AHMED MAGD ALY SHEHATA

a.magd@alumni.kaist.ac.kr · https://amagd.github.io/ · Johns Hopkins University, Daejeon, S. Korea

RESEARCH INTERESTS

Focused on machine learning, especially in reinforcement learning, 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 CGPA: 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 CGPA: 4.67/5.00

Nile University Aug 2016 - Aug 2020
B.Sc. in Mechatronics Engineering CGPA: 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) at Inopolis University. [Link] 2020

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.