

# MUHAMMAD HUZAIFA

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## Education

### Master of Science in Machine Learning

Aug 2022 – June 2024

Mohamed Bin Zayed University of Artificial Intelligence (MBZUAI), Abu Dhabi

GPA - 3.73/4.00

- Graduate research student supervised by [Dr. Fahad Khan](#) and [Dr. Salman Khan](#)
- MS Research: "Resilience of Vision Language models to Object-to-Background Context" (*using Diffusion Models*)
- Major Courses: Trustworthy AI, Natural Language Processing, Probabilistic Machine Learning

### Bachelor of Electrical Engineering

Sept 2017 – Aug 2021

National University of Science and Technology (NUST), Islamabad, Pakistan

- Undergraduate student supervised by [Dr. Latif Anjum](#) and [Dr. Mansoor Asif](#)
- Final year thesis "Gesture to speech recognition system for specially-abled people (*using raspberry pi*)"
- Major courses: Machine Learning, Computer Vision, Embedded Systems, Signal Processing

## Research Interests

- Generalizability of Vision-Language models (VLMs, LLMs), Multimodal Generative Models, Medical AI, Robust ML
- Zero-Shot and few-shot adaptation, Semi-Supervised and Self-Supervised Learning, Privacy and Security preserving ML

## Publications

\* indicates Equal Contribution

- [Muhammad Huzaifa\\*](#), HS Malik\*, M Naseer, S Khan, FS Khan, **ObjectCompose: Evaluating Resilience of Vision-Based Models on Object-to-Background Compositional Changes** *ACCV-2024* (*Oral, Top 5.6%*) | [Project](#)
- R Imam, H Ghani\*, [Muhammad Huzaifa\\*](#), K Nandakumar, **Test-Time Low Rank Adaptation via Confidence Maximization for Zero-Shot Generalization** *WACV-2025* | [arXiv](#)
- [Muhammad Huzaifa\\*](#), R Imam\*, MEA Azz, **On enhancing the robustness of Vision Transformers: Defensive Diffusion**, *27<sup>th</sup> Conference on MIUA 2023, Scotland* | [Paper](#)
- R Imam, [Muhammad Huzaifa](#), N Mansour, SB Mirza, F Lamghari, **Domain Adaptable Fine-Tune Distillation Framework For Advancing Farm Surveillance**, | [arXiv](#)

## Experience

### Vision and Language Lab, MBZUAI

May 2024 – Dec 2024

Research Associate II

MBZUAI, Abu Dhabi

- Working under the supervision of [Dr. Yova](#). Main research topics: Generalizability of Multi-modal models, Test time adaption, Semi-supervised and weakly supervised Learning

### Intelligent Visual Analytics Lab (IVAL)

Aug 2022 – May 2024

Graduate Research Assistant

MBZUAI, Abu Dhabi

- Main research topics: Multi-modal models, Generative AI, Robustness of vision-language models
- Working on Generative AI (Diffusion models) for adversarial attacks and robustness (medical and natural images)
- Act as Teaching assistant for Machine Learning (ML701), Deep Learning (AI703), Artificial Intelligence (AI701) courses

### Fujairah Research Center

May 2023 – Aug 2023

Visiting Researcher

Fujairah, UAE

- Combined the foundational models SAM & GroundingDINO for automated annotation of raw CCTV/video dataset
- Introduced zero-shot fine-tune distillation, which distills knowledge from large GroundingDINO to lightweight YOLOv8
- Evaluated SOTA object detection algorithms like YOLO models for enhancing physical security in camel farm settings

### Techlogix

Mar 2022 – June 2022

Application Consultant

Lahore, Pakistan

- Developed Management Information System (MIS) reports per business requirements using SQL
- Established a streamlined issue tracking system by leveraging the capabilities of SQL databases
- Provided specialized assistance for the deployment and maintenance of critical banking applications

### ProntoDigital

Nov 2021 – Feb 2022

Digital Data Analytics Consultant

Lahore, Pakistan

- Implemented cutting-edge tracking systems through Google Analytics and Google Tag Manager, providing clients with comprehensive visibility into their website performance.
- Leveraged in-depth analysis of website data to generate bespoke reports, enabling clients to optimize strategies and boost sales effectively

## Projects

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### Multi Modal Learning - Hateful Meme Detection | [Git](#) Aug – Dec 2022

- Improved hateful meme classification using a dynamic multi-modal strategy, overcoming diverse content challenges
- Optimizing feature vectors alignment of a pre-trained Contrastive Language-Image Pre-training (CLIP) model, and employing fusion techniques, resulting in a 2% AUROC improvement over the baseline in hate meme classification

### On Adversarial Robustness of Vision Transformers in Medical Imaging| [Report](#) Jan – April 2023

- Developed specialized defense mechanisms against adversarial attacks, customized to the unique characteristics of medical image datasets, ensuring robustness in critical healthcare scenarios.
- Conducted a thorough examination of vision transformers' performance across various medical image datasets, benchmarking their robustness against diverse attack methods and providing valuable insights for enhancing the safety

### Segmentation Models (DeepLabV3+ and SegFormer) robustness analysis| [Git](#) Aug – Dec 2022

- Compared Segformer and DeeplabV3+ for semantic segmentation, emphasizing Segformer's robustness to perturbations
- Utilized ADE20k dataset, with a focus on person class segmentation to alleviates pre-training bias.
- Highlighted controlled noise levels as crucial for optimal performance in both models.

### Gesture To Speech Recognition System for Specially-abled People| [Git](#) July 2020 – May 2021

- Designed and developed a smart glove incorporating flex and gyro sensors, programmed on a Raspberry Pi microcontroller. This innovation enables the translation of sign language gestures into speech.
- Addressed the global challenge of hearing loss, which affects approximately 5% of the population, by creating a technological solution that empowers individuals with special abilities to interact effectively.

## Skills

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**Programming Languages:** Python, C/C++, MATLAB, Assembly and embedded C, SQL, JavaScript, HTML/CSS

**Machine Learning Frameworks:** PyTorch, Keras, Tensorflow, Hugging Face, Peft

**Development Tools:** PyCharm, VS Code, Git, GitHub, Overleaf, Draw.io, Roboflow, Jira, AutoCAD

**System Administration:** Linux, AWS, Bash scripting, Batched job submission

**Soft Skills:** Teamwork, Problem-solving, Leadership, Research, Critical Thinking, Management

**Languages:** English (IELTs Band 7), Hindi, Urdu, Arabic

## Honours & Awards

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- [ObjectCompose](#) accepted as an **Oral** presentation at ACCV, 2024 (top 5.6%) 2024
- [Defensive Diffusion](#) nominated for the best Paper award, under Abstract Category, at 27<sup>th</sup> Conference on MIUA 2023
- Secured **Fully Funded Scholarship** for Graduate School at MBZUAI for MS program in Machine Learning 2022
- Achieved 2<sup>nd</sup> Prize for Best Undergraduate Thesis in Electrical Engineering Department at NUST, Pakistan. 2021
- Finalist of [Crossroads Emerging Leadership](#) Program, organized By Harvard University 2021

## Positions & Services

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- Served as a **reviewer** at **ECCV'24, WACV'25** 2024
- Selected as a **Mentor**, provided guidance and evaluated student projects at MBZUAI. 2023-24
- Participated** in Human Phenotype Project Hackathon, UAE 2023
- Attended** and **Volunteer** the **EMNLP'22** conference in Abu Dhabi. 2022
- University **Campus Ambassador** at WALEE (a marketing company) 2021
- Served As **Science Educator** at Science Fuse Society 2021-22

## MOOCS, Certifications & Events

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Machine Learning, Stanford University

AI For Everyone, DeepLearning.AI

Data Science Methodology, IBM

Computer Vision with TensorFlow, DeepLearning.AI

Improving Deep Neural Networks, DeepLearning.AI

Entrepreneurship in Emerging Economies, edX

Supply Chain Basics for Everyone, LinkedIn

Introduction to Data Studio, Google Analytics

Neural Networks and Deep Learning, DeepLearning.AI

What is Data Science, IBM

Tools for Data Science, IBM

Python for Data Science, AI & Development, IBM

Introduction to Computer Vision and Image Processing, IBM

AI for Medical Diagnosis, DeepLearning.AI

Python Bootcamp Build Applications and Games, Udemy

Google Tag Manager, Google Analytics

## Other Interests

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- Reading, Interesting topic discussions, Swimming, Gym, Table Tennis, Football, Nature photography, Traveling

## References

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- ✉ [Fahad Khan](#) (MBZUAI, Linkoping university)
- ✉ [Muhammad Haris Khan](#), (MBZUAI)
- ✉ [Salman Khan](#) (MBZUAI, Australian National University)
- ✉ [Muzammal Naseer](#), (MBZUAI)