developed a prototype for classifying objects from heatmaps using TI radar sensors within a car's interior.

**Valeo Egypt** *Jan 2019 – Apr 2019*

*Deep Learning Researcher*

During the internship, I worked on enhancing the autonomous driving capabilities through the development of occupancy grid maps (OGM) based on LIDAR data. My primary focus was on optimizing the processing time for updating the OGM. By implementing a novel approach that updated only the polygon of affected points rather than the entire convex hull, I was able to significantly reduce the processing time from 3.18 milliseconds to 1.28 milliseconds. This optimization not only improved the efficiency of the system but also contributed to more accurate and faster real-time environmental mapping, which is crucial for safe and effective autonomous driving.

**Ain-Shams University** *Mar 2018 – Jul 2021*

*Teaching/Lecturer Assistant*

As part of my academic involvement at Ain-Shams University, I have contributed to both teaching and course development in the fields of deep learning, computer vision, neural networks, and machine learning. My roles included:

- **Lecturer Assistant: Deep Learning and Computer Vision (2021)**
  Assisted in teaching advanced topics in Deep Learning and Computer Vision. The responsibilities included preparing and delivering lectures/labs, creating and grading assignments, providing guidance to students, create new course projects, and assisting with the development of course materials from scratch.
- **Teaching Assistant: Neural Networks and Machine Learning (2018-2020)**
  Supported the instruction of Neural Networks and Machine Learning courses. My duties involved conducting tutorials, creating and grading assignments, holding office hours to assist students with course material, grading assignments and exams, and creating new course projects.
- **Graduation Project Supervisor**
  Supervised over ten graduation projects, providing mentorship and guidance to senior undergraduate students. Responsibilities included helping students to define their project scope, offering technical advice, monitoring progress, and evaluating the final projects to ensure they met academic standards.
- **Exam Preparation**
  Contributed to the preparation and correction of mid-term exams for courses in Deep Learning, Computer Vision, Neural Networks, and Machine Learning. My responsibilities included drafting exam questions and ensuring the fairness and accuracy of grading.

**Mercedes Benz-GAS** *Aug 2016 – Jan 2017*

*Software Engineer*

Contributed to the development of in-house software applications designed to enhance communication and collaboration between departments and vendors.

## TECHNICAL SKILLS

**Artificial Intellegince:** Computer Vision, Deep Learning, Machine Learning.

**Programming Languages**: Python and C++. **Frameworks**: PyTorch and TensorFlow.

**Concepts:** Object Oriented Programming, Data Structures and Algorithms, and Agile Methodologies.

## EXTRA-CURRICULAR AND ACHIEVEMENTS

- Acted as a reviewer for Transformer-based related papers in IEEE TPAMI, IEEE Access, CVPR-2024, ECCV-2024, NeurIPS-2024, WACV-2025.
- Teaching Assistant: *CV701*, *CV703*, *AI701* at Mohamed Bin Zayed University of AI, UAE.
- Mentor in Kaggle competitions for deep learning projects at MBZUAI and Ain-Shams University.
- Ranked 1st in Deep Learning course during Ph.D. at MBZUAI.
- First place in the Innovation Competition 2017, hosted by the Egyptian Ministry of Communications
    - The competition hosted every year for excellent graduation projects for all engineering and computer sciences colleges in Egypt. We had achieved first place in the Data Science track.

## CERTIFICATES

- TensorFlow in Practice specialization from deeplearning.ai *Coursera*
- Deep Learning specialization from deeplearning.ai *Coursera*
- Machine Learning specialization from the University of Washington *Coursera*

## LANGUAGES

- Arabic: Native or bilingual proficiency.
- English: Professional working proficiency.

## REFERENCES


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