

# Aisha Javed

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## EDUCATION

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### Ph.D.

Seoul National University of Science and Technology, South Korea      September 2021- August 2025  
Department of Civil Engineering  
Major in Civil Engineering (Remote Sensing Image processing)  
Cumulative GPA of 4.33/4.5

### M.Eng.

Kyungpook National University, South Korea      September 2019 - August 2021  
Department of Convergence & Fusion System Engineering  
Major in Remote Sensing  
Cumulative GPA of 4.38/4.5

### B.E.

Iqra University, Pakistan      September 2013 - May 2017  
Department of Electronic Engineering  
Major in Electronic Engineering  
Cumulative GPA of 3.49/4

## PROFESSIONAL EXPERIENCE

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### Research Experience in Remote Sensing Image Processing Laboratory

#### Ph.D. Thesis: Lightweight Hybrid CNN-Transformer Network for Semantic Change Detection

January 2025 – August 2025

Developed a multitask deep learning model for joint semantic segmentation and change detection in bi-temporal satellite images. The architecture integrates shared-weight Siamese encoders with a Temporal-Symmetric Transformer to refine temporal features. The model was evaluated on ultra-high, very-high, and mid-resolution imagery acquired by different satellite sensors, demonstrating state-of-the-art performance with significantly reduced parameter count and enhanced semantic transition consistency.

This work is currently being prepared for submission to the ISPRS Journal of Photogrammetry and Remote Sensing.

#### Semantic Segmentation of Urban Trees and Grass in Korean Cities

2024 – Internal R&D Project (Non-published)

Contributed to a project focused on detecting urban trees and grass in South Korean cities including Jeju, Incheon, and Seoul. A multi-temporal dataset was prepared using KOMPSAT-3 and 3A imagery. I updated and trained a semantic segmentation network tailored to this dataset, achieving high class-wise accuracy for both vegetation categories. The trained model was later validated on full-scene imagery to assess performance in real-world urban mapping scenarios.

### **Deep Learning-Based Forest Change Detection in Urban Environment by Using Very High-Resolution Satellite Images**

September 2021 – December 2024

Conducted two complementary studies to detect changes in urban vegetation and broader urban structures. One study focused on South Korea using KOMPSAT-3, WorldView-3, and QuickBird-2 imagery, while the other utilized open-source semantic change detection datasets tailored for urban greenery monitoring. Developed deep learning models for class-wise semantic change detection with emphasis on forest degradation, new urban vegetation, and infrastructure changes. Both models were validated using extensive experiments and led to two first-author publications in Remote Sensing and IEEE JSTARS.

### **3D Vibration Measurement Using Multiple Videos**

September 2019 -September 2022

Developed a vibration analysis pipeline using dual-camera video streams, employing epipolar-line-based ROI extraction and a target-less photogrammetric approach. Phase-based motion magnification was applied to enhance signal clarity and suppress measurement noise. The method was validated on both simulated and real experimental datasets, leading to the publication of three first-author papers in top-tier mechanical engineering journals.

### **Object-based Buildings Change Detection by Using Satellite Imagery**

September 2019 -September 2020

Designed a change detection algorithm for small urban structures using multi-temporal very-high-resolution satellite images acquired by KOMPSAT-3 over a Korean city. The method combined morphological pixel-level indices with object-level post-processing to accurately detect and classify building changes in dense urban environments.

### **Additional Experience**

Mentored junior researchers and graduate students in lab-based workflows, including data preparation, model training, result evaluation, and reviewing papers and theses related to remote sensing and deep learning.

## **SKILLS**

**Programming & Frameworks** → Python, PyTorch, TensorFlow, MATLAB, Verilog, C++ (basic)

**Remote Sensing & GIS** → ENVI, eCognition Developer, ArcGIS

**Deep Learning & Image Analysis** → Satellite Image Processing, Semantic Segmentation, Change Detection, Vibration Detection

**Others** → AutoCAD, Multisim, LabVIEW, Proteus

## **RESEARCH PROJECTS**

Satellite Information Big Data Utilization National Land Comprehensive Management Technology Development, Korea Land, Infrastructure and Transport Science and Technology Promotion Agency, Research Assistant	2022 - 2025
Analysis and control of motion/vibration in the new renewable power generation system using image data, Korea Hydro & Nuclear Power Co., Ltd., Research Assistant	2020 - 2022
Improvement of change detection performance for very-high-resolution multi-source optical imagery through automated fine registration, National Research Foundation of Korea (NRF), Research Assistant	2019 - 2021

## PUBLICATIONS

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- 1) **A. Javed**, T.-H. Kim, C.-H. Lee, and Y.-K. Han\*, "Deep-Learning-Based Semantic Change Detection for Urban Greenery and Comprehensive Urban Areas," *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, vol. 18, pp. 1841-1852, 2024. (IF: 4.7, JIF: 10.0% (7/65), IEEE).
- 2) **A. Javed**, T.-H. Kim, C.-H. Lee, J.-H. Oh, and Y.-K. Han\*, "Deep Learning-based Detection of Urban Forest Cover Change along with Overall Urban Changes Using Very-High-Resolution Satellite Images," *Remote Sensing*, vol. 15, no. 17, pp.4285, 2023. (IF: 5.0, JIF: 15.2% (31/201), MDPI).
- 3) **A. Javed**, J.-E. Park, H.-I. Lee, and Y.-K. Han\*, "Vibration Signal Separation of Rotating Cylindrical Structure Through Target-less Photogrammetric Approach," *Journal of Sound and Vibration*, vol. 547, 117540, 2023. (IF: 4.761, JCR: 10.94% (4/32), Elsevier).
- 4) **A. Javed**, J.-E. Park, C.-N. Lee, H.-I. Lee, B.-I. Kim, and Y.-K. Han\*, "Edge-based 3D Vibration Measurement of Rotating Cylinder-shaped Structure through Epipolar Line-based Corresponding Point Extraction between Two Camera Images," *Mechanical Systems and Signal Processing*, vol. 187, 109981, 2023. (IF: 8.934, JCR: 2.55% (4/137), Elsevier).
- 5) **A. Javed**, H.-I. Lee, B.-I. Kim, and Y.-K. Han\*, "Vibration Measurement of a Rotating Cylindrical Structure Using Subpixel-based Edge Detection and Edge Tracking," *Mechanical Systems and Signal Processing*, vol. 166, 108437, 2022. (IF: 8.934, JCR: 2.55% (4/137), Elsevier).
- 6) **A. Javed**, S.-J. Jung, W.-H. Lee, and Y.-K. Han\*, "Object-Based Building Change Detection by Fusing Pixel-Level Change Detection Results Generated from Morphological Building Index," *Remote Sensing*, vol. 12, no. 18, pp. 2952, 2020.

## INTERNATIONAL CONFERENCES

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- 1) **A. Javed**, T.-H. Kim, C.-H. Lee, and Y.-K. Han, "Deep Learning Framework for Semantic Change Detection in Urban Green Spaces along with Overall Urban Areas", *IEEE International Geoscience and Remote Sensing Symposium*, Athens, Greece, 2024.
- 2) **A. Javed**, C.-H. Lee, T.-H. Kim, and Y.-K. Han, "Urban Vegetation Segmentation in Very High-resolution Satellite Imagery Using Vegetation-related Multiclass Dataset", *International Symposium on Remote Sensing*, Taichung, Taiwan, 2024.
- 3) **A. Javed**, Y.-R. Yun, J.-W. Hur, J.-H. Yeom, and Y.-K. Han, "Deep Learning-Based Vegetation Extraction and Vegetation Change Monitoring by using Very High-Resolution Satellite Imagery," *European Geosciences Union*, Vienna, Austria, 2023.
- 4) **A. Javed**, J. Park, H.-I. Lee, Y.-K. Han, "Measurement Of Vibration Occurring at Multiple Frequencies Using Target-less Photogrammetry And Phase-based Motion Magnification," *IEEE International Geoscience and Remote Sensing Symposium*, Kuala Lumpur, Malaysia, 2022.
- 5) **A. Javed**, J. Park, H.-I. Lee, B.-I. Kim, Y.-K. Han, "Epipolar Line-Based Lateral Vibration Measurement by Using Two Cameras," *International Society for Photogrammetry and Remote Sensing (ISPRS) Congress*, Nice, France, 2022.

## LANGUAGE SKILLS

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English	Professional
Korean	Intermediate level
Urdu	National Language