



# MUNEEB AHMED KHAN

Post-Doctoral Researcher | Vision& Learning Lab

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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. During my Ph.D., 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 (Deep Learning & Computer Vision)** 2025
  - Sangmyung University, Cheonan, South Korea
  - **Dissertation:** Efficient and Interpretable Deep Learning Frameworks for Resource-Constrained and Time-sensitive Vision 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: 482

- [1] MA Khan, et al. "HP-ViT: Hierarchical Pathology-Aware Vision Transformer for Multi-Label Thoracic Disease Classification in Chest X-rays" Springer Applied Intelligence. IF: 3.5 ([In Review](#))
- [2] MA Khan, et al. "MediFusionNet: A Novel Architecture for Multi-Modal Medical Image Analysis" Wiley International Journal of Imaging Systems and Technology (IMA). IF: 2.5 [[Link](#)]
- [3] MA Khan, et al. "Traffic Sign Recognition Under Visual Perturbations: Shadows, Light Patches, and Simulated Obstructions." In *Proceedings of the Computer Vision and Pattern Recognition (CVPR) Workshops*, 2025. [[Link](#)]
- [4] 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 [[Link](#)]
- [5] MA Khan, et al. "Multi-Path Convolutional Architecture with Channel-Wise Attention for Multiclass Brain Tumor Detection in Magnetic Resonance Imaging Scans." Electronics 14, no. 9 (2025): 1741. IF: 2.6 [[Link](#)]
- [6] MA Khan, et al. "M-GAID: A Real-World Dataset for Ghosting Artifact Detection and Removal in Mobile Imaging." In *Proceedings of the Winter Conference on Applications of Computer Vision (WACV) Workshops*, 2025. [[Link](#)]
- [7] 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](#)]
- [8] 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](#)]
- [9] 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](#)]
- [10] 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](#)]
- [11] 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](#)]

- [12] 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)
- [13] MA Khan, H Park. "An XAI-Based Framework for Interpretable Traffic Sign Recognition using Deep Learning." Korea Computer Congress (KCC), 2023. [\[Link\]](#)
- [14] 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 [\[Link\]](#)
- [15] U Ejaz, MA Khan, H Park, H Kim. "An Offline Signature Verification leveraging One-shot Learning" Korea Computer Congress (KCC), pp. 1011-1013. 2022. [\[Link\]](#)
- [16] 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 [\[Link\]](#)
- [17] 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. [\[Link\]](#)
- [18] MA Khan, et al. "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. [\[Link\]](#)
- [19] 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. [\[Link\]](#)
- [20] 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 [\[Link\]](#)
- [21] MA Khan, et al. "A Systematic Review of Location Aware Schemes in the Internet of Things." Sensors 21, no. 9 (2021): 3228. IF: 3.84 [\[Link\]](#)
- [22] MA Khan, et al. "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 [\[Link\]](#)
- [23] 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. [\[Link\]](#)
- [24] 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

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- **Post-Processing Methods for Artifact Removal Using Machine Learning** June 2024 – May 2025  
*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.
- **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)
- **Advanced Medical Image Analysis for Disease Detection and Multi-Modal Deep Learning** 2023 – 2025
  - 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 by integrating Thoracic and Neuro-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.

## PROFESSIONAL EXPERIENCE

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### • Post-Doctoral Researcher

Sep. 2025 – Present

*Ulsan National Institute of Science & Technology (UNIST), Korea*

- Conducting research on WiFi- and mmWave-based human pose estimation for full-body and hand-level articulation.
- Investigating physics-informed neural networks and Mamba-based sequence models to incorporate for robust pose inference.

### • Lecturer - Department of Computer Science

Mar. 2019 – Feb. 2021

*Institute of Southern Punjab (ISP), Multan, Pakistan*

- **Courses Taught (Undergraduate):** List specific course titles, e.g., Introduction to Programming (Python), Data Structures & Algorithms, Computer Networks, Introduction to AI.
- Planned and managed the development of standards-based curriculum, focusing on integrating foundational CS concepts with practical application.
- Designed and supervised computer lab sessions focusing on specific software/tools, e.g., Packet Tracer, Python programming, OpenCV, TensorFlow, Keras, providing hands-on technical training.

### • Research Associate

Mar. 2016 – Nov. 2018

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

- Developed cooperative sensing algorithms leveraging mobility prediction and energy-efficient data fusion mechanisms to improve target localization accuracy.
- Implemented simulation pipelines for evaluating tracking performance under varying noise and mobility patterns.

## RESEARCH INTEREST

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- **Medical Imaging:** MRI analysis, Tumor segmentation, Multi-class classification, Resolution enhancement.
- **Computer Vision & Image Processing:** Low-light enhancement, Feature extraction and visualization.
- **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

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- **ML Frameworks:** TensorFlow, PyTorch, Keras, Python, Pandas
- **Computer Vision:** Object detection and classification, Image segmentation, Visual Intelligence Systems
- **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

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- **Google Korea Research Grant** (2024-2025): "Post-Processing Methods for Artifact Removal"
- **Google Korea Research Grant** (2023-2024): "Objective Quality Metrics for Ghosting Artifacts"
- **Best Paper Award** (2023): "FireExplainer: An Interpretable Approach for Detection of Wildfires" KCC, Jeju, Korea
- **DURE Scholarship** (2022-2023): For international collaboration with Mongolia Uni. of Science and Technology

## REFERENCES

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### Dr. Heemin Park

Senior Software Engineer  
Google Inc.

[heemin@google.com](mailto:heemin@google.com) (Ph.D. Advisor)

### Dr. Muhammad Haris

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