Joonwoo Kwon

Ph.D. Student in Computer Science & Engineering, MSU
Physics-Informed Deep Learning, Computer Vision, Generative AI

Curriculum Vitae
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Research Interests	**Physics-Informed Deep Learning** — integrating physical laws into deep generative and vision models for interpretable and physically coherent 3D human motion understanding and generation.

Education

08/2025 – Present *East Lansing, MI*	**Ph.D. in Computer Science and Engineering** Michigan State University (MSU)
03/2021 – 02/2023 *Seoul, South Korea*	**M.S. in Applied Bioengineering** Seoul National University (SNU)
03/2015 – 02/2021 *Suwon, South Korea*	**B.S. in Electronic and Electrical Engineering** SungKyunKwan University (SKKU)	(2016 – 2018) Korea Air Force for military service

Research Experience

08/2025 – Present *East Lansing, MI*	**MSU DominoAI Lab (Advisor: Dr. Zijun Cui)** *Research Assistant | Physics-Informed Deep Learning & Generative Modeling* • Developed physics-informed benchmark models and evaluation metrics to assess the physical plausibility and consistency of 3D human motion estimation & generation frameworks.
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.** | Institute of Advanced Technologies (Defense & 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

Publications * Equal contribution; † corresponding author	**[P2]**. Stylus: Repurposing Stable Diffusion for Training-Free Music Style Transfer on Mel-Spectrograms Wang, H.*, **Kwon, J.***, Kim, S.*, Seo, J., 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.†
ACM MM CogMAEC '25 (Oral)

[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).

Manuscripts in Preparation	**[P5]**. An Instance-Adaptive Photorealistic Style Optimization for Commercial Image Harmonization Kim, S.*, **Kwon, J.***, Shin, J., Cha, J., & Kim, S. † **[P4]**. Compositional Brain Decoding from Symbolic Representations in the Hierarchical Visual System Kim, S.*, **Kwon, J.***, Wang, H., Kwon, J., Park, M. †, Yoo, S. †, Lin, Y. †, & Cha, J. † **[P3]**. A Viscosity-guided Artistic Style Optimization via Brushstroke Parameterization **Kwon, J.***, Kim, S.*, Lee, S.*, Yoo, S., Lin, Y. †, & Cha, J.†

Selected Projects	10/2024	**The Recollection of Your Most Cherished Experience Utilizing AI and Neural Signals** • Proposed a multimodal AI framework for synthesizing personalized video with music using generative AI and neural signals (EEG).
	09/2023 – 08/2025	**Affect-Contextualized Perception Decoding with Cross-Species Multiscale Neuroscience Foundation Model** • Developed a composable brain-to-text/image model using brain signals (fMRI)
	09/2020 – 12/2020	**An Appreciation Aid Tool for the Visually Impaired via Synesthetic Perception** • Developed an Arduino-based tool for the visually impaired that converted object colors and brightness into musical notes to enable synesthetic perception.

Honors and Awards	2024	**The Grand Prize, [AI & Art Hackathon](#)** ($1,000 USD), AI Art Research Center, SNU
	2020	**Academic Excellence Scholarship for Outstanding Research** (25% tuition), SKKU
	2020	**Corporate Partner Scholarship** (75% tuition), SKKU, ITECH Industrial Systems
	2018	**The 2nd Winner for the 9th Engineering Competition for Local Impact**, SKKU
	2018	**Korean Patent** (Applied; Public Telephone Booth for Sightseeing)

Invited Talks & Exhibition	10/2024	**ART DIFFUSION**, Tech to Art Platform (TAP) Prequel, SNU Museum of Art
	09/2024	**Invited Talks:** A Composable Brain Decoding, Annual Meetings on Brain Decoding, SNU

Teaching & Mentoring	08/2018 – 12/2018	**Exchange Student Mentoring,** SKKU, (Electronic Circuits I; Introduction to Automatic Control)

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)

Reference	**Dr. Zijun Cui** (Assistant Professor, MSU CSE | Doctoral Advisor) | email: cuizijun@msu.edu **Dr. Jiook Cha** (Associate Professor, SNU Psychology | Academic Advisor) | email: connectome@snu.ac.kr **Dr. Shinjae Yoo** (Chair, Artificial Intelligence Department, Brookhaven National Lab. | email: sjyoo@bnl.gov **Dr. Yuewei Lin** (Senior Computational Scientist, Brookhaven National Lab. | email: ywlin@bnl.gov