Mohamed Abdelfattah

Lausanne, Switzerland

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Education

École Polytechnique Fédérale de Lausanne (EPFL)   *Lausanne, Switzerland*

Ph.D. in Computer Vision   *Aug 2026 (Expected)*

- Supervised by Alexandre Alahi at VITA Lab
- Building SOTA **transformer**-based frameworks in *self-supervised learning*, *representation learning*, and *action understanding*
- First-author of top-tier conference publications at **CVPR** and **ECCV**; co-author at **EMNLP**.

The American University in Cairo (AUC)   *Cairo, Egypt*

B.S. in Computer Engineering   *Jun 2022*

- Graduated with Highest Honors (Rank: 5/80, GPA: 3.91/4.0), recognized on the Dean's List of Honors
- Double Minor in Mathematics and Business Administration
- **Thesis Title:** Fine-Grained Text-to-Image Generation using Generative Adversarial Networks (GANs).
- IELTS 8.5/9.0, GRE: Math 170/170, Verbal 161/170, Writing 5.5/6.

Publications

S-JEPA: A Joint Embedding Predictive Architecture for Self-Supervised Skeletal Action Recognition
  <u>Mohamed Abdelfattah</u>, Alexandre Alahi
  European Conference on Computer Vision **ECCV**, 2024

MaskCLR: Attention-Guided Contrastive Learning for Robust Action Representation Learning
  <u>Mohamed Abdelfattah</u>, Mariam Hassan, Alexandre Alahi
  Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition **CVPR**, 2024

Toward contactless human thermal monitoring: A framework for Machine Learning-based human thermo-physiology modeling augmented with computer vision
  Mohamad Rida, <u>Mohamed Abdelfattah</u>, Alexandre Alahi, Dolaana Khovalyg
  Building and Environment 110850. Elsevier, 2023

Zerowaste dataset: Towards deformable object segmentation in cluttered scenes
  Dina Bashkirova, <u>Mohamed Abdelfattah</u>, Ziliang Zhu, James Akl, Fadi Alladkani, Ping Hu, Vitaly Ablavsky, Berk Calli, Sarah Adel Bargal, Kate Saenko
  Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition **CVPR**, 2022

ArtELingo: A Million Emotion Annotations of WikiArt with Emphasis on Diversity over Language and Culture
  Youssef Mohamed, <u>Mohamed Abdelfattah</u>, Shyma Alhuwaider, Feifan Li, Xiangliang Zhang, Kenneth Church, Mohamed Elhoseiny
  Proceedings of the 2022 Conference on Empirical Methods in Natural Language Processing **EMNLP**, 2022

Research Experience

SpreeAI   *Nevada, USA*

Computer Vision Research Scientist   *Jul 2022 – Feb 2023*

- Developed a **conditional diffusion model** that enhanced high-quality user face reconstruction, resulting in a **20% improvement** in performance compared to previous methods.
- Innovated a U-Net architecture for **head swapping** that effectively preserved **pose, skin tone, and illumination**, improving realism in AI-powered photorealistic try-on.

King Abdullah University of Science and Technology (KAUST)   *Thuwal, Saudi Arabia*

Deep Learning Intern (Prof. Mohamed Elhoseiny, Vision-CAIR Group)   *Mar 2022 – Jan 2023*

- Led the collection of the first and largest **vision-language dataset** with affective captions and explanations in four languages.
- Co-developed training techniques and recipes for leveraging diversity of language and culture towards superior performance in image captioning and emotion prediction tasks. Co-authored and published a high-impact paper at **EMNLP 2022**

Boston University   *Boston, USA*

Remote Visiting Research Student (Prof. Sarah Bargal, IVC Group)   *Jun 2021 – Dec 2021*

- Designed and implemented **data augmentation pipelines** tailored to preserve object characteristics and dataset diversity.
- Delivered insights into the challenges of balancing datasets and optimizing segmentation performance in deformable industrial waste objects.
- Co-authored and published a pioneering paper at **CVPR 2022** .

SWVL   *Cairo, Egypt*

Data Engineering Intern   *Sep 2020 – Jan 2021*

- Utilized Amazon Web Services (AWS) to store, analyze, and model data of **5.2 million** customers.
- Engineered an innovative data visualization tool utilizing Apache Spark, Kepler, and Mapbox, enhancing team collaboration and insights.

Featured Projects

MaskCLR: Robust Transformers for Action Recognition
Lausanne, Switzerland
CVPR 2024   *EPFL*
- Proposed a novel **masking strategy** that selectively drops the most important joints in the human skeleton sequence, helping transformers learn from previously-unexplored, information-rich joints for skeleton-based action classification.
- Developed a multi-level **contrastive learning** framework to enforce the representations of standard and occluded skeletons to be class-discriminative, forming better decision boundaries and boosting the overall model accuracy and robustness.
- Achieved SOTA results on NTU60, NTU120, and Kinetics400 datasets, outperforming prior models on perturbed and incomplete skeletons.

S-JEPA: A New Pretext Task for Self-Supervised Action Recognition
Lausanne, Switzerland
ECCV 2024   *EPFL*
- Proposed a new **pretext task** based on predicting the latent representations of missing joints, focusing on high-level contextual information.
- Introduced a centering operation to stabilize training and enhance the quality of learned representations.
- Outperformed SOTA methods on NTU60, NTU120, and PKU-MMD datasets using a vanilla transformer architecture.

ArtELingo: Multi-Modal Understanding Through Language Diversity
Thuwal, Saudi Arabia
EMNLP 2022   *KAUST*
- Spearheaded the collection of an extensive **1.5 million dataset** (ArtELingo), comprising **84,000 artworks** with affective human captions in English, Arabic, Chinese, and Spanish, supporting cultural and linguistic diversity in AI.
- Co-developed novel algorithms for **multi-modal understanding**, boosting performance on image captioning and emotion prediction tasks by leveraging cross-language and cross-culture diversity.

ZeroWaste: Detection and Segmentation of Challenging Objects
Boston, USA
CVPR 2022   *Boston University*
- Developed an augmented version of an industrial waste deletion dataset - ZeroWasteAug - to address **class imbalance** by augmenting cropped objects from underrepresented classes, resulting in a class-balanced dataset.
- Conducted extensive experiments on **weakly supervised semantic segmentation** of highly deformable objects using state-of-the-art (SOTA) models (e.g., PuzzleCAM, Mask R-CNN) to establish robust baselines for future research.
- Evaluated model performance and validated the generalization capability of segmentation approaches across deformable object categories.

Skills

Coding	Python, PyTorch, TensorFlow, CUDA, Git, Docker, OpenCV, NumPy, SciPy, Scikit-learn
Deep Learning	Self-Supervised Learning, Representation Learning, Transfer Learning, Graph Neural Networks
Computer Vision	Semantic Segmentation, Object Detection, Feature Extraction, 3D Human Pose Estimation
Languages	English (Fluent), Arabic (Native)

Achievements

2022	**PA Cup,** for top academic and extracurricular achievements in the class of 2022	*AUC*
2022	**High Academic Achievement Award,** for graduating among the top 5 students in the class of 2022	*AUC*
2021	**Research Grant,** awarded 4,000 USD for impactful research contributions in computer vision	*AUC*
2019	**Best Design Award,** for designing the most efficient mine-detection rover at a national robotics competition	*Minesweepers*
2019	**ROV Excellence Award,** for ranking in the top 10 teams in the middle east in the MATE ROV Competition	*MATE ROV*
2018	**First Place,** for solving the most competitive programming problems in the CSCE Programming Contest.	*AUC*
2018	**Highest Achiever and Reader of the Year,** for authoring the rhetorically strongest essays in 2018.	*AUC*
2017	**AGFE Full Scholarship,** awarded a 160,000 USD scholarship for outstanding potential in STEM fields	*AUC*

Teaching Experience

École Polytechnique Fédérale de Lausanne (EPFL)
Lausanne, Switzerland
Lead Teaching Assistant, Deep Learning for Autonomous Vehicles   *Feb 2023 – Present*
- Champion an ambitious project enabling **+150 EPFL master's students** to collaboratively design and implement a **Tesla Autopilot** prototype from the ground up.
- **Lead a team of Ph.D. TAs** in transforming course structure, mentoring high-achieving student teams in a competitive landscape.
- Facilitate engaging weekly **coding workshops** focused on deepening students' understanding of **PyTorch**.
- Oversee course deliverables and timelines, tracking student progress through challenging **Kaggle** competitions.

The American University in Cairo (AUC)
Cairo, Egypt
Deep Learning Teaching Assistant   *Sep 2020 – Dec 2021*
- Mentored and guided students in designing and implementing the foundational building blocks of **deep neural networks** using numpy, fostering hands-on skills essential for future researchers.
- Helped students gain the intuition behind complex machine and deep learning concepts.