

FARIS HAMDI RIZK

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Education

Delta Higher Institute of Engineering and Technology

Sep. 2021 – Jul. 2026

Bachelor's Degree in Engineering • GPA: 3.2/4.0

Mansoura, Egypt

- **Major:** Electronics and Communication Engineering with a concentration in Machine Learning and Computer Vision
- **Relevant Coursework:** Python Programming, Computer Science (I, II), Statistics & Probability Theory, Linear Algebra, Calculus (I, II), Discrete Mathematics, Computer Organization and Structure, Technical Writing

Research Experience

Research Staff

Sep. 2024 – Present

Applied Machine Learning Lab, Zewail City Computing Society

Zewail City of Science and Technology, Egypt

- **Collaborating** with a multidisciplinary team to conduct research on Computer Vision, NLP, and Machine Learning.

Undergraduate Research Assistant

Sep. 2023 – Present

Applied Machine Learning Lab • Supervisor: **Prof. El-Sayed M. El-kenawy (h-index: 69)**

Department of Communications and Electronics, Delta Higher Institute of Engineering and Technology. Mansoura, Egypt

In collaboration with Computer Science and Intelligent Systems Research Center.

Blacksburg, Virginia, USA

- **Development of an Integrated Computer Vision System for Real-Time Pothole Detection:** Developed an integrated system for detecting potholes in real-time on asphalt roads using a mobile car equipped with cameras. Implemented and evaluated deep learning models, including VGG19Net, ResNet-50, GoogLeNet, and AlexNet on the Pothole Detection Dataset. Achieved highest performance with AlexNet, reaching 92.15% accuracy. Presented at the 2024 International Telecommunications Conference (ITC-Egypt).
- **Advanced traffic detection and pattern prediction:** Enhanced traffic detection and prediction by integrating CNNs with the Waterwheel Plant Algorithm (WWPA) for optimization. Achieved 97.28% accuracy with the hybrid WWPA-CNN model on diverse traffic datasets. Used ANOVA and Wilcoxon Signed Rank Test for evaluation. Published findings in two journal articles.
- **Applied Deep Learning techniques for oil spill detection:** Used computer vision and an ANN to classify satellite images for oil spill detection. Feature extraction via image processing algorithms achieved 96.88% accuracy, providing rapid environmental hazard detection. Published one conference paper.
- **Optimized ML models for student performance prediction:** Improved student performance prediction by using the Binary WWPA for feature selection and Greylag Goose Optimization (GGO) for hyperparameter tuning. Reduced MSE from 0.064 to 0.032 and further improved the MLP Regressor's MSE from 0.0103 to 0.006. Published in 2 papers.

Conference Articles

- Abdelmalak M. E. S., Khodadadi N., Zaki A. M., Eid M. M., **Rizk F. H.**, et al. (2024). *Pothole Detection in Asphalt Roads: A Comprehensive Approach for Enhanced Road Maintenance and Safety with AlexNet Model*. In *Proceedings of the 2024 International Telecommunications Conference (ITC-Egypt)*, pp. 269–274. doi:10.1109/ITC-Egypt61547.2024.10620566.
- **Rizk F. H.**, Mohamed M. E., Sameh B., Zaki A. M., Eid M. M., et al. (2024). *Enhancing Student Performance Prediction with Greylag Goose Optimization Algorithm*. In *Proceedings of the 2024 International Telecommunications Conference (ITC-Egypt)*, pp. 32–37. doi:10.1109/ITC-Egypt61547.2024.10620568.
- Sherif K., **Rizk F. H.**, Zaki A. M., Eid M. M., et al. (2024). *Revolutionizing Oil Spill Detection: A Machine Learning Approach for Satellite Image Classification*. In *Proceedings of the 2024 International Telecommunications Conference (ITC-Egypt)*, pp. 245–250. doi:10.1109/ITC-Egypt61547.2024.10620599.

Journal Articles

- **Rizk F. H.**, Arkhstan S., Zaki A. M., Kandel M. A., & Towfek S. K. (2023). *Integrated CNN and Waterwheel Plant Algorithm for Enhanced Global Traffic Detection*. *Journal of Advanced Intelligent Systems*, 6(2), 36–45. doi:10.54216/JAIM.060204.
- Kandel M. A., **Rizk F. H.**, Hongou L., Zaki A. M., Khan H., et al. (2023). *Evaluating the Efficacy of Deep Learning Architectures in Predicting Traffic Patterns for Smart City Development*. *Journal of Advanced Intelligent Systems*, 6(2), 26–35. doi:10.54216/JAIM.060203.
- **Rizk F. H.**, Elshabrawy M., Sameh B., Mohamed K., & Zaki A. M. (2024). *Optimizing Student Performance Prediction Using Binary Waterwheel Plant Algorithm for Feature Selection and Machine Learning*. *Journal of Advanced Intelligent Systems*, 7(1), 19–37. doi:10.54216/JAIM.070102.

Selected Projects

Mobile Car for Detecting Potholes on Asphalt Roads Using Computer Vision

Jan. 2024 – May. 2024

- Designed and implemented an advanced computer vision system leveraging a customized AlexNet architecture for real-time pothole detection on asphalt roads, contributing to smart city infrastructure and road safety.
- Curated and preprocessed a comprehensive dataset of road images captured under diverse environmental conditions to enhance model robustness.
- Applied transfer learning and fine-tuned the AlexNet model to improve detection accuracy, incorporating data augmentation techniques to mitigate overfitting.
- Integrated the optimized model into a mobile car system equipped with high-resolution cameras and real-time processing units, achieving an accuracy of 92.15% in identifying potholes and enhancing road maintenance efficiency.
- Skills:** Computer Vision, AlexNet, Transfer Learning, Data Augmentation, Real-Time Systems Integration

Efficient Face Mask Detection Using an Enhanced MobileNetV2 Model

Apr. 2024

- Developed an efficient deep learning model based on an enhanced MobileNetV2 architecture to detect face masks, addressing public safety needs during the COVID-19 pandemic.
- Implemented advanced preprocessing techniques and data augmentation to improve model generalization and robustness against real-world variations.
- Fine-tuned the MobileNetV2 model using transfer learning, optimizing it for high accuracy and low computational cost suitable for deployment on edge devices. Achieved 97.71% accuracy on the test dataset
- Skills:** MobileNetV2, Transfer Learning, TensorFlow Lite, OpenCV, Edge Computing, Model Optimization

Exploratory Data Analysis for Retail Sales Optimization

Mar. 2024

- Conducted exploratory data analysis on a large retail dataset using Python to identify sales patterns, trends, and product performance.
- Utilized Pandas, NumPy, Matplotlib, and Seaborn for comprehensive data cleaning, transformation, and visualization, generating actionable insights for sales strategy optimization.
- Discovered key customer purchasing trends and seasonal sales spikes, leading to improved inventory and marketing strategies for the retail chain.
- Skills:** Data Analysis, Python, Pandas, NumPy, Data Visualization, Insight Extraction

Technical Skills

Programming Languages: Python (proficient), C (intermediate)

Machine Learning Frameworks: TensorFlow, Keras, PyTorch, Scikit-learn

Computer Vision Tools: OpenCV, dlib, YOLO, Faster R-CNN

Deep Learning Techniques: CNNs, Transfer Learning, Object Detection, Segmentation, Backpropagation, Attention Mechanisms, Transformers, Optimization Algorithms

Generative Models: GANs (Generative Adversarial Networks), Variational Autoencoders (VAEs)

3D Vision & Multiview Geometry: Depth Estimation, Stereo Vision, 3D Reconstruction

Reinforcement Learning: Q-Learning, Policy Gradient

Data Handling & Visualization: NumPy, Pandas, Matplotlib, Seaborn

Tools & Version Control: L^AT_EX, Git/GitHub

Research Interests

- Primary:** Computer Vision, Applied Machine Learning, Deep Learning
- Secondary:** AI in Education, AI for Social and Economic Development, Ethical AI Practices

Extracurricular Activities and Competitions

2nd Place (out of 25 teams)

Dec. 2023

GDG DevFest Mansoura Hackathon

Mansoura University, Egypt

- Awarded 2nd place for developing a web-based project demonstrating the potential of the freelance market for skilled workers in the Egyptian market.

Graphic Design Head

Oct. 2023 – Present

Google Developer Student Club (GDSC)

Delta Higher Institute of Engineering and Technology

- Leading the graphic design team to create visually engaging materials for events and workshops.
- Overseeing the design and branding of club projects and promotional content.

Human Resources Member

Sep. 2023 – Dec. 2023

IHOW Organization

Delta Higher Institute of Engineering and Technology

- Managed recruitment, onboarding, and team-building activities for the organization.
- Facilitated communication between members and addressed HR-related issues.

Graphic Designer

Jun. 2023 – Oct. 2023

Google Developer Student Club (GDSC)

Delta Higher Institute of Engineering and Technology

- Designed graphics and promotional materials for various club activities and events.
- Collaborated with team members to develop creative solutions for design challenges.

Related Training and Courses

Deep Learning for Computer Vision

Online

University of Michigan • Prof. Justin Johnson

Fall 2019 - Michigan Online

- Skills Gained: Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), YOLO, SSD, Neural Architecture Search, Attention Mechanisms, Transformers, 3D Vision, Adversarial Attacks, Reinforcement Learning.

Machine Learning Diploma

Online

Dr. Mostafa Saad Ibrahim, PhD • NVIDIA

Live Course

- Skills Gained: Advanced Machine Learning Algorithms, Deep Learning Foundations, Model Optimization, Fine-Tuning.

Machine Learning Specialization

Online

Stanford University, DeepLearning.ai • Andrew Ng

Coursera

- Skills Gained: Supervised Learning Algorithms, Unsupervised Learning Algorithms, Reinforcement Learning, Model Validation and Tuning, Recommendation Systems, Practical AI Deployment.

Data Analysis Course

Online

freeCodeCamp

YouTube

- Skills Gained: Data Cleaning and Preprocessing, Exploratory Data Analysis (EDA), Data Visualization, Statistical Analysis, Python-based Data Manipulation.

Data Structures & Algorithms

Online

freeCodeCamp

YouTube

- Skills Gained: Algorithm Design, Sorting Algorithms, Searching Algorithms, Data Structure Implementation, Complexity Analysis, Python Programming.

Python and Object-Oriented Programming

Online

freeCodeCamp

YouTube

- Skills Gained: Python Programming, Object-Oriented Programming (OOP), Inheritance, Polymorphism, Encapsulation.

Languages

English: C1 Level (Advanced)

Arabic: Native Proficiency