AHMED MAGD ALY SHEHATA

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RESEARCH INTERESTS

Focused on machine learning, especially in computer vision and advanced generative models like diffusion models.

EDUCATION

Korea Advanced Institute of Science and Technology (KAIST) Aug 2021 - Aug 2023
M.Sc. in Robotics - Focused on AI and Computer Vision GPA: 4.05/4.30
Thesis: Exploring Diffusion Models for Semantic Segmentation in Bird's Eye View Mapping for Autonomous Vehicle Perception [Link]

Innopolis University — Transferred Aug 2020 – June 2021
M.Sc. in Robotics and Computer Vision GPA: 4.67/5.00

Nile University Aug 2016 - Aug 2020
B.Sc. in Mechatronics Engineering GPA: 3.98/4.00 (2^{nd}/110 students)
Thesis: Intelligent EMG-Assisted Continuous Knee Motion [Link]

RESEARCH EXPERIENCE

Johns Hopkins University - Remote Research Internship, Computer Science Department April 2024 – Present
Advised by Zongwei Zhou and Alan Yuille at the CCVL Lab
Goal: Improving medical image analysis & synthesis using computer vision and generative models.

KAIST - Researcher, Computer Science Department Jun 2023 - Mar 2024
Advised by Sungjin Ahn at the Machine Learning & Mind Lab. Contributed by:

- Developed RetNet WM: Enhanced S4WM's long-term memory by 2x, advancing model-based RL.
- Worked on fine-tuning diffusion models (based on Diffuser code) for improved RL task performance.

KAIST - Graduate Student Researcher, Robotics Department Aug 2021 – Aug 2023
Advised by Dongsuk Kum at VDC Lab
Developed a generative diffusion model to create a semantic map of the surroundings of the ego-vehicle.

Nile University - Undergraduate Researcher Jun 2019 – Jul 2020
Advised by Hossam Hassan Ammar at SESC Lab
Published three research paper in the intersection of robotics and machine learning.

PUBLICATIONS

1. A. Bangunharcana, **A. Magd**, KS Kim. DualRefine: Self-Supervised Depth and Pose Estimation Through Iterative Epipolar Sampling and Refinement Toward Equilibrium. Conference on Computer Vision and Pattern Recognition (CVPR) 2023. [Link]
2. A. Sayed, AA Mohamed, **A. Magd**, et al. Experimental modeling of hexapod robot using artificial intelligence. In the International Conference on Artificial Intelligence and Computer Vision (AICV) 2020. [Link]

3. H. Elkholi, AT Azar, **A. Magd**, et al. Classifying Upper Limb Activities Using Deep Learning. In the International Conference on Artificial Intelligence and Computer Vision (AICV) 2020. [Link]
4. AT Azar, **AM Aly**, AS Sayed, et al. Neuro-Fuzzy System for 3-DOF Parallel Robot Manipulator. In Novel Intelligent and Leading Emerging Sciences Conference (NILES) 2019. [Link]

HONORS & AWARDS

Scholarships:

- M.Sc. Full scholarship recipient at KAIST 2021
- Full scholarship recipient at Inopolis University 2020
- Funding support from the Academy of Scientific Research and Technology (ASRT) in Egypt, for my graduation project. 2020
- Bank of Egypt full scholarship recipient for B.Sc. at Nile University 2016

Contests:

- Finalist in IDAO (International Data Analysis Olympiad, Yandex) Begemot's Team [Link] 2021
- 1st place in deep learning contest (domain generalization) in Inopolis University. [Link] 2020
- Best project in Rigid Body Dynamics for modeling and controlling Steward platforms. 2018

Honorary Titles:

- Graduating from Nile University with highest honors 2020
- Recipient of the Dean's Honor award – Nile University 2019

SKILLS

Programming Languages:	Python, C++, C#, Java, MATLAB, HTML, CSS, JavaScript and React.js
Libraries:	PyTorch, TensorFlow, Keras, OpenCV, ROS
Software (since undergrad):	LabVIEW, SolidWorks, Fusion360, ANSYS, MSC Adams, MAXIMA
Languages:	Arabic (Native), English (Advanced)

SELECTED PROJECTS & EXPERIENCE

For detailed projects and demos, visit my GitHub page and website.

- **Fine-Tuning Diffusion Models using RL:** Fine-tuned Diffuser to perform better on RL tasks.
- **Diffusion Model for Autonomous Vehicles:** Developed a high-definition map prediction model for enhanced vehicle perception (Master's thesis).
- **Computer vision for Autonomous UAVs:** Developed classical computer vision algorithms for UAV localization and autonomous landing in harsh environments.
- **Reinforcement Learning:** Improved long-term memory in world models using RetNets with DreamerV2, tested on complex environments.
- **SAC Algorithm Tutorial:** Created comprehensive slides and a Colab project accessible [Link].
- **AI Sequence Models:** Worked with sequence models like Transformers, S4, and RetNet, and model-based RL including Dreamer and BLAST, tested on MiniGrid and DMC environments improving the SOTA performance of world models.
- **Classical Computer Vision Algorithms:** Developed algorithms for 360° image stitching and depth estimation.

- **Applied ML Tasks:** Trained models for lane segmentation, object detection, and neural machine translation.
- **Applied AI Algorithms:** Implemented and validated BLAST, SAC, PPO, YOLO, and many other known models for various tasks.
- **Regular AI Papers Review:** Regularly presented ML papers at KAIST, discussing cutting-edge topics like GFlowNets and MaskDiT.
- **Seminars and Reviews:** Regularly attended seminars with experts from KAIST, Google DeepMind, OpenAI, and MILA; and wrote extensive reviews of famous AI papers, some of which accessible [Link] and [Link].
- **AI Course Completion:** Completed over eight AI-related courses at KAIST and Innopolis University, supplemented by self-study from cs231n and DeepMind x UCL RL course.
- **Robotic Manipulator Simulation:** Simulated 6DOF KUKA robots using Python and MATLAB for motion control.
- **Convex Optimization for UAVs:** Created obstacle-avoidance path planning algorithms.
- **Competitions and Diplomas:** Competed in ACM programming contests and robotics competitions; attained a professional diploma from FESTO in robotics programming, control systems, and CNC operation.

UNDERGRADUATE PROJECTS

For demos, visit my website.

- **Automated Vacuum Cleaner:** Built with PID motion control.
- **6DOF Robotic Arm:** Developed from scratch with a team during an Erasmus+ project.
- **SCARA Manipulator Control:** Applied PD, Feedback Linearization + PD, and Robust controls.
- **2048 Game:** Created using Python.
- **Potato Harvester Machine:** Designed using SolidWorks.
- **Stewart Platform Simulation:** Studied and simulated different motions using MSC Adams.
- **Video Encryption:** Implemented using MATLAB.

Freelancing

- Served consecutively as a judge at the Korea Science & Engineering Fair (KSEF) in 2022 and 2023, evaluating student projects in Computer Science, Engineering, Mathematics, Invention and Design, etc. Links: 2022, 2023.
- Designed a linear peristaltic pump operated with a non-standard four-stroke engine for FX GROUP (a startup group at Latvia) in 2019. [Link]
- Programmed a PLC to automate a production line for pipes in one of the factories in Egypt (2019).

Volunteering

- Head of scientific committee in "Building" club at MUST, where I used to help students in their courses by preparing detailed notes and solutions that they can get from the library.

MISC.

- Long-distance cycling (∼150km), sightseeing, exercising, and watching anime.