Joonwoo Kwon

Physics-Informed Deep Learning,
Generative Modeling, Computer Vision

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Education

08/2025 – East Lansing, MI
Michigan State University (MSU)
Ph.D. in Computer Science and Engineering **(Advisor: Dr. Zijun Cui)**

03/2021 – 02/2023 Seoul, South Korea
Seoul National University (SNU)
M.S. in Applied Bioengineering GPA: 3.88 / 4.0 **(Top 3%)**

03/2015 – 02/2021 Suwon, South Korea
SungKyunKwan University (SKKU)
B.S. in Electronic and Electrical Engineering GPA: 3.75 / 4.5 **(Top 8%)**

Research Experience

02/2023 – 12/2024 Seoul, South Korea
SNU Connectome Lab (Advisor: Dr. Jiook Cha)
Research Associate | Neuroscience & Generative Modeling

- Developed a new neural style transfer method **(C1)** for aesthetic-aware stylization.
- Designed an image-to-image translation model **(P1)** for cross-modal MRI synthesis.
- Proposed a novel generation task, dataset, and a multimodal framework **(C2)** for reconstructing video with music contextualized by human affect from brain signals.

02/2023 – 12/2024 Upton, NY (Remote)
Brookhaven National Lab (Advisor: Dr. Shinjae Yoo, Dr. Yuewei Lin)
Research Associate | Computer Vision & Multimodal Learning

- Developed a training-free approach for music style transfer **(P2)** by directly manipulating the self-attention features of pre-trained diffusion models.
- Designed viscosity-aware style optimization and brushstroke parameterization to emulate the physical and textural properties of oil painting and watercolor.
- Proposed a brain-to-text generation model and showed its versatility (e.g., composable brain decoding), inspired by how the brain perceives the visual world.

03/2022 – 06/2022 Seoul, South Korea
Samsung Advanced Institute of Technology (SAIT) (Research Capstone)
Student Researcher | Image-to-image translation, Semiconductor, and 3D Depth

- Led research on an image-to-image translation model utilizing U-NET and PatchGAN to synthesize 3D depth maps from SEM imaging.

Professional Experience

01/2025 – 05/2025 YongIn, South Korea
Hanwha Systems Co., Ltd. (Defense) | Institute of Advanced Technologies (Space)
Research Scientist (Full-time) | *Military Satellite Imaging (SAR)*

- Developed image registration algorithms for SAR (Synthetic Aperture Radar) analysis.

10/2024 – 12/2024 Seoul, South Korea
Planningo Inc.
Research Engineer | Commercial Photography, Image Compositing

- Developed an image harmonization framework that resolves inconsistencies in lighting, textures, and color for commercial photography compositing.

Publications

(† denotes corresponding author)

[P2]. A Training-Free Approach for Music Style Transfer with Latent Diffusion Models
Kim, S.*, **Kwon, J.***, Wang, H.*, Yoo, S.†, Lin, Y.†, & Cha, J.†
Under Review, 2025.

[P1]. Macro2Micro: Cross-modal Magnetic Resonance Imaging Synthesis Leveraging Multi-scale Brain Structures
Kim, S.*, **Kwon, J.***, Kwon, J.*, Bae S., Yoo, S.†, Lin, Y.†, & Cha, J.†
Under Review, 2025.

[C2]. Revisiting Your Memory: Reconstruction of Affect-Contextualized Memory via EEG-guided Audiovisual Generation
Kwon, J.*, Wang, H.*, Lee, J.*, Kim, S.*, Yoo, S., Lin, Y.,† & Cha, J.†
AAAI 2025 Workshop on Artificial Intelligence for Music (AI4Music)

[C1]. AesFA: An Aesthetic Feature-Aware Arbitrary Neural Style Transfer
Kwon, J.*, Kim, S.*, Yoo, S.†, Lin, Y.†, & Cha, J.†
AAAI 2024. Acceptance Rate: 23.75% (2342/12100).

Skills

Communications: **English** (Fluent; TOEFL 110; R30 L29 S24 W27), **Korean** (Native)
Programming: Python, PyTorch, TensorFlow, MATLAB, C, R
Others: **Hardware Languages** Verilog (intermediate), VHDL (intermediate)