

Azka Rehman

Seoul, South Korea

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Education

Seoul National University (SNU)

MS in Biomedical Science

- **Featured Courses:** Topics in Data Science, Natural Language Processing and Information Retrieval.
- **Thesis:** AI-Driven Opportunistic Screening for Cardiovascular Disease Risk Using Abdominal CT Scans

Seoul, Republic of Korea

2023, Sept - 2025, Aug

National University of Science and Technology (NUST)

BS in Electrical Engineering

- **Featured Courses:** Artificial Intelligence, Computer Vision.
- **Thesis:** Chest X-Ray Abnormality Detection using Deep Learning.

Islamabad, Pakistan

2016 - 2020

Experience

Health System Data Science (HSDS) Lab, Seoul National University

Researcher

- Working under the supervision of Dr. Sang Min Park in the Department of Biomedical Sciences.
- Contributing to research on leveraging AI and data science techniques to address challenges in healthcare systems.
- Participating in projects involving health data analysis, predictive modeling, and medical image analysis.

Seoul, Republic of Korea

September 2023 - August 2025

HealthHub.kr

AI Research Engineer

- Researched, experimented with, and implemented state-of-the-art (SOTA) machine learning and deep learning algorithms in the field of medical image analysis.
- Developed computer vision and deep learning-based medical diagnostic solutions.
- Integrated AI solutions with the HealthHub DICOMLINK system, optimizing the pipeline for efficiency and scalability.
- Mentored and trained new employees, facilitating their onboarding and professional development.

Seoul, Republic of Korea

January 2021 - July 2023

Journal Publications

- **A. Rehman**, M. Usman, A.Ur Rehman, M. U.Farooq, D.K.Chae. eTransUNet: Enhancing Encoder-Decoder Segmentation with Progressive Transformers and Adaptive Attention Mechanism. Submitted to MICCAI.
- **A. Rehman**, M. Usman, A.Ur Rehman, M. U.Farooq, D.K.Chae. HADDS-Net: Hybrid Attention-based Dual-Branch Dynamically Self-distilled Network for Knee-Osteoarthritis Grading. Submitted to ECCV.
- **A. Rehman**, J. Kim, H. Lee, J. Chang, S. Park. *Opportunistic AI for Enhanced Cardiovascular Disease Risk Stratification using Abdominal CT Scans*. Computerized Medical Imaging and Graphics, Impact Factor: 5.4.
- **A. Rehman**, M. Usman, A. Shahid, S. Latif, J. Qadir. (2023). *Selective Deeply Supervised Multi-Scale Attention Network for Brain Tumor Segmentation*. Sensors, 23(4), 2346., Impact Factor: 3.9.
- **A. Rehman**, J. Kim, H. Lee, J. Chang, S. Park. (2025). *Opportunistic Screening of Carotid Atherosclerosis and Cardiovascular Mortality Risk Using Chest X-Rays: A Comparative Study of Foundation Models*. Under Review in *Journal of American Heart Association* IF:6.1.
- H. Lee, J. Kim, **A. Rehman**, J. Chang, S. Park. (Accepted). *Optimizing Retinal Image-Based Carotid Atherosclerosis Prediction with Explainable Foundation Models*. *npj Digital Medicine*. Impact Factor: 15.3.
- M. U.Farooq, A.Ur Rehman, **A Rehman**, M. Usman, D.K.Chae (2025). *SSMT-Net: A Semi-Supervised Multitask Transformer-Based Network for Thyroid Nodule Segmentation in Ultrasound Images*. WACV 2026
- M. Usman, **A. Rehman**, A. Shahid, S. Latif, Y. G. Shin. (2024). *MEDS-Net: Multi-Encoder Based Self-Distilled Network with Bidirectional Maximum Intensity Projections Fusion for Lung Nodule Detection*. Engineering Applications of Artificial Intelligence, 129, 107597. Impact Factor: 8.0.
- M. Usman, **A. Rehman**, A. Shahid, S. Latif, S. S. Byon, S. H. Kim, T. M. Khan, Y. G. Shin. (2023). *MESAHA-Net: Multi-Encoders Based Self-Adaptive Hard Attention Network with Maximum Intensity Projections for Lung Nodule Segmentation in CT Scan*. arXiv preprint arXiv:2304.01576.
- M. Usman, **A. Rehman**, S. Masood, T. M. Khan, J. Qadir. (2024). *Intelligent Healthcare System for IoMT-Integrated Sonography: Leveraging Multi-Scale Self-Guided Attention Networks and Dynamic Self-Distillation*. Internet of Things, 25, 101065. Impact Factor: 5.9.
- M. Usman, **A. Rehman**, A. Shahid, A. U. Rehman, S. M. Gho, A. Lee, T. M. Khan. (2024). *Advancing Metaverse-Based Healthcare With Multimodal Neuroimaging Fusion Via Multi-Task Adversarial Variational Autoencoder for Brain Age Estimation*. IEEE Journal of Biomedical and Health Informatics., Impact Factor: 6.7.
- M. Usman, **A. Rehman**, A. Shahid, A. U. Rehman, S. M. Gho, A. Lee, T. M. Khan. (2024). *Multi-Task Adversarial Variational Autoencoder for Estimating Biological Brain Age with Multimodal Neuroimaging*. arXiv preprint arXiv:2411.10100. Impact Factor: -.
- A. U. Rehman, **A. Rehman**, M. Usman, A. Shahid, S. M. Gho, A. Lee, T. M. Khan. (2024). *Biological Brain Age Estimation Using Sex-Aware Adversarial Variational Autoencoder with Multimodal Neuroimages*. arXiv preprint arXiv:2412.05632.
- M. Usman, **A. Rehman**, A. M. Saleem, R. Jawaid, S. S. Byon, S. H. Kim, B. D. Lee, Y. G. Shin. (2022). *Dual-Stage Deeply Supervised Attention-Based Convolutional Neural Networks for Mandibular Canal Segmentation in CBCT Scans*. Sensors, 22(24), 9877. Impact Factor: 3.9.

Projects

M.S. Thesis: AI-Driven Opportunistic Cardiovascular Disease Risk Stratification using Abdominal

CT Scans

- Developed an opportunistic screening pipeline to estimate cardiovascular risk from routine abdominal CT scans.
- Designed and trained deep learning models for imaging-based risk prediction and evaluated performance using survival analysis (e.g., Cox models / concordance).
- Built end-to-end workflow including data preprocessing, ROI/feature extraction, model training, and validation with clinical outcomes.
- Tools: PyTorch, Python, medical imaging preprocessing (e.g., DICOM/NIfTI handling), experiment tracking.

Opportunistic Screening of Carotid Atherosclerosis and Cardiovascular Mortality Risk Using Chest

Submitted

X-rays: A Comparative Study of Foundation Models

- Conducted a comparative evaluation of multiple foundation models for opportunistic cardiovascular risk prediction from standard chest X-rays.
- Developed model adaptation and training pipeline (e.g., fine-tuning/feature extraction) and performed rigorous validation using clinical outcomes.
- Performed performance analysis across risk endpoints (atherosclerosis-related markers and cardiovascular mortality), including calibration and subgroup checks.

• GitHub Repo: [CXR Atherosclerosis-Screening Public](#)

KL Grade Classification using Knee X-ray Images

- Conducted literature survey, implemented research papers, and designed novel architectures.
- Utilized Keras and TensorFlow frameworks for implementation.
- GitHub Repo: [KL Grade Classification Repository](#)

3D Cervical Spine Segmentation

- Developed a 3D U-Net pipeline for automatic vertebra segmentation and labelling to assist in cervical disc arthroplasty.
- Trained on the VerSe dataset (374 CT scans), addressing challenges of variable vertebral coverage and highly imbalanced data.
- Achieved a Dice score of 95% on cervical spine segmentation.
- GitHub Repo: [Cervical Spine Segmentation Repository](#)

MESAHA-Net

- Developed MESAHA-Net, a multi-encoder self-adaptive hard attention network combining raw CT slices with bidirectional Maximum Intensity Projections (MIPs) for accurate lung nodule segmentation.
- Introduced a self-adaptive hard attention block that selectively amplifies nodule regions while suppressing background noise, eliminating rescaling-induced errors common in prior methods.
- Published in *Computers in Biology and Medicine* (2025); achieved a DSC of 88.27 on LIDC-IDRI with only ~0.44M parameters and ~48ms inference time, outperforming Res-UNet, DEHA-Net, and CMSF baselines.
- GitHub Repo: [MESAHA-Net Repository](#)

SDS-MSA-Net

- Proposed a fully automatic Selective Deeply Supervised Multi-Scale Attention Network for brain tumor segmentation.
- Utilized a 3D multi-slice input combined with 2D slices and multi-scale encoding units to capture global and local features; evaluated on the BraTS2020 dataset.
- GitHub Repo: [SDS-MSA-Net Repository](#)

MAXedNet

- Developed MAXedNet, a multiscale self-guided attention network with a DenseNet-121 backbone for thyroid nodule segmentation in IoMT-enabled sonography.
- Introduced a novel Dynamic Self-Distillation (DSD) training mechanism that dynamically selects a teacher branch to supervise student branches, improving model robustness and generalizability.
- Evaluated on DDTI and TN3K public datasets, outperforming state-of-the-art models including ATT-U-Net, DeepLab v3+, and SANet.
- GitHub Repo: [MAXedNet Repository](#)

Skills & Tools

Technical Skills

Image Processing, Medical Imaging, DICOM Standards, Machine Learning, Deep Learning, Data Analysis
Natural Language Processing, Data Visualization, Algorithm Development, Front-End Development

Languages and Frameworks

Python, TensorFlow, Keras, PyTorch, Scikit-Learn, Scikit-image
OpenCV, SimpleITK, Tkinter, Pydicom, FastAI

Linux (Ubuntu, CentOS), AWS, MLFlow, Git, Docker, VTK, RESTful APIs

Certifications

- Neural Networks and Deep Learning - Andrew Ng, Coursera
- Structuring Machine Learning Projects - Andrew Ng, Coursera
- Image Processing with Keras in Python - DataCamp
- Advanced Deep Learning with Keras - DataCamp
- Introduction to Deep Learning with PyTorch - DataCamp
- Python for Data Science and Machine Learning Bootcamp - Udemy
- NLP –Natural Language Processing with Python - Udemy

Interests

Exploring Cultures Through Travel and Food • Connecting with Nature • Baking • Watching K-Dramas • Learning New Languages • Book Reading