

## EDUCATION

**PhD, Machine Learning**

Jan. 2021 – Nov 2024

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

CGPA 3.84/4.00

- Graduate research student supervised by [Dr. Salman Khan](#) and [Dr. Fahad Khan](#)
- Research: "Improved Computer vision algorithms for objects in cluttered environment"
- Major courses: Advance Machine Learning, Machine Learning, Optimization

**Master of Science in Wireless Communications**

Sept. 2007 – June 2009

LTH, Sweden)

CGPA 4.3/5

- Master student supervised by [Professor B.k Lau](#) and [Dr. Rian](#)
- Thesis: "Robust Communication in BANs using MIMO"
- Major courses: Digital Communications, Stochastic Processes, Radio System Design, Spread Spectrum Techniques

## RESEARCH INTERESTS

- Multi-modal models for image understanding tasks, zero-shot image recognition, and open-vocabulary object detection
- Efficient transfer learning techniques with prompt learning for robustness and generalization of vision-language models
- Semantic segmentation of waste in cluttered environments
- Zero-shot multi-label classification and underwater detection

## PUBLICATIONS

Waste-Bench: A Comprehensive Benchmark for Evaluating VLLMs in Cluttered Environments, NACCL May 2024 (under review)  
**Muhammad Ali**, Salman Khan

COSNet: A Novel Object Segmentation Network using Enhanced Boundaries in Cluttered Scenes (WACV-2024) 2024 (under review)  
**Muhammad Ali**, Mubashir Numan, Mustanser,, Salman Khan

Muhammad Ali, Salman Khan, *RobustWaste-Bench: Understanding the Limitations of Vision-Language Models in Degraded Visual Contexts*, Sep 2024, (NeurIPS Workshop)(under review) ]

FANET: Feature Amplification Network for Semantic Segmentation in ClutteredBackground, (ICIP-2024)  
**Muhammad Ali**, Mamoona Javaid, Mubashir Noman, Mustansar Fiaz, Salman Khan [Link](#)

FusionSort: Enhanced Cluttered Waste Segmentation with Advanced Decoding and Multimodal Fusion of RGB and Hyperspectral Data, (WACV-2024) (under review)  
**Muhammad Ali**, Salman Khan

CLIP-Decoder: ZeroShot Multilabel Classificationusing Multimodal CLIP Aligned Representations March 2023 (ICCVW-2023) [Link](#)  
**Muhammad Ali**,Salman Khan

FlexPooling with Simple Auxiliary Classifiers in Deep Networks Oct 2023 (VISAPP-2023)  
**Muhammad Ali**, Omar Alsuwaidi, Salman Khan

Enhanced Segmentation of Deformed Waste Objects in Cluttered Environments, (ICPRAM-2024)  
**Muhammad Ali**, Omar Alsuwaidi, Salman Khan [Link](#)

Underwater Object Detection Enhancement via Channel Stabilization Dec (DICTA-2022)  
**Muhammad Ali**, Salman Khan

Self-supervised Representation Learning Through Predicting Geometric Transformations (IBCAST-2022)  
**Muhammad Ali**, Sayed Hashim

## EXPERIENCE

**Graduate Teaching Assistant**

Aug 2021 – July 2023

Advance Machine Learning

Main research topics: Object detection with transformers, Multi-modal modals, Prompt learning

- Worked as Teaching Assistant , where we deliver tutorials as well as assist students in labs
- Assignments preparation and grading as well as worked as an invigilator
- Worked as AI Facilitator in University MEP program

**Undergraduate Research Assistant**

May 2008 – May 2009

May 2019 – May 2021

Undergraduate Research Assistant

Electrical and Information Technology Department (EIT) Advanced Communication Lab

, LTH, Sweden

Main research topics: Advanced Digital Communications

- Robust Communication of BANS on MIMO
- Pattern Recognition of Alphabets by using Neural Networks
- Teaching assistant for Advanced Telecommunication Systems

#### PIAIC Intern

Oct. 2018 – April 2020

PIAIC, Islamabad, Pakistan

- Worked Deep learning projects including CATs and Dogs Classification
- Implemented quantized MobileNet model in PyTorch

#### PROJECTS

##### Robust Generalization of Vision-Language Models

Jan 2023 – Present

- Addressed the over-fitting problem of soft prompts during fine-tuning of Vision-Language models
- Designed novel loss formulations and optimization techniques to overcome prompt over-fitting

##### Transformers Transforming Vision

Sept 2021 – Dec 2021

- Explored state-of-the-art vision transformers for image recognition, including ViTs, DeiT, and T2T-ViTs
- Performed performance scalability comparison of ViTs and DeiT with CNNs (ResNets) with respect to pretraining dataset size
- Benchmarked ViTs and ResNets on downstream datasets like CIFAR-10, CIFAR-100, and CUB-200

##### Segmentation Architectures in Cluttered Environments

Jan 2023 – Feb 2024

- Explored various methods to enhance segmentation performance, particularly in complex and cluttered environments
- Introduced a new architecture accommodating the fusion of RGB and HSI images to improve performance

#### TECHNICAL SKILLS

**Languages:** Python, J2ME, MATLAB, Assembly, Verilog, SQL,

**Programming:** PyTorch, fast.ai, Keras, Latex, Scikit-learn, Hugging-Face

**Tools:** Linux, PyCharm, VS code, Git, , Google Cloud Platform, PowerBI, CST, HFSS

#### HONOURS AND AWARDS

- MBZUAI graduate studies scholarship holder
- LTH, Sweden studies scholarship holder
- Selected as AI -Facilitator for ADNOC accelerator program

#### ACADEMIC SERVICES

- Attended DICTA-2022 conference in Sydney, Australia.
- Serving as a reviewer at VISAPP, BMVC
- Technical Facilitator at ADNOC AI Facilitator Program by MBZUAI, ADNOC, UAE

#### EXTRACURRICULAR ACTIVITIES

- Team captain of Hockey, UET team, Table Tennis
- Member of Youth welfare organization
- Organized rationing of food plus medical services during the devastating earthquake in Pakistan

#### OTHER INTERESTS

- Bookreading, Traveling, socializing