Kareem Metwaly

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Education

- **Ph.D. in Electrical Engineering,** The Pennsylvania State University, USA **August 2018 – October 2022**
  GPA: 3.96, **Thesis:** Prior Guided Deep Learning for Image Restoration and Analysis (Expected)
- **M.Sc. in Engineering Mathematics,** Alexandria University, Egypt **September 2014 – June 2018**
  GPA: 3.82, **Thesis**: Optimized cooperative LTE/WiFi transmission over unlicensed bands.
- **B.Sc. in Electrical Engineering,** Alexandria University, Egypt **September 2008 – June 2013**
  Grade: Distinction with Degree of Honor 88.72% (GPA≈3.94) – ranked 6th out of 335 students.
  Received a fund from the Academy of Scientific Research and Technology (**ASRT**) and **Vodafone,** Egypt

Work and Internship Experience

- **Ph.D. Intern** at **Scale AI,** San Francisco, CA, USA **June 2021 – December 2021**
  Description: Machine Learning for attributes prediction for autonomous vehicles (CVPR 2022 paper + a dataset paper)
- **Ph.D. Intern** at **Toyota Motor North America,** Mountain View, CA, USA **February 2021 – April 2021**
  Description: Machine learning for autonomous driving (night vision using GAN architectures) [filed 2 patents].
- **Software Engineer** at **Brightskies Technologies,** Alexandria, Egypt **January 2017 – July 2018**
  Description: Developing optimized algorithms on parallel architectures for Seismic Imaging [4 posters at multiple conf.]
- **Teaching Assistant** of Mathematics at **Alexandria University,** Egypt **April 2016 – June 2018**
- **Reserve Officer** at **Egyptian Naval Forces,** Egypt **October 2013 – March 2016**

Publications

- **Kareem Metwaly**, Aerin Kim, Elliot Branson and Vishal Monga, "**GlideNet: Global, Local and Intrinsic based Dense Embedding NETwork for Multi-category Attributes Prediction**," 2022 the IEEE/CVF Computer Vision and Pattern Recognition (**CVPR**), **2022**.
- **Kareem Metwaly**, Aerin Kim, Elliot Branson and Vishal Monga, "**CAR – Cityscapes Attributes Recognition A Multi-category Attributes Dataset for Autonomous Vehicles**," to be submitted to BMVC 2022. arxiv: 2111.08243
- Li Yu*, **Kareem Metwaly***, James Wang and Vishal Monga, "**Surface Defect Detection and Evaluation for Marine Vessels using Multi-Stage Deep Learning**," the **IEEE transactions on Intelligent Transportation Systems** (TITS). *Equal Contrib. [under review]
- **Kareem Metwaly**, et al., "**NonLocal Channel Attention for NonHomogeneous Image Dehazing**," the IEEE/CVF Computer Vision and Pattern Recognition (**CVPR**) workshops, **2020**. "**Honorable Mention Award**" and "**Runner-up**" in **NTIRE 2020 competition**.
- Codruta O. Ancuti, Cosmin Ancuti, Florin-Alexandru Vasluianu, Radu Timofte, **Kareem Metwaly**, et al. "**NTIRE 2020 Challenge on NonHomogeneous Dehazing**," The IEEE/CVF Conference on Computer Vision and Pattern Recognition (**CVPR**) Workshops, **2020**.
- **Kareem Metwaly** and Vishal Monga, "**Attention-Mask Dense Merger (Attendense) Deep HDR for Ghost Removal**," IEEE International Conference on Acoustics, Speech and Signal Processing (**ICASSP**), Barcelona, Spain, **2020**, pp. 2623-2627.
- **Kareem M. Metwaly**, Karim G. Seddik, Mustafa Y. ElNainay, "**A Cooperative Scheme for the Coexistence of the LTE and WiFi Systems**" in Proceedings of the IEEE Wireless Communications and Networking Conference (**WCNC**), San Francisco, CA, **2017**.
- **Kareem Metwaly**, Mahmoud Alaa Eldin, Maha Elsabrouty, "**SISO and MIMO analog network coding relay architectures for the uplink of LTE-Advanced**" in proceedings of the IEEE Symposium on Computer and Communication (**ISCC**), Larnaca, Cyprus, **2015**.

Posters:

- **Kareem Metwaly**, et al. from Brightskies Inc. and Philippe Thierry, Intel Corp, "**Accelerated Reverse Time Migration with optimized IO**" in HPC in Asia, ISC High Performance, Frankfurt, Germany, 2018.
- Essam Algizawy, Khaled Elamrawi, Kareem Morad, Ingy Monir, Mohamed ElBasyouni, **Kareem Metwaly**, Brightskies Inc. and Philippe Thierry, Intel Corp, "**Highly Scalable Flexi-trace-based Pre-stack Time Migration**" in HPC in Asia, ISC High Performance, Frankfurt, Germany, 2018.

- **Kareem Metwaly**, et al. from Brightskies Inc., Philippe Thierry, Intel Corp., "**Revisited RTM IOs strategies with new memory hierarchies**" in Intel eXtreme Performance User Group (IXPUG), KAUST, Thuwal, Kingdom of Saudi Arabia, 2018.
- **Kareem Metwaly**, Khaled Elamrawi, Essam Algizawy, Mohamed Mahmoud, Mohamed ElBasyouni, Brightskies Inc. and Philippe Thierry, Intel Corp, "**Accelerated Reverse Time Migration with optimized IO**" in Intel HPC Developer Conference, Denver, CO, 2017.

Research Experience

- **Research Assistant** at **The Pennsylvania State University (iPAL Lab)**, PA, USA **August 2018 – Present**
  Description**:** Developing algorithms for Computer Vision and Inverse Problems in Image and Signal Processing: **1)** AttenDense for HDR. **2)** AtJwD for dehazing [**Second** in a **CVPR 2020** workshop]. **3)** Defect Detection and Classification in vessels (funded by PPG in PA, U.S.) [a patent has been filed and a journal paper is under review].
- **Research Assistant** at Collaborative Radio Cloud (CRC), **Alexandria University**, Egypt. **May 2016 – August 2017**
  Description: Participant in SC2 Challenged organized by the Defense Advanced Research Projects Agency (**DARPA**), USA + LTE/WiFi Coexistence Project [publication in the IEEE WCNC 2017]
- **Research Assistant** at Collaboration between **E-JUST** and **Wasiela**, Egypt. **April 2014 – October 2015**
  Description: Developing new approaches for relaying using Network Coding [publication in the IEEE ISCC 2015]

Technical Skills

- **Deep Learning:** PyTorch, TensorFlow, Scikit-Learn, Optuna, TensorBoard, PyTorch-Lightning ≈ **4 years**
- **Programming and Scripting Languages:** Matlab, Python, C, C++, Linux and Bash ≈ **8 years**
- **Code Optimization and Parallel Programming:** OpenMP, MPI, Intel Parallel Studio XE ≈ **2 years**
- **Experience with various HW/SW tools:** Jupyter, USRP kits, GNURadio, Intel Parallel Studio XE, Click Modular Router

Developed Software and Toolboxes

- **CAR-API:** to access our developed CAR Dataset and utilize it in Learning Algorithms, https://github.com/kareem-metwaly/car-api
- **GlideNet:** an algorithm for multi-category attributes prediction, https://github.com/kareem-metwaly/glidenet
- **AtJwD:** an algorithm for image dehazing (runner up in NTIRE 2020 competition), https://github.com/kareem-metwaly/AtJwD
- **Defect Classifications:** an algorithm for paint defect detection and classification [Proprietary of PPG Industries]

Honors and Awards

- "**Honorable Mention Award**" in the IEEE **CVPR 2020** workshops and the **Second** in the NTIRE 2020 competition.
- Joint RA/TA award from the Electrical Engineering Department at the Pennsylvania State University, PA, USA.
- Honored yearly as a **top student** during my B.Sc. degree.

Talks and Presentations

- The IEEE Conference on Computer Vision and Pattern Recognition (CVPR). **June 2020**
- The IEEE Conference on Acoustics, Speech, and Signal Processing (ICASSP). **May 2020**
- The IEEE Wireless Communications and Networking Conference (WCNC). **March 2017**

Professional Activities

- Member of the Institute of Electrical and Electronics Engineering (IEEE).
- Reviewer of the IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI).
- Reviewer of the IEEE Conference on Acoustics, Speech and Signal Processing (ICASSP).
- Reviewer of the IEEE Conference on Image Processing (ICIP).

Extracurricular Activities

- The current **Treasurer** and the **Web Manager** of MGSO [a student organization at Penn State].
- The current **Activities Coordinator** of ISCP [a non-profit organization at PA, USA].
- A previous volunteer to teach freshmen students about embedded systens [organized by the **IEEE Alexandria Student Branch**].
- Participated in MinesSweepers competition [**German University in Cario**] as well as a **SIEMENS**-funded project.
- A previous volunteer in the **Library of Alexandria**, Egypt – 2 times winning of a world cultural competition organized by **UNESCO.**
- A previous volunteer at Sona' Elhaya, Egypt – a civil and non-profit organization.
- **Languages:** Arabic [Native], English [Fluent], German/Italian/Persian [Basic]