MUNEEB AHMED KHAN

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Professional Summary

Machine learning researcher with expertise in computer vision and interpretable AI with a focus on solving real-world imaging challenges. As a Ph.D. candidate, I focused on solving real-world imaging challenges by developing efficient, interpretable deep learning frameworks. My research contributions include 20+ peer-reviewed publications, multiple Google Korea research grants, and recognition through academic awards.

Education

- **Ph.D. in Software (Machine Learning & Computer Vision)** March 2021 – Expected Aug. 2025
  - Sangmyung University, Cheonan, South Korea
  - **Dissertation:** Efficient and Interpretable Deep Learning Frameworks for Real-World Applications
  - **Advisor:** Dr. Heemin Park
- **Master of Science in Information Technology** 2019
  - National University of Science and Technology (NUST), Islamabad, Pakistan
  - **Thesis:** Prediction based Target Tracking in Wireless Sensor Network
- **Bachelor of Computer Engineering** 2014
  - COMSATS Institute of Information Technology (CIIT), Lahore, Pakistan

Publications

Google Citations: 368

[1] **MA Khan**, H Park. "HP-ViT: Hierarchical Pathology-Aware Vision Transformer for Multi-Label Thoracic Disease Classification in Chest X-rays" Springer Health Information Science and Systems. **IF: 4.7** (In Review)

[2] **MA Khan**, H Park. "MediFusionNet: A Novel Architecture for Multi-Modal Medical Image Analysis" Springer Signal, Image and Video Processing. **IF: 2.0** (In Review)

[3] **MA Khan**, H Park. "Adaptive Channel Attention and Multi-Path Convolutional Architecture for Brain Tumor Detection Using MRI Images." Springer Multimedia Tools and Applications. **IF: 3.0** (In Review)

[4] **MA Khan**, Y Choi, J Eum, H Park. "Traffic Sign Recognition Under Visual Perturbations: Shadows, Light Patches, and Simulated Obstructions." IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (**CVPRw**), 2025. (Accepted)

[5] **MA Khan**, H Kim, J Eum, Y Myung, Y Choi, H Park. "M-GAID: A Real-World Dataset for Ghosting Artifact Detection and Removal in Mobile Imaging." IEEE/CVF Winter Conference on Applications of Computer Vision Workshops (**WACVw**), 2025. [Link]

[6] H Kim, **MA Khan**, H Park. "Regression Analysis of Ghosting Artifacts in Temporal Fusion Videos Using AutoML." IEEE/ACIS International Conference on Big Data, Cloud Computing, and Data Science (BCD), pp. 109-114. IEEE, 2024. [Link]

[7] **MA Khan**, B Kim, Y Choi, H Park. "TrafficXplainNet: An Advanced Deep Learning Framework for Traffic Sign Detection and Classification." Korea Computer Congress (KCC), 2024. [Link]

[8] **MA Khan**, H Park. "A Convolutional Block Base Architecture for Multiclass Brain Tumor Detection Using Magnetic Resonance Imaging." Electronics 13, no. 2 (2024): 364. **IF: 2.6** [Link]

[9] **MA Khan**, H Park. "Exploring Explainable Artificial Intelligence Techniques for Interpretable Neural Networks in Traffic Sign Recognition Systems." Electronics 13, no. 2 (2024): 306. **IF: 2.6** [Link]

[10] **MA Khan**, H Park. "FireXplainNet: Optimizing Convolution Block Architecture for Enhanced Wildfire Detection and Interpretability." Electronics 13, no. 10 (2024): 1881. **IF: 2.6** [Link]

[11] U Ejaz, **MA Khan**, H Park, H Kim. "FireXplainer: An Interpretable Approach for Detection of Wildfires." Korea Computer Congress (KCC), pp. 1109-1111. 2023. [Link] (Best Paper Award)

[12] **MA Khan**, H Park. "An XAI-Based Framework for Interpretable Traffic Sign Recognition using Deep Learning." Korea Computer Congress (KCC), 2023. [Link]

[13] **MA Khan**, H Park, J Chae. "A Lightweight Convolutional Neural Network (CNN) Architecture for Traffic Sign Recognition in Urban Road Networks." Electronics 12, no. 8 (2023): 1802. **IF: 2.6** [Link]

[14] U Ejaz, **MA Khan**, H Park, H Kim. "An Offline Signature Verification leveraging One-shot Learning" Korea Computer Congress (KCC), pp. 1011-1013. 2022. [Link]

[15] **MA Khan**, H Kim, H Park. "Leveraging Machine Learning for Fault-Tolerant Air Pollutants Monitoring for a Smart City Design." Electronics 11, no. 19 (2022): 3122. **IF: 2.9** [Link]

[16] **MA Khan**, H Kim, H Park. "Exploiting Neural Network for Temporal Multi-variate Air Quality and Pollutant Prediction" Journal of Korea Multimedia Society 25, no. 2 (2022): 440-449. [Link]

[17] **MA Khan**, MA Khan, M Driss, W Boulila, J Ahmad. "Evolution of Target Localization in Wireless Sensor Network (WSN): A Review." IEEE International Congress of Advanced Technology and Engineering (ICOTEN) pp. 1-8. IEEE, 2021. [Link]

[18] **MA Khan**, H Park. "Lightweight Convolutional Neural Network (CNN) based COVID-19 Detection using X-ray Images. Journal of Multimedia Information System 8, no. 4 (2021): 251-258. [Link]

[19] S Usmani, A Saboor, M Haris, **MA Khan**, H Park. "Latest Research Trends in Fall Detection and Prevention Using Machine Learning: A Systematic Review." Sensors 21, no. 15 (2021): 5134. **IF: 3.84** [Link]

[20] **MA Khan**, A Saboor, H Kim, H Park. "A Systematic Review of Location Aware Schemes in the Internet of Things." Sensors 21, no. 9 (2021): 3228. **IF: 3.84** [Link]

[21] **MA Khan**, MA Khan, AU Rahman, AW Malik, SA Khan. "Exploiting cooperative sensing for accurate target tracking in industrial Internet of things." International Journal of Distributed Sensor Networks (IJDSN) 15, no. 12 (2019): 1550147719892203. **IF: 1.4** [Link]

[22] A Saboor, A Mustafa, R Ahmad, **MA Khan**, M Haris, R Hameed. "Evolution of wireless standards for health monitoring." IEEE Information Technology, Electromechanical Engineering and Microelectronics Conference (IEMECON) pp. 268-272. IEEE, 2019. [Link]

[23] MAK Sherwani, MA Khan. "Quality of Services in Warehouse Scale Computers." IEEE International Conference on Networking and Network Applications (NaNA) pp. 187-190. IEEE, 2018. [Link]

Research Experience

- **Objective Quality Metrics for Ghosting Artifacts in Video and HDR Images** June 2023 – May 2024
  ***Research Funding**: Google Korea*
  - Built a dataset of 2,500+ real images and annotated over 37,000 patches for spatial/temporal artifact detection.
  - Designed data pipelines for collection, annotation, and feature extraction from diverse imaging sources.
  - Trained SOTA deep learning models for domain specific tasks (e.g ghosting artifacts, object detection)
- **Multi-Scale Attention Model for Low-Light Image Enhancement** 2024
  - Designed a lightweight model (12M parameters) achieving 0.88 SSIM, 0.93 MS-SSIM, 0.207 LPIPS on LoL datasets using GCP A100.
  - Worked on integrating attention Mechanisms and transfer learning.
  - Implemented an adaptive enhancement pipeline balancing perceptual quality and computational efficiency.
- **Medical Image Analysis and Multi-Modal Deep Learning** 2023 – 2024
  - Developed hierarchical vision transformer models for multi-label classification in chest X-rays.
  - Developed lightweight architecture achieving 99.51% mAP with 17.2 ms inference for brain tumor detection.
  - Designed multi-modal fusion techniques for integrating various medical imaging modalities.
  - Reduced false positives by 78% using explainable AI techniques (Grad-CAM, LIME).
- **Traffic Sign Recognition with Advanced Neural Network Techniques** 2022 – 2024
  - Developed an interpretable CNN (2.6M parameters) achieving 98.4% accuracy and 74.34 ms inference.
  - Streamlined ML model development and deployment with MLflow for tracking and reproducibility.
  - Optimize GPU acceleration and parallel processing to optimize the system performance.
- **FireXplainNet: Interpretable Wildfire Detection System** 2021 – 2022
  - Developed a lightweight interpretable CNN (5.3M parameters) for early wildfire detection.
  - Applied gradient-based attribution (Grad-CAM) for decision explainability in high-risk outdoor scenarios.
  - Achieved high accuracy under variable conditions; received Best Paper Award at KCC 2023.

Current Projects

- **Multi-Modal Framework for Medical Condition Classification and Detection** @ Pi Lab, Korea
  - Developing multi-class detection system for brain tumors, COVID-19, pneumonia, and lung opacities.
  - Working on CNN architectures to handle ambiguous boundaries in medical images.
  - Optimizing model performance for resource-constrained clinical environments with explainability.
- **Post-Processing Methods for Artifact Removal Using Machine Learning** @Google Korea & Pi Lab, Korea
  ***Research Funding**: Google Korea*
  - Investigating machine learning techniques for suppressing noise, ghosting, and compression artifacts.
  - Optimized artifact removal performance across diverse imaging modalities.
  - Designed deployment strategies suitable for mobile and resource-constrained environments.
- **Transformer-Enhanced Diffusion Models for Image Segmentation and Super-Resolution** @ Pi Lab, Korea
  - Developing diffusion techniques for image segmentation and resolution enhancement.
  - Integrating text-guided diffusion processes to enhance segmentation precision.
  - Validating performance across diverse imaging modalities for real-world applications.

Research Interest

- **Computer Vision & Image Processing:** Low-light enhancement, Feature extraction and visualization.
- **Medical Imaging:** MRI analysis, Tumor segmentation, Multi-class classification, Resolution enhancement
- **Intelligent Transportation:** Traffic sign recognition, Autonomous Driving systems.
- **Efficient Model Design:** Lightweight Architecture design, Model Optimization and Quantization.
- **Image/Video Enhancement & Artifact Removal:** Noise Removal, Ghosting Artifact Compression.
- **Interpretable AI:** Explainable deep learning models, Gradient-based attribution methods

Technical Skills

- **ML Frameworks:** TensorFlow, PyTorch, Keras, Python, Pandas
- **Computer Vision:** Object detection and classification, Image segmentation, Visual Intelligence Systems
- **CV Libraries:** OpenCV, Keras, scikit-image, Pillow, NumPy
- **Deep Learning:** SSD, YOLOX, YOLO-NAS, Faster R-CNN, Transfer learning, Attention mechanisms
- **Explainable AI:** Grad-CAM, LIME, Integrated Gradients
- **Data Science:** Data collection, Data Cleaning and Labeling, Feature Engineering and Visualization
- **Research Tools:** Google Cloud Platform (GCP), CUDA, Git, LaTeX, Jupyter Notebook

Research Funding & Honors

- **Google Korea Research Grant** (2024-Present): "Post-Processing Methods for Artifact Removal"
- **Google Korea Research Grant** (2023-2024): "Objective Quality Metrics for Ghosting Artifacts"
- **Best Paper Award** (2023): "FireXplainer: An Interpretable Approach for Detection of Wildfires" KCC, Jeju, Korea
- **Professor Scholarship for Ph.D.** (2021-2025): Pi-Lab, Sangmyung University
- **DURE Scholarship** (2022-2023): For international collaboration with Mongolia
- **Teaching Assistant Scholarship** (2021-2022): Department of Software, Sangmyung University

Conference Participation

- **WACV'25, CVPR'23, KCC'23, ICWSM'22, KCC'22, WWW'21, AAAI'21, CSCW'21**

References

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