

# Joonwoo Kwon

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

Curriculum Vitae  
Homepage: <https://kwonjoon.info>  
Email: [kwonjoon@msu.edu](mailto:kwonjoon@msu.edu)

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**Research Interests**      **Physics-Informed Deep Learning** — integrating physical laws into deep generative and vision models to achieve interpretable and physically coherent 2D/3D generation, such as human motion generation.

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**Education**

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

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**Research Experience**

08/2025 – Present <i>East Lansing, MI</i>	<b><a href="#">MSU DominoAI Lab</a> (Advisor: Dr. Zijun Cui)</b> <i>Research Assistant   Physics-Informed Deep Learning &amp; Generative Modeling</i> <ul style="list-style-type: none"><li>Developed retargeting algorithm and datasets for physics-informed deep learning (e.g., human motion generation).</li></ul>
02/2023 – 12/2024 <i>Seoul, South Korea</i>	<b><a href="#">SNU Connectome Lab</a> (Advisor: Dr. Jiook Cha)</b> <i>Research Associate   Neuroscience &amp; Generative Modeling</i> <ul style="list-style-type: none"><li>Developed a new neural style transfer method (<b>C1</b>) for aesthetic-aware stylization.</li><li>Designed an image-to-image translation model (<b>P1</b>) for cross-modal MRI synthesis.</li><li>Proposed a novel generation task, dataset, and a multimodal framework (<b>C2</b>) for reconstructing video with music contextualized by human affect from brain signals.</li></ul>
02/2023 – 12/2024 <i>Upton, NY (Remote)</i>	<b><a href="#">Brookhaven National Lab</a> (Advisor: Dr. Shinjae Yoo, Dr. Yuewei Lin)</b> <i>Research Associate   Computer Vision &amp; Multimodal Learning</i> <ul style="list-style-type: none"><li>Developed a training-free approach for music style transfer (<b>C3</b>) by directly manipulating the self-attention features of pre-trained diffusion models.</li><li>Designed viscosity-aware style optimization and brushstroke parameterization to emulate the physical and textural properties of oil painting and watercolor.</li><li>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.</li></ul>
03/2022 – 06/2022 <i>Seoul, South Korea</i>	<b><a href="#">Samsung Advanced Institute of Technology (SAIT)</a> (Research Capstone)</b> <i>Student Researcher   Image-to-image translation, Semiconductor, and 3D Depth</i> <ul style="list-style-type: none"><li>Led research on an image-to-image translation model utilizing U-NET and PatchGAN to synthesize 3D depth maps from SEM imaging.</li></ul>

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**Professional Experience**

01/2025 – 05/2025 <i>YongIn, South Korea</i>	<b><a href="#">Hanwha Systems Co., Ltd.</a>   Institute of Advanced Technologies (Defense &amp; Space)</b> <i>Research Scientist (Full-time)   Military Satellite Imaging (SAR)</i> <ul style="list-style-type: none"><li>Developed image registration algorithms for SAR (Synthetic Aperture Radar) analysis.</li></ul>
10/2024 – 12/2024 <i>Seoul, South Korea</i>	<b><a href="#">Planningo Inc.</a></b> <i>Research Engineer   Commercial Photography, Image Compositing</i> <ul style="list-style-type: none"><li>Developed an image harmonization framework that resolves inconsistencies in lighting, textures, and color for commercial photography compositing.</li></ul>

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**Publications**      **[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, 2026)

\* Equal contribution;  
† corresponding author

**[C3]. [Repurposing Image Diffusion Models for Training-Free Music Style Transfer on Mel-Spectrograms](#)**  
Wang, H.\*, **Kwon, J.\***, Kim, S.\*, Seo, J., Yoo, S.†, Lin, Y.†, & Cha, J.†  
**IEEE ICIP 2026.**

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[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).

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Manuscripts  
in Preparation

[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.†

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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.
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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 2<sup>nd</sup> Winner for the 9<sup>th</sup> Engineering Competition for Local Impact**, SKKU

2018

**Korean Patent** (Applied; Public Telephone Booth for Sightseeing)

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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

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Teaching &  
Mentoring

08/2018 – 12/2018

**Exchange Student Mentoring**, SKKU, (Electronic Circuits I; Introduction to Automatic Control)

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Services

Reviewer

**CVPR, ICIP, NeurIPS**

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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)

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Reference

**Dr. Zijun Cui** (Assistant Professor, MSU CSE | Doctoral Advisor) | email: [cuizijun@msu.edu](mailto:cuizijun@msu.edu)

**Dr. Jiook Cha** (Associate Professor, SNU Psychology | Academic Advisor) | email: [connectome@snu.ac.kr](mailto:connectome@snu.ac.kr)

**Dr. Shinjae Yoo** (Chair, Artificial Intelligence Department, Brookhaven National Lab.) | email: [sjyoo@bnl.gov](mailto:sjyoo@bnl.gov)

**Dr. Yuewei Lin** (Senior Computational Scientist, Brookhaven National Lab.) | email: [ywlin@bnl.gov](mailto:ywlin@bnl.gov)

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