# Junhyuk Heo

E-mail Github LinkedIn Google Scholar Homepage

## Introduction

I am a researcher in TelePIX dedicated to solving fundamental challenges in remote sensing by leveraging advanced neural networks. My work focuses on developing robust models for complex tasks unique to satellite imagery, including self-supervised SAR despeckling, few-shot segmentation, and high-fidelity image translation. My recent research explores the use of Implicit Neural Representations (INRs) for continuous and efficient signal representation, demonstrated in my work on neural image compression and pansharpening. Additionally, I am interested in exploring Physics-Informed Neural Networks (PINNs) to solve complex problems in earth science.

## Education

**Konkuk University** — *Mar 2018 – Feb 2024*
*B.S in Civil Engineering, minor in Compuer Science* — *Seoul, Republic of Korea*

## Publications

**Fourier-Modulated Implicit Neural Representation for Multispectral Satellite Image Compression** — *IGARSS (Oral), 2025*
Woojin Cho*, Steve Andreas Immanuel*, ***Junhyuk Heo***, and Darongsae Kwon
Paper Code Poster

**Tackling Few-Shot Segmentation in Remote Sensing via Inpainting Diffusion Model** — *ICLRw (Best Paper Award), 2025*
Steve Andreas Immanuel, Woojin Cho, ***Junhyuk Heo***, and Darongsae Kwon
Paper Code Poster

**SAR-to-optical image translation with UNSB-FFC considering shadow area pixels** — *KSCE Journal of Civil Engineering, 2025*
Su Min Jo, ***Junhyuk Heo***, and Yang Dam Eo
Paper

**Neural Compression for Multispectral Satellite Images** — *NeurIPSw, 2024*
Woojin Cho*, Steve Andreas Immanuel*, ***Junhyuk Heo***, and Darongsae Kwon
Paper Code Poster

## Research Experiences

**TelePIX** — *May 2024 – Present*
*AI Researcher* — *Republic of Korea*
- Satellite image enhancement (denoising, pansharpening)
- Image segmentation and few-shot learning for satellite analysis (for environmental & industrial monitoring)
- Satellite image compression using modulated INR

**Geomatics Lab** — *Jun 2023 – Feb 2024*
*Research Intern* — *Konkuk Univ., Republic of Korea*
- Satellite image preproccesing using QGIS, ArcGIS
- SAR(Synthetic Aperture Radar) to Optical image translation using generative models

## Projects

**SAR despeckling** — *Mar 2025 – Jun 2025*
*ICML 2025 workshop(rejected)*
- A self-supervised, score-based framework for SAR despeckling using a novel noise normalization pipeline
- Utilizes a Log-Yeo-Johnson transformation to normalize multiplicative Gamma speckle into an approximately Gaussian distribution.
- Employs a Corruption2Self-inspired objective, enabling robust training solely on noisy SAR images without clean ground truth.
- Delivers superior speckle reduction while maintaining fast inference times comparable to traditional algorithms.

**Hyperspectral Images Pansharpening** — *Dec 2024 – Jan 2025*
*ESA-NASA Workshop on AI Foundation Model for Earth Observation*
- Proposal for a PAN-conditioned INR enabling continuous, resolution-independent pansharpening.
- Aims to mitigate color distortion on real data by overcoming the resolution gap inherent in supervised models.
- Designed for fast inference with a single forward pass, in contrast to slow per-image optimization methods.
- Accepted for presentation at the ESA-NASA International Workshop on AI Foundation Models for Earth Observation.

**Other Deep Learning Projects** *Jul 2022 – Jan 2024*
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- Deployment of a Golf Swing Analysis Web Service with YOLO-Based 3D Pose Estimation
- Novel Model Development and Web Pipeline for Change Detection
- Text-Based Meme Recommendation and Face Synthesis Web Service
- Object-to-Hanjii Stylization via Image-to-Image Generation
- Golf Swing Correction and Analysis Using 3D Pose Estimation

## Research Interests

Generative Models, Diffusion Models, Implicit Neural Representations, Physics-Informed Neural Networks, Self-Supervised Learning, Remote Sensing, SAR Imagery, Few-Shot Learning

## Skills

**Programming Languages:** Python, Javascript, MATLAB

**Deep Learning:** PyTorch, TensorFlow, Keras, DDP

**Remote Sensing:** ArcGIS, QGIS, Google Earth Engine

**Tools & Platforms:** Git, Docker, Linux, AWS, Latex

**Language:** Korean(native), English