Muhammad Saad

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Professional Summary

My research focuses on advancing AI and deep learning for applications in medical imaging, activity recognition, and immersive technologies. I have designed advanced models for tasks such as facial emotion recognition, violence detection, and medical image analysis. Building on this foundation, I am now eager to apply my expertise to robotics, focusing on integrating AI-driven perception, immersive systems, and telepresence technologies.

Education

Bachelor of Science, Software Engineering Aug 2017 - Sep 2021

Islamia College Peshawar (ICP) icp.edu.pk, Pakistan *CGPA 3.24/4.0*

- 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

Research Intersts

- Integrating robotics with metaverse platforms for telepresence, enabling remote control and interaction in virtual and augmented reality environments
- Developing deep learning-based frameworks for human activity recognition to enhance robot perception and interaction in indoor environments.
- Enhancing medical imaging with computer vision for diagnostics, detection, segmentation, automated analysis, disease tracking, and precision-guided interventions

Publications

*****Indicates joint first authors, **+** indicates my role as co-author

1. Action Knowledge Graph for Violence Detection Using Audiovisual Features (Paper) **2024**
   *Mustaqeem. Khan, **Muhammad Saad***, A. Khan, Wail Gueaieb, Abdulmotaleb El Saddik, Giulia De Masi, Fakhri Karray*
2. Combating Counterfeit Products in Smart Cities with Digital Twin Technology (Paper) **2023**
   Muhammad Saad, Musatqeem Khan, Muhammad Saeed, Abdulmotaleb El Saddik, Wail Gueaieb*
3. Gaming-Based Education System for Children on Road Safety in Metaverse Towards Smart Cities (Paper) **2023**
   *M. Saeed, A. Khan, M. Khan, **Muhammad. Saad**+, Abdulmotaleb El Saddik, Wail Gueaieb*
4. BreastUS: Vision Transformer for Breast Cancer Classification Using Breast Ultrasound Images (Github) (Paper) **2022**
   Muhammad Saad, Mohib Ullah, Hina Afridi, Fouzi Alaya. Cheikh, Muhammad Sajjad*

Co-Authored Submissions (Under Review):

5. All Languages Matter: Evaluating LMMs on Culturally Diverse 100 Languages, submitted to *CVPR* **2024**
6. CP-Diffusion: Conditional Prompt-Based Diffusion Models for Video Generation, submitted to *CVPR* **2024**

Experience

Graduate Research Assistant

Metaverse Center, Mohamed Bin Zayed University of Artificial Intelligence, Abu Dhabi, UAE

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

- Worked on real-time violence detection on Jetson Nano at the Technology Innovation Institute (TII).
- Interactive avatar animation with Mixamo and real-time lip-syncing using JavaScript and TypeScript. (Github)
- Created a visual avatar assistant powered by a fine-tuned LLaMA 3 model, customized with haptics and multimedia data to enhance educational experiences and interactive multimedia books. (Github)
- Build a custom virtual learning platform named ZapAura, built on Mozilla Hubs, featuring full-body avatars, real-time lip-syncing, and an AI teaching assistant powered by ChatGPT for multilingual interactions.

Undergraduate Research Assistant

Digital Image Processing (DIP) Lab in collaboration with NTNU Norway and IMLAB South Korea, ICP, Peshawar, Pakistan

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

- Contributed to NTNU's implementation of the Facial Emotion Recognition Module assigned by the ALAMEDA AI Toolkit to analyze facial expressions for pain assessment and emotional state monitoring in neurological healthcare.
- Attention-based CNN-LSTM, CNN-GRU, and Video Vision Transformer (ViViT) Models for Complex Activity Recognition in Cricket. (Github)
- Teaching assistant for Python programming course.

PROJECTS

COVID-19 Progression Visualization **2021**

- Applied pre-trained CNNs models and proposed lightweight CNN for COVID-19 X-ray classification.
- Used Grad-CAM to visualize disease progression on X-rays over time, enabling model interpretability.
- Gained insights into CNN performance and critical regions in medical imaging.

Sequential Models for Video Analysis **2022**

- Extracted video features using CNNs, applied LSTM, GRU, and attention-based models for temporal analysis.
- Enhanced temporal analysis with LSTM-Attention and GRU-Attention.
- Explored Vision Transformers for video analysis, assessing their effectiveness compared to traditional CNN-sequential model pipelines. (Github)

TECHNICAL SKILLS

Programming: Python, MATLAB, C++, SQL, JavaScript. (HTML/CSS)
Technologies: Keras, TensorFlow, Pytorch, Scikit-learn, NodeJS, React, A-Frame, ThreeJs,
Tools: PyCharm, VS code, Git, Blender, AWS (Amazon Web Services), Digital Ocean, Docker, Latex

HONOURS AND AWARDS

- Awarded the University of Ottawa Graduate Studies Scholarship for September 2025
- Award of appreciation for securing 1st position in Youth Talent Expo
- Awarded a data science certificate by the government of Pakistan (NAVTTC)

ACADEMIC SERVICES

- Attended a virtual Omniverse meeting on its academic and research applications.
- Attended a virtual talk on the metaverse, gaining valuable insights and understanding of its applications.
- Mentor and project evaluator for new batch of DIP Lab, guiding and assessing final-year students' projects.

EXTRACURRICULAR ACTIVITIES

- Captain of Islamia College Peshawar cricket team for tennis ball tournaments
- Organized and led tennis ball cricket tournaments as Sports President of the Islami Jamiat Talaba (IJT) student federation.

HOBBIES

- **Academic:** Reading and writing articles
- **Sports:** Playing and watching cricket

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
  Professor, Department of Human Computer Interaction, Mohamed Bin Zayed University of Artificial Intelligence, Abu Dhabi, UAE
  Email: elsaddik@uOttawa.ca
- **Dr. Muhmmad Sajjad**
  Associate Professor, Department of Computer Science at Islamia College Peshawar, Pakistan
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