Byeonghun Lee

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EDUCATION

Mar. 2017 ~ Feb. 2022	**Daegu Gyeongbuk Institute of Science and Technology** School of Undergraduate Studies *B.S. in Convergence* GPA: 3.21 / 4.3	Daegu, Korea
Mar. 2022 ~ Present	**Korea University** School of Electrical Engineering *Advisor: Kyong Hwan Jin* *Ph.D. Student* GPA: 4.38 / 4.5	Seoul, Korea

RESEARCH INTERESTS

- Image processing
- Inverse problem
- Retrieval-Augmented Generation in Vision
- Image Super-Resolution
- 3D rendering, Depth Estimation

PUBLICATIONS

1. **Byeonghun Lee**, Hyunmin Cho, Sunghoon Im†, and K.H. Jin†, "ReAL: Reference-to-Image (R2I) Aware Latent Diffusion for Image Super-Resolution," European Conference on Computer Vision (ECCV), 2026.
2. **Byeonghun Lee***, Hyunmin Cho*, Honggyu Choi, Soo Min Kang, Iljun Ahn and K.H. Jin*, "Reference-based Super-Resolution via Image-based Retrieval-Augmented Generation Diffusion," IEEE/CVF International Conference on Computer Vision (ICCV), 2025.
3. Woo Kyoung Han*, Yongjun Lee*, **Byeonghun Lee**, Sang Hyun Park, Sunghoon Im*, and K.H. Jin*, "JPEG Processing Neural Operator for Backward-Compatible Coding," IEEE/CVF International Conference on Computer Vision (ICCV), 2025.
4. Woo Kyoung Han, **Byeonghun Lee**, Hyunmin Cho, Sunghoon Im*, K.H. Jin*, "Towards Lossless Implicit Neural Representation via Bit Plane Decomposition," IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2025.

5. EungGu Kang, **Byeonghun Lee**, Sunghoon Im*, and K. H. Jin*, “BurstM: Deep Burst Multi-scale SR using Fourier Space with Optical Flow,” European Conference on Computer Vision (ECCV), 2024.
6. Minsu Kim, Jaewon Lee, **Byeonghun Lee**, Sunghoon Im and K. H. Jin, “Implicit Neural Image Stitching With Enhanced and Blended Feature Reconstruction,” IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), 2024.
7. Woo Kyoung Han, **Byeonghun Lee**, Sang Hyun Park, and K. H. Jin, “ABCD : Arbitrary Bitwise Coefficient for De-quantization,” IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2023.

Under Review & In preparation

1. **Byeonghun Lee**, Jaedeok Kim, Sunghoon Im and Kyong Hwan Jin, "Target-Oriented Neural MPI Stitching for Novel View Synthesis," WACV 2027.
2. **Byeonghun Lee**, Seonhwa Kim, Sunho Lee, Kyong Hwan Jin, "Polarimetric Spin-2 Equivariant Adapters for Metric Monocular Depth", ICLR 2027
3. **Byeonghun Lee***, Seonhwa Kim*, Pureum Kim, Jee Eun Kim, Sunho Lee, "Efficient RGB-to-Polarization Estimation via Residual-Shifting Generative Models", ICLR 2027

PATENTS

1. Apparatus and Method of Recovering Image Using Arbitrary Bitwise Coefficient Estimation for De-quantization, 1020230111027(2023-08-24)
2. Method and Apparatus for Lossless Implicit Neural Representation using Bit-plane Decomposition, 1020250151831(2025-10-20)
3. Synthetic polarization data generation and polarization-based depth estimation (**Samsung Electronics collaboration**)
   - 2 Korean patent applications, pending
   - 1 international patent application, pending

PROJECTS

- Synthetic Polarization Data Generation from RGB Images & Polarization-Based Precise Depth Estimation — **Samsung Electronics** (MAR 2026 –) Production Engineering Research Institute Developed a model that generates polarization images from RGB inputs, and a model that leverages these polarization images to improve monocular depth estimation.
- Hallucination Mitigation in Video Understanding Models — **Samsung Research** (DEC 2025 –) Built a graph-based structured representation of video content, and applied first-order logic constraints over the graph to detect and suppress hallucinated outputs in video-language model responses.
- User-Preference-Based Image Quality Enhancement — **Samsung Research** (Jun 2024 – May 2025) Developed diffusion-model-based methods for reference-guided style transfer and for restoring low-quality images into high-quality outputs; the resulting work was accepted at ICCV.
- Cognitive Reverse-Haptics Reproduction System Lab — **Basic Research Laboratory (BRL), National Research Foundation of Korea** (Feb 2023 – Feb 2024) Developed signal-processing algorithms to convert real-world tactile data into digital signals, and designed a Verilog-based hardware demonstration.
- Food Classification Algorithm for Caloric Intake Analysis — **Pinset Healthcare** (Aug 2022 – Jul 2023) Developed food classification and calorie estimation algorithms from user-captured food images.
- Deep Learning Algorithm for Bacteria Detection — **THE WAVE TALK** (Mar 2022 – Aug 2022) Developed an image-based classification algorithm to identify bacteria species and concentration levels.

AWARDS AND HONORS

- Bronze medal for paper award , IPIU, Korea (Jun. 2026)

SKILLS AND TECHNIQUES

- Proficient in C++ and Python
- Experienced in developing AI algorithms with PyTorch
- Background in 3D rendering and image warping
- Expertise in image super-resolution techniques
- Research and development experience with diffusion models