

Omar Alsaqa

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Research Interests

Mathematical Foundations of Deep Learning, Graph Neural Networks (algorithmic scalability, sampling), Computer Vision (efficient architectures, geometric reasoning, 2D/3D generation), and Parallel & GPU Computing.

Education

Wilfrid Laurier University, Waterloo, Canada

Sept 2024 - April 2026

Master's of Applied Computing (Full-time, Thesis based).

CGPA: 4.0/4.0

- **Thesis:** Developed an efficient Vision GNN using explicit Geometric Deep Learning via dynamic diffusion-distance pooling, reducing parameter counts, achieving GPU speedup, and minimizing boundary errors. Supervisor: [Prof. Emad A. Mohammed](#) .
- **Relevant Coursework:** CP631: Advanced Parallel Programming, CP640: Advanced Machine Learning, CP600: Practical Algorithm Design, CP614: Applied Cryptography.
- **Teaching Assistantships:** CP468: Artificial Intelligence (1 semester), CP264: Data Structures (4 semesters).

Mansoura University, Mansoura, Egypt

Sept 2015 - Aug 2020

Bachelor's in Computer and Systems Engineering.

Grade: Very Good with Honors (83.44%)

Publications & Research

GRecNet: Gated Recurrent Message Passing for Depth-Invariant GNNs

2026

Work in Progress. Proposes reformulating graph message passing as a gated linear recurrence with persistent node memory to mitigate dimensional collapse in deep GNNs.

Latent Graph Diffusion for Generative 2D/3D Modeling

2026

Work in Progress. Investigates graph-based diffusion models in latent space for high-fidelity 2D image and 3D mesh generation.

GeoViG: Geometry-Aware Graph Reasoning for Mobile Vision Tasks

2025

O. Alsaqa and E. Mohammed

Under Review, IEEE EMBC 2026. Efficient vision GNN replacing strided convolutions with diffusion-distance pooling; competitive on ImageNet & MS COCO with 30% fewer parameters and up to $2.3\times$ GPU speedup.

BLISS: Bandit Layer Importance Sampling Strategy for Training of GNNs

2025

O. Alsaqa, T. L. Hoang, and M. F. Balin

[NeurIPS 2025, MusIML Workshop](#)  Dynamic bandit-based layer-wise neighbor sampling improving GNN scalability and accuracy.

Multimodal System for Driver Distraction Detection and Elimination

2022

A. AbouOuf, I. Sobh, M. Nasser, O. Alsaqa, O. Elezaby, J. F. W. Zaki (equal contribution)

[IEEE Access, 2022.](#)  End-to-end multimodal driver monitoring system.

Selected Industry Experience

Machine Learning Engineer, LightRing (*Remote*)

Sept 2023 – May 2025

- Developed a real-time system for traffic monitoring and automated FTTH network design using Graph Neural Networks.
- Engineered a Multi-Agent assistant bot using LangGraph, and fine-tuned Whisper for Arabic speech recognition.

Research Fellow, Fatima Fellowship (*Remote*)

Apr 2022 – Sept 2024

- Researched unbiased GNN importance sampling strategies, accepted to a NeurIPS 2025 workshop.

Data Scientist, Orange Innovation Egypt

Nov 2021 – Jan 2024

- Developed scalable MLOps pipelines (MLflow) and automated NLP-based ticket routing, reducing latency by 60%.
- Researched transformer-based Multiple Object Tracking (MOT) with 3D shape prediction and OCR applications.

Computer Vision Intern, Intixel

July 2020 – Sept 2020

- Explored U-Net, GAN, auto-encoder to segment breast cancer micro-calcification using the DDSM-CBIS dataset.

Deep Learning Intern, Valeo

Sept 2019 – July 2020

- Developed a multimodal driver distraction monitoring system, won 2nd Place at the 2020 Dell Technologies Competition.

Technical Skills

Languages: Python, C++, C, CUDA.

Frameworks: PyTorch, DGL, PyG.

Tools: Docker, Git, MLflow.