Youssef A. Mehanna

M.Sc. Candidate in Computer Science

Arab Academy for Science, Technology & Maritime Transport (AASTMT)

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Research Interests

My research interests lie at the intersection of artificial intelligence, healthcare, and computer vision, with a focus on developing efficient, multimodal, explainable, and trustworthy deep learning systems for medical imaging, human-computer interaction, assistive technologies, and autonomous systems in real-world clinical applications.

Education

Master of Science in Computer Science *September 2022 – February 2026*
Arab Academy for Science, Technology & Maritime Transport (AASTMT) Alexandria, Egypt

- Current GPA: **3.96/4.0**
- Research Focus: Computer Vision, Deep Learning, Medical Image Analysis, Multimodal Learning

Bachelor of Science in Computer Science *August 2017 – September 2021*
Arab Academy for Science, Technology & Maritime Transport (AASTMT) Alexandria, Egypt

- GPA: **3.9/4.0** (Excellent with Honors) – **Ranked 2nd out of 210 students**
- Graduation Project: Excellent

Publications & Conferences

GazeXTextNet: Multimodal Deep Learning for Chest X-ray Diagnosis | *Accepted* 2025

- **Conference:** 10th International Conference on Advanced Technology and Applied Sciences (ICATAS)
- Developed novel multimodal deep learning framework integrating visual attention from radiologists, image data, and radiology reports to enhance chest X-ray classification accuracy and interpretability
- Implemented vision graph neural network guided by expert attention, medical language models for semantic extraction, and differential mixture of experts for dynamic modality fusion
- Achieved **86.9% overall accuracy** on public chest X-ray datasets with attention maps mirroring radiologists' diagnostic strategies
- Contributed to clinical decision support and medical education through explainable AI techniques

IMITASD: Imitation Assessment Model for Children with Autism | *MDPI Journal* 2024

- Developed computer vision-based assessment model for evaluating imitative behaviors in children with autism spectrum disorder using deep learning and human pose estimation
- Integrated attention estimation with imitation assessment framework, achieving **0.9 correlation coefficient** with clinical therapists' evaluations

- Validated on dataset of **268 videos from 11 autistic children**, demonstrating clinical viability with scoring time **under 3 seconds** per assessment
- Advanced automated behavioral analysis tools for autism therapy in clinical and home environments

Research Experience

Research Assistant *June 2022 – Present*
Information Technology Industry Development Agency (ITIDA) & AASTMT Alexandria, Egypt

- Led design and development of secure microservice-based platform for monitoring educational progress and health status of children with autism using computer vision techniques (DeepFace, activity scoring) implemented with FastAPI and PyTorch
- Designed and implemented scalable RESTful APIs and WebSocket protocols for real-time camera feed streaming and patient activity monitoring, achieving low-latency performance for clinical applications
- Developed blockchain-based secure data management system for patient information using Ethereum smart contracts, ensuring HIPAA-compliant data privacy and integrity
- Established CI/CD pipelines with comprehensive testing frameworks including unit, integration, and load/stress testing with rigorous code review processes

Computer Vision Research Lead *January 2019 – January 2023*
Invictus ROVs – Autonomous Systems Team Alexandria, Egypt

- Designed and implemented end-to-end computer vision pipeline for autonomous underwater vehicles (ROVs), including real-time image enhancement using Generative Adversarial Networks (GANs)
- Developed custom CNN and YOLO-based object detection models optimized for underwater environments, achieving robust performance in challenging lighting and turbidity conditions
- Implemented advanced image stitching algorithms using Gaussian Pyramids and Feature Pyramid Networks (FPN) for panoramic underwater scene reconstruction
- Integrated computer vision modules with Robot Operating System (ROS) for autonomous underwater vehicle navigation and object recognition

Teaching Experience

Graduate Teaching Assistant *August 2021 – Present*
Arab Academy for Science, Technology & Maritime Transport (AASTMT) Cairo, Egypt

- **Computer Vision:** Mentored students in applying state-of-the-art computer vision methods to real-world datasets using OpenCV and PyTorch, guiding capstone projects and research assignments
- **Data-Focused Python Programming:** Designed comprehensive assignments and laboratory exercises teaching data analysis workflows with Python, Pandas, and NumPy
- **Big Data & Large-Scale Computing:** Coached students in distributed computing frameworks including Apache Spark, MLlib, scikit-learn, and PyTorch for scalable machine learning
- **Additional Courses:** Object-Oriented Programming (CS243), Introduction to Problem Solving (CS143), Computing Algorithms (CS312), Digital Image Processing (CS455), Digital Logic Design (CE216), Operating Systems (CCS3203), Optimization Techniques (CCS4004), Introduction to Artificial Intelligence (CAI3101)

Selected Projects

Autonomous Underwater Vehicle (AUV) for Underwater Exploration *July 2020 – August 2021*

- Led software architecture and development for autonomous underwater vehicle, integrating computer

vision, path planning, and control systems using Robot Operating System (ROS)
- Implemented distributed computing architecture (master-slave configuration) using ROS1 for real-time sensor fusion and autonomous decision-making
- Developed Virtual Reality streaming system using Flask API for stereo camera feeds with augmented reality overlay capabilities for remote operation and telepresence
- Created custom underwater image enhancement pipeline and curated annotated dataset for training robust object detection models
- Achieved **2nd place** in MATE International ROV Competition (2021) and **1st place** in MATE Egypt Regional Competition (2021)

Technical Skills

- **Programming Languages:** Python, C++, JavaScript, TypeScript
- **Machine Learning & AI:** PyTorch, TensorFlow, scikit-learn, OpenCV, YOLO, GANs, CNNs, Transformers
- **Medical AI:** Graph Neural Networks, Vision Transformers, Multimodal Fusion, Attention Mechanisms
- **Web Development & APIs:** FastAPI, Flask, Node.js, Express, React
- **Distributed Systems:** Apache Spark, MLlib, Robot Operating System (ROS), Microservices Architecture
- **DevOps & Cloud:** Docker, Kubernetes, CI/CD Pipelines, AWS Lambda, Git
- **Blockchain:** Ethereum, Truffle, Ganache, Web3.js, Smart Contracts
- **Data Analysis:** Pandas, NumPy, Data Structures and Algorithms
- **Languages:** English (Professional Proficiency), Arabic (Native)

Mentorship & Service

Competitive Programming Coach *January 2022 – January 2024*

- Coached 30 teams from various faculties for Egyptian Collegiate Programming Contest (ECPC) qualifications
- Successfully mentored **10 teams to qualify for ECPC 2022**, **5 teams for ACPC 2022**, and **1 team for ICPC 2023**
- Provided comprehensive instruction in advanced algorithms, data structures, and competitive problem-solving strategies

Computer Science Tutor *2021 – Present*

- Provided one-on-one mentoring in programming, data structures, algorithms, career development, coding interview preparation, and professional portfolio building for undergraduate and graduate students

Honors & Awards

- **2nd Place,** MATE International ROV Competition (September 2021)
- **1st Place,** MATE Egypt Regional Competition (January 2021)
- **5th Place,** ACM AAST Collegiate Programming Contest (2019) – 20 teams
- **38th Place,** ACM ECPC Kick-off Programming Contest (2019) – 110 teams
- **4th Place,** ACM AAST Collegiate Programming Contest (2018) – 17 teams
- Participant, ACM Egyptian Collegiate Programming Contest (ECPC 2018)
- Participant, ACM Arab Collegiate Programming Contest (ACPC 2018)