Ahmad Obeid, PhD

ELECTRICAL AND COMPUTER ENGINEER

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Research Profile

I am an AI researcher and engineer working at the intersection of deep learning, optimization, and data-driven modeling across multiple modalities, including images, sequences, structured data, and data in the wild. My work targets real-world challenges in areas such as medical imaging, genomics, remote sensing, and industrial plants power systems, with a focus on interpretability, generalization, and efficiency. I have secured over **$500,000** in research funding and scholarships, published in top-tier venues, and received multiple academic awards. I maintain several open-source repositories, and have been active in research dissemination through talks, posters, and invited lectures. I also contribute to academic service as a reviewer and regularly teach undergraduate courses and labs in AI and engineering. I am a member Eta Kappa Nu Honor Society.

Research Interests

Deep Learning; Applied Mathematics; Biomedical Engineering; Efficient, Explainable, and Robust AI

Executive Summary

Research: Conducting interdisciplinary AI research with a focus on interpretability, generalization, and learning under limited supervision across multiple modalities including images and sequences.

Impact: Published in high-impact journals and conferences, maintained multiple public code repositories, and presented research through invited talks, posters, and national forums.

Services: Served as a reviewer for peer-reviewed journals and helped organize academic events, including university-level innovation symposia.

Awards: Recipient of multiple academic, publication, and innovation awards; recognized through honorary memberships and public distinctions.

Funding: Secured over **$500,000** in competitive scholarships and research funding across PhD, MSc, and undergraduate programs.

Education

- **PhD** in Electrical Engineering and Computer Science, Khalifa University (KU), 3.88 2021–2025
- **MSc** in Electrical and Computer Engineering, Khalifa University (KU), 3.93 2018–2020
- **BSc** in Electrical Engineering, with **Minor** in Applied Mathematics, American University of Sharjah (AUS), 3.86 2014–2018

Academic Appointments

- **Research and Teaching Assistant** | Khalifa University
  - o Center for Cyber-Physical Systems (C2PS)
- **Research Associate** | Khalifa University
  - o Research in CRISPR technology
- **Research and Teaching Assistant** | Khalifa University
  - o KU Center for Autonomous and Robotic Systems (KUCARS)
- **Research and Teaching Assistant** | American University of Sharjah
  - o Graded students' work
  - o Authored the IET journal paper

Scholarships and Funds (over $400,000)

- **Graduate Research and Teaching Assistant Scholarship (GRTA-PhD)** | Khalifa University – around $300,000 funds (2021-2025)
- **Graduate Student and Teaching Assistant Scholarship (GRTA-MSc)** | Khalifa University – over $100,000 funds (2018-2021)
- **Chancellor's List Scholarship** | American University of Sharjah – around $10,000 funds (2014-2018)
- **Dean's List Scholarship** | American University of Sharjah – around $5,000 funds (2014-2018)
- **Sheikh Rashid Bin Humaid Al Nuaimi Endowed Scholarship** | American University of Sharjah – around $30,000 funds (2017-2018)
- **Merit Scholarship** | American University of Sharjah – around $5,000 funds (2014)

Academic Contributions

Summary: Authored and co-authored **6** peer-reviewed journal articles, **7** conference papers, **1** book chapter, and have several papers in the pipeline either under review or significantly developed. I have **1** provisional patent filed recently. I received multiple awards for my publications. I maintain high quality code online, presented several posters/talks, and was invited as a guest lecturer. Currently cited **100+** times with an h-index of **7** (last updated June, 2025).

Published/Accepted Journal Articles:

- **A. Obeid** and H. Almarzouqi, "CRISPR-VAE: An interpretable and efficiency-aware gRNA sequence generator," *Engineered Science*, 2025. (Scopus: 98th percentile)
- T. Mahbub, **A. Obeid**, S. Javed, J. Dias, T. Hassan, and N. Werghi, "Center-focused affinity loss for class imbalance histology image classification," *IEEE J. Biomed. Health Inform.*, vol. 28, no. 2, pp. 952-963, 2023. (Scopus: 94th percentile)
- C. Tortorici, S. Berretti, **A. Obeid**, and N. Werghi, "Convolution operations for relief-pattern retrieval, segmentation and classification on mesh manifolds," *Pattern Recognition Letters*, vol. 142, pp. 32-38, 2021. (Scopus: 91st percentile)
- **A. Obeid**, I. M. Elfadel, and N. Werghi, "Unsupervised land-cover segmentation using accelerated balanced deep embedded clustering," *IEEE Geoscience Remote Sensing Letters*, vol. 19, pp. 1–5, 2021. (Scopus: 84th percentile; 96th at time of acceptance)
- E. Moscoso Thompson *et al.*, "SHREC'20 track: Retrieval of digital surfaces with similar geometric reliefs," *Compuers and Graphics*, vol. 91, pp. 199-218, 2020. (Scopus: 78th percentile)
- **A. Obeid**, U. Tariq, and S. Mukhopadhyay, "Supervised learning for early and accurate battery terminal voltage collapse detection," *IET Circuits Devices Syst.*, vol. 14, no. 3, pp. 347-356, 2020. (Scopus: 57th percentile)

Conference Papers:

- **A. Obeid**, "PMIL: A Topology Module to Improve MIL-based WSI Classification," in *Proc. IEEE Int. Symp. Circuits Syst. (ISCAS)*, 2025, pp. [to be updated upon publication]
- **A. Obeid**, T. Mahbub, S. Javed, J. Dias, and N. Werghi, "NucDETR: End-to-End Transformer for Nucleus Detection in Histopathology Images," in *Computational Mathematics Modeling in Cancer Analysis – 1st Int. Workshop (CMMCA)*, Singapore, Sep. 2022, pp. 47–57. (Best-Paper Award ⭐)
- A. Ahmed, **A. Obeid**, D. Velayudhan, T. Hassan, E. Damiani, and N. Werghi, "Balanced Affinity Loss for Highly Imbalanced Baggage Threat Contour-Driven Instance Segmentation," in *Proc. IEEE Int. Conf. Image Process. (ICIP)*, Bordeaux, France, Oct. 2022, pp. 981–985.
- T. Mahbub, **A. Obeid**, S. Javed, J. Dias, and N. Werghi, "Class-balanced affinity loss for highly imbalanced tissue classification in computational pathology," in *Proc. ICPR 2022 Int. Workshops and Challenges*, vol. 13643, Springer, Montreal, QC, Canada, Aug. 2022, pp. 499–513.
- X. Zhang, S. Javed, **A. Obeid**, J. Dias, and N. Werghi, "Gender Recognition on RGB-D Image," in *Proc. IEEE Int. Conf. Image Process. (ICIP)*, Abu Dhabi, UAE, Oct. 2020, pp. 1836–1840.
- **A. Obeid**, A. Takiddeen, and A. S. Sluzek, "ICSAC: Towards Outliers Rejection and Multi-Model Identification in Keypoint-Based Matching of Partial Near-Duplicates," in *Proc. 16th IEEE/ACS Int. Conf. Comput. Syst. Appl. (AICCSA)*, Abu Dhabi, UAE, Nov. 2019, pp. 1-5.
- G. Haddad, A. Takiddeen, **A. Obeid**, and A. Sleptchenko, "Traffic Optimization by Simultaneous Control of Vehicles Speeds and Routes," in *Proc. 6th IEEE Int. Conf. Ind. Eng. Appl. (ICIEA)*, Tokyo, Japan, Apr. 2019, pp. 786–790.

Book Chapters:

- S. Fikri, A. Sohail, U. Imdad, **A. Obeid**, S. Javed, N. Werghi, H. Almarzouqi, and A. Mahmood, "Challenges and recent trends in histopathology foundation models," *invited book chapter*, under review.

Patents:

- Patent Pending:: AI-based Medical Insurance Fraud Guard

Under-Review Papers:

- **A. Obeid**, S. Javed, J. Dias, I. Elfadel, and N. Werghi, "Enhancing prostate cancer subtyping: A persistent homology approach in multiple instance learning,"- Under review in *Engineered Science* – (Scopus: 98th percentile).
- **A. Obeid**, S. Boumaraf, A. Sohail, T. Hassan, S. Javed, J. Dias, M. Bennamoun, and N. Werghi, "Advancing histopathology with deep learning under data scarcity: A decade in review," - Under review in *AIOpen* (Scopus: 99th Percentile).

In-progress Papers:

- **A. Obeid**, S. Javed, J. Dias, and N. Werghi, "Proper selection of external datasets boosts semi-supervised learning in histopathology,"
- **A. Obeid**, M. Habtie, S. Javed, J. Dias, and N. Werghi, "Nuclei-aware self-supervision towards enhancing nuclei segmentation in histopathology,"

- A. Sohail, **A. Obeid**, S. Javed, S. Fikri, H. Almarzouqi, and N. Werghi, "Semantically aware vision-language nuclei classification in computational pathology,"
- A. Sohail, **A. Obeid**, S. Javed, S. Fikri, H. Almarzouqi, and N. Werghi, "Context Guided Mitosis Classification in Histopathology Images,"

Online Code Repositories:

- github.com/AhmadObeid/PMIL: the official implementation of the PMIL and cPMIL modules
- github.com/AhmadObeid/NucDETR: the official implementation of the NucDETR model
- github.com/AhmadObeid/Balanced-DEC Keras and CUDA implementation for the GRSL paper
- github.com/AhmadObeid/CRISPR-VAE: the official implementation of CRISPR-VAE

Poster Presentations:

- **Histopathology Nuclei Detection Using DETR** | UAE Graduate Students Research Conference (GSRC) 2023
- **Innovation Opportunities and Deep Learning Advancements in the Field of Histopathology** | Khalifa University Innovation Day 2025

Local Talks and Symposium Presentations:

- **Topology Analysis in Histopathology Images** | UAE Graduate Students Research Conference (GSRC) 2025
- **Current Trends and Future Opportunities in Topological Data Analysis in Histopathology** | Annual Research Forum: Artificial Intelligence and Big Data

Invited Guest Lectures:

- **Research Ideas in Topological Data Analysis. Histopathology as an Example** | Professor Ibrahim (Abe) Elfadel's course: ECCE794 Selected Topics in Electrical and Computer Engineering – Khalifa University

Courses Taught:

- Engineering Design
- Introduction to MATLAB Lab
- Introduction to Python Lab
- Data Science and AI Lab

Projects

- Medical AI to combat insurance fraud, 2025-present
  - Patent pending
  - Raising funds
  - Developed a prototype and deployed it on cloud services using Docker.
- Efficient Deep Learning for Histopathology Medical Images, 2021-2025
  - Researched weakly-supervised, semi-supervised, transfer, and active learning, data augmentation and synthesis. Developed novel methods, and published multiple awarded academic works.
  - Authored a 50 page survey paper about efficient learning, and another survey about foundation models in histopathology.
  - Developed an image synthesis technique and a novel pretext task to improve object detection accuracy by up to 9%.
  - Developed a topology analysis weakly-supervised learning framework to improve accuracy by up to 22%.
  - Developed an algorithmic approach to improve fine-grained accuracy by up to 2% in imbalanced settings
  - Developed a system to preserve the accuracy of a segmentation model while reducing annotation to 10% budget.
- SauronAI, 2025
  - Developed a working prototype of a central AI monitoring and recommendation system, which communicates with six AI agents, each responsible for monitoring a specific safety and sustainability aspect in oil and gas off-shore plants.
  - Reduced response time to hazardous events, and improved monitoring efficiency.
  - Deployed Python code as a standalone website.
- Traveler Sentiment & Safety Monitoring, 2023
  - Developed a system for enhancing traveler experience at Dubai Airport using emotion and panic detection via CCTV, smartwatches, and phone data.
  - Reduced response time to hazards, and enhanced response protocol with LLM-based recommendation.
- EagleEye – AI for Emergency Response, 2022
  - Designed an AI-powered CCTV system to detect medical emergencies and hazardous incidents. Built a functional hazard detection prototype.
  - Reduced the emergency response time, and enabled a 24/7 accurate monitoring framework.
- Explainable Deep Learning for Genomic Engineering, 2020-2021
  - Developed a novel autoencoder that synthesizes thousands of viable gRNAs with high/mid/low efficiency, and used it to study the genomic characteristics of efficient sequences.
  - Synthesized 85000 gRNA sequences efficiently
  - Used statistical analysis to discover 5 high-efficiency sequence traits.

- o Published results in a top 2% journal.
- Imbalance-robust Deep Learning for Remote Sensing Data using UAVs, 2018-2020
  - o Researched data-driven and algorithmic approaches to combat the problem of data scarcity in UAV images.
  - o Developed a CUDA-based searching strategy to improve segmentation accuracy of remote satellite images by up to 23%
  - o Maintained code versioning best-practices with Git; published code on Github.
  - o Published results in a top 5% journal.
- Wireless Charging Transceiver System, 2017-2018
- Machine Learning and Deep Learning for Industrial Battery Monitoring, 2017-2018
  - o Developed a supervised learning technique to monitor the discharge of factory batteries, and predict their downtime ahead of its occurrence.
- Power Amplifier for Radio Frequency, 2017
- Mini projects: Animals Recognition and Tracking; MATLAB numerical analysis package (non-linear solver, integration/differentiation, interpolation, ODE solver); Analysis of speech signals ...and more

Skills

Summary: Proficient in a wide range of programming languages and frameworks, including Python, MATLAB, R, and C++, with experience in high-performance computing and GPU programming. Skilled in designing deep learning pipelines across computer vision, NLP, and generative modeling, with strong foundations in optimization, probabilistic modeling, and applied mathematics. Adept in DevOps and MLOps practices, model deployment, and academic prototyping, with extensive experience in collaborative development, version control, and workflow automation.

Programming Skills
- Python (Pytorch, TensorFlow, JAX)
- MATLAB
- R (statistical modeling)
- SQL
- C/C++
- CUDA / OpenCL / OpenMP / MPI
- UNIX and Shell Scripting (workflow automation, job scheduling)
- RegEx
- Git (version control, collaborative development)

Technical Skills
- Deep Learning and Machine Learning (CNN/Transformer architecture, hyperparameter tuning, weakly-/self-/semi-supervised learning, explainable AI)
- Computer Vision (image Analysis, filtration, generative models)
- Natural Language Processing (data Mining, LLM Pretraining/Fine-tuning, multimodal learning)
- Sound Processing
- Applied Mathematics and Stochastic Processes (probabilistic modeling, inference techniques)
- Optimization Theory
- High-performance computing (distributed training, GPU clusters)
- Data Annotation, Preprocessing Pipelines, Visualization
- Model Deployment (cloud platforms, edge devices)
- DevOps & MLOps (Docker, model serving, reproducibility)
- Academic communication (research papers, prototyping, pitching)

Experience

- Research and Teaching | Khalifa University, 2018-Present
- Research and Teaching | American University of Sharjah, 2017-2018
- Internship | Prime Engineering Co., 2017- 2017
  - o Led technology-based innovations in 7-Star hospital project
  - o Developed two smart systems: key-based gate system and smart curtains system, activated by sunlight.

Achievements

Honorary Memberships
- Member of the Eta Kappa Nu Honor Society
- Member of the inaugural class of the Engineering Honor Society at AUS

Publication Awards
- Best Paper Award - 2022
- Top Publication Award - 2021

Academic Awards
- Chancellor's and Dean's list medals at AUS
- Sheikh Rashid Bin Humaid Al Nuaimi Endowed Scholarship

Public Recognitions
- Interviewed on National TV for undergraduate senior design project

Competition Awards
- Second place in Abu Dhabi Digital Authority Hackathon – 2019
- Fourth place in Sharjah Chamber of Commerce and Industry Award for Innovators - 2018

Innovation and Technology Entrepreneurship
Co-founder and CTO | Riobotics – Assistive Domestic Robots **(2021)**

Proposed a line of human-assisting domestic robots for home use. Gained experience in ideation, prototyping, and investor pitching.

Services
Academic Reviewer
- The journal of Supercomputing (1 manuscript)
- Innovation and Research in BioMedical engineering (IRBM) (1 manuscript)

Academic Symposium Organizer
- Khalifa University Innovation Day - 2025

Lab Coordinator
- Developed, improved, and monitored the laboratory material of the Introduction to MATLAB Lab. Held weekly meetings with lab instructors, monitored the successful continuation of the academic process. Organized end-of-semester examination for over 200 students at once.

References
- **Prof. Naoufel Werghi – PhD and MSc supervisor:**
  Professor of Computer Science at Khalifa University – PhD University of Strasbourg. Email: naoufel.werghi@ku.ac.ae
- **Prof. Ibrahim (Abe) Elfadel – Teacher of several courses and co-author:**
  Professor of Computer and Information Engineering at Khalifa University – PhD MIT. Email: Ibrahim.elfadel@ku.ac.ae
- **Dr. Andreas Henschel – Teacher of NLP course:**
  Associate Professor of Computer Science at Khalifa University – PhD Technical University of Dresden. Email: andreas.henschel@ku.ac.ae
- **Prof. Nasser Qaddoumi – Supervisor of undergraduate senior design project:**
  Professor of Electrical Engineering at American University of Sharjah – PhD Colorado State University. Email: nqaddoumi@aus.edu