MUHAMMAD SAAD

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PROFESSIONAL SUMMARY

AI Engineer with 4+ years of experience building and deploying deep learning systems across vision, natural language processing (NLP), and interactive applications. Skilled in developing full-stack systems that integrate large language models into web-based 3D environments, enabling lifelike avatar interactions and domain-specific digital twins. Experienced in RAG pipeline implementation, real-time AI integration, and optimizing models for deployment across cloud and edge systems. Delivers impactful, research-driven solutions through scalable engineering and intelligent system design.

EDUCATION

Bachelor of Science, Software Engineering — **Peshawar, Pakistan**
Islamia College Peshawar (ICP) — *Aug 2017 – Sep 2021*

- Undergraduate research student supervised by Dr. Muhammad Sajjad and Dr. Jamil Ahmad.
- **Thesis**: "Visual explanation of deep learning-based breast cancer classification via gradient localization."
- **Major Courses**: Object-Oriented Programming (OOP), Data Structure and Algorithms, Software Architecture, Artificial Intelligence

PROFESSIONAL EXPERIENCE

AI Engineer & Researcher — **Abu Dhabi, UAE**
Metaverse Center, Mohamed Bin Zayed University of Artificial Intelligence — *Jan 2023 – Present*

Research topics: Digital twin, Metaverse, Violence Detection, LLMs for Interactive Avatars.

- Designed and launched **ZapAura**, a customized virtual learning platform built on Hubs, featuring full-body avatars, real-time lip-syncing, and sentiment-aware interaction for immersive web-based learning environments.
- Built **dTalk**, an AI-powered interactive avatar system integrating large language models for speech-based interaction, with expressive full-body animations and real-time lip-syncing using Mixamo and Three.js (GitHub).
- Built expressive 3D avatar animations using Mixamo and enabled real-time lip-sync functionality through Three.js (GitHub).
- Created a React-based analytics dashboard for the Malaria No More (MnM) project, enabling live data visualization and streamlined decision-making.
- Developed a multimodal real-time violence detection system using LSTM, GRU, and Vision Transformer architectures on Jetson Nano at the Technology Innovation Institute (TII), improving inference performance for edge deployment.

AI Developer — **Peshawar, Pakistan**
Digital Image Processing (DIP) Lab Islamia College Peshawar — *Dec 2020 – 2022*

Research topics: Medical Imaging, Activity recognition, Facial emotion recognition (FER).

- Contributed to NTNU's implementation of the facial emotional recognition module assigned by the ALAMEDA AI Toolkit to analyze facial expressions for pain assessment and emotional state monitoring in neurological healthcare.
- Built an automatic vehicle number plate detection system using deep learning and image processing techniques for real-time recognition and localization in traffic footage.
- Attention-Based CNN-LSTM, CNN-GRU, and Video Vision Transformer (ViViT) Models for Complex Activity Recognition in Cricket.
- Teaching assistant for Python programming course, helping students with programming concepts and practical lab assignments.

KEY PROJECTS

AI Systems & Production Applications — 2021 – 2025

- **ZapAura Platform:** Immersive learning platform with sentiment-aware avatars and LLM-based interaction for educational environments.
- **dTalk System:** AI-powered avatar with speech interaction and real-time animations using Mixamo and Three.js.
- **Violence Detection:** Multimodal LSTM/GRU/ViT system deployed on Jetson Nano for edge surveillance.
- **ALAMEDA AI Toolkit:**Facial emotion recognition for neurological healthcare applications.

- **License Plate Detection:** Deep learning system for real-time vehicle recognition in traffic surveillance.

Publications

- **M. Saad**, M. Saeed, F. Laamarti, A. El Saddik, Multimodal Interaction with Digital Twins: An Embodied Assistant for Immersive Virtual Environments, *ACM Multimedia (ACMMM) 2025*, BNI Track. **(Submitted)**
- M. Saeed, M. Khan, **M. Saad**, N. Rahim, W. Gueaieb, A. El Saddik, CP-Diffusion: Conditional Prompt-Based Diffusion Models for Video Generation, *ACM Transactions on Multimedia Computing, Communications, and Applications (TOMM)*, 2025. **(Submitted)**
- A. Vayani, D. Dissanayake, H. Watawana, N. Ahsan, [...], **M. Saad**, [...], F. Khan, All Languages Matter: Evaluating LMMs on Culturally Diverse 100 Languages, *CVPR 2025*. **(Accepted)**
- M. Khan, **M. Saad**, A. Khan, W. Gueaieb, A. El Saddik, G. De Masi, F. Karray, Action Knowledge Graph for Violence Detection Using Audiovisual Features, *IEEE International Conference on Consumer Electronics (ICCE)*, Las Vegas, USA, 2024.
- **M. Saad**, M. Khan, M. Saeed, A. El Saddik, W. Gueaieb, Combating Counterfeit Products in Smart Cities with Digital Twin Technology, *IEEE International Smart Cities Conference (ISC2)*, Bucharest, Romania, 2023.
- M. Saeed, A. Khan, M. Khan, **M. Saad**, A. El Saddik, W. Gueaieb, Gaming-Based Education System for Children on Road Safety in Metaverse Towards Smart Cities, *IEEE International Smart Cities Conference (ISC2)*, Bucharest, Romania, 2023.
- **M. Saad**, M. Ullah, H. Afridi, F. A. Cheikh, M. Sajjad, BreastUS: Vision Transformer for Breast Cancer Classification Using Breast Ultrasound Images, *International Conference on Signal-Image Technology & Internet-Based Systems (SITIS)*, Dijon, France, 2022.

Technical Skills

- **Programming Languages:** Python, C++, MATLAB, JavaScript, HTML/CSS
- **Frameworks & Libraries:** PyTorch, TensorFlow, Scikit-learn, Keras, Hugging Face, LlamaIndex, OpenCV, NumPy, Pandas, Matplotlib
- **Deployment & MLOps:** Docker, Git, REST APIs, DigitalOcean, Weights & Biases
- **Computer Vision & Edge AI:** Vision Transformers (ViT), YOLOv5, LSTM/GRU, Siamese Networks, Jetson Nano, Model Optimization, Quantization
- **Web & 3D Development:** React, NodeJS, Three.js, A-Frame, WebSockets, Blender, Mixamo, Unity
- **Tools & IDEs:** PyCharm, VS Code, LaTeX

Honors and Awards

- Award of appreciation for securing 1st position in Youth Talent Expo *2020*
- Awarded with a Data Science certificate by the Government of Pakistan (NAVTTC) *2022*

Languages

- **English:** Fluent
- **Urdu:** Native speaker
- **Pashto:** Native speaker

References

- **Prof. Abdulmotaleb El Saddik**
  University Research Chair and Professor in the School of Electrical Engineering and Computer Science at the University of Ottawa, Canada
  Email: elsaddik@uOttawa.ca
- **Prof. Muhammad Sajjad**
  Associate Professor, Department of Computer Science, Islamia College Peshawar, Pakistan
  Email: Muhammad.sajjad@icp.edu.pk