# Sooyoung Kim

Website

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RESEARCH INTERESTS

**Computer Vision, Generative AI, Human-AI**
I aim to understand and generate dynamic images, including video and 3D computer vision, particularly for story-based multimodal media, through a human perspective.

EDUCATION

**Seoul National University**, Seoul, South Korea — Mar 2021 – Aug 2023
M.S. in Brain and Cognitive Sciences (Advisor: Jiook Cha)
Overall GPA: 3.61/4.3 (94.1%)

**Ewha Womans University**, Seoul, South Korea — Mar 2017 – Feb 2021
B.S. in Computer Science and Engineering
Overall GPA: 3.51/4.3 (92.5%)

RESEARCH IN PROGRESS
(* denotes equal contribution)

**[P6]** An Instance-Adaptive Photorealistic Style Optimization for Relightful Image Harmonization
Kwon, J.*, **Kim, S.***, Kim, S., Shin, J., Yoo, S., Lin, Y., & Cha, J.

**[P5]** Attention Guidance Enables A Composable Brain-To-Text Decoding
**Kim, S.***, Kwon, J.*, Park, M.*, Seo, J., Ro, W., Yoo, S., Kim, S., Lin, Y., & Cha, J.

**[P4]** An Aesthetically Enhanced Brushstrokes Parameterization for Neural Style Transfer
Kwon, J.*, **Kim, S.***, Lee, S.*, Yoo, S., Lin, Y. †, & Cha, J.†

PUBLICATIONS
(† denotes corresponding author)

**[P3]** 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.†
Under Review.

**[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.

**[P1]** Macro2Micro: A Rapid and Precise Cross-modal Magnetic Resonance Imaging Synthesis using Multi-scale Structural Brain Similarity
**Kim, S.***, Kwon, J.*, Kwon, J.*, Bae S., Yoo, S.†, Lin, Y.†, & Cha, J.†
Preprint, 2024.

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

**[B1]** Designing Software Creation: Using UML Diagrams
Textbook, 2023.

RESEARCH EXPERIENCE

**Connectome Lab**, Seoul National University — Sep 2023 – Present
*Research Associate with Prof. Jiook Cha*

- Propose a new generation task **(P3)** that reconstructs videos with music that are contextualized by human affect from brain signal.
- Generate a training-free music style transfer **(P2)** by manipulating the self-attention features of the pre-trained Latent Diffusion Models.

**Connectome Lab**, Seoul National University — Jun 2020 – Feb 2021
*Undergraduate Researcher with Prof. Jiook Cha*

- Modeled brain connectivity—setting brain regions as nodes and their connections as edges—utilizing Graph Convolutional Networks (GCN) to predict Obsessive Compulsive Disorder.
- Resulted in a higher performance than machine learning algorithms like Random Forest.

**NLP & Bioinformatics Lab**, Ewha Womans University — Jul 2019 – Feb 2020
*Undergraduate Researcher with Prof. Hyunseok Park*

- As an assistant author for textbook **(B1)**, developed Java codes and contributed to the illustrations and writing for Computer Science students at Ewha Womans University based on Java Programming and Unified Modeling Language (UML).
- Studied NLP algorithms predicting the part of speech of words in Genomics and Informatics research papers using Python.

## WORK EXPERIENCE

**Planningo**, Seoul, South Korea — Oct 2024 – Present
*AI Researcher*

- Develop image harmonization models **(P6)** for commercial photography by resolving the incongruity between AI-generated backgrounds and original advertising product images.

## PROJECTS

**Brain Decoding with Foundation Model** — Sep 2024 – Present

- Propose a new brain-to-text decoding task **(P5)** and develop model enabling a composable brain decoding for the first time in the decoding project at Seoul National University.

**AI x Art Hackathon** — Sep 2024 – Oct 2024

- Designed AI framework that generates video with music using electroencephalogram (EEG) signals for affect, text prompts, and sketches from users recalling memory.

**Samsung Advanced Institute of Technology Research Capstone** — May 2022 – Jun 2022

- Developed a new Image-to-Image Translation model that synthesizes 3D depth maps from 2D Scanning Electron Microscope (SEM) images leveraging U-Net and Patch GAN.
- Ranked in the top 20% for Root Mean Squared Error (RMSE) compared to other models.

**U.S. DOE NERSC Exa-scale Science Application Program** — Jun 2021 – Present

- Advised by Dr. Shinjae Yoo and Dr. Yuewei Lin, conducted computer vision research **(C1, P1, P2, P3, P4, P5, P6)** using super-computers supported by National Energy Research Scientific Computing Center (NERSC) in NERSC Exa-scale Science Application Program (NESAP).

**Mitigating Unwanted Background Biases with Background Data Augmentation**

- Led a research project that implemented various backgrounds (RGB, black, mean, human-selected) for training in image classification and object detection. — May 2021 – Nov 2021
- Achieved 8.49% increasement in accuracy using the mean of backgrounds in classification.

**A Real-Time Face Detecting AI Surveillance Camera** — Sep 2019 – Jun 2020

- Designed a senior capstone project as a leader and developed a smartphone application that identifies individuals' faces in front of a residence and notifies the presence of unfamiliar persons in real-time, using Raspberry Pi and Pi camera that can be affixed to the door.

## PROFESSIONAL SERVICE

**Server Administrator** — Jan 2021 – Dec 2021
*Seoul National University*

- Developed and managed the lab's first Linux server system, providing training sessions for lab members on how to use Linux server and software like SLURM and Docker.

## TEACHING EXPERIENCE

**Tutoring – CS20497: Computer Algorithms** — Mar 2020 – Jun 2020
*Ewha Womans University*

- Lectured junior undergraduate students weekly on fundamental and difficult algorithm by preparing supplementary materials and conducting Q&A sessions.

**Programming Contest for Female High School Students** — Nov 2019
*Ewha Womans University & Huawei Korea*

- Supervised the programming contest and addressed inquiries from students on code and programming environment.

## HONORS & AWARDS

**Grand Prize at AI x Art Hackathon** - $700 USD — Oct 2024
**BrainKorea21 Four Scholarship** - $14,000 USD — 2021 – 2022
**2020 4th Seoul Innovation Challenge** - $15,000 USD — Jan 2020 – Sep 2020
**The 9th Ewha Festival for Business Plan** - $1,560 USD — Mar 2019 – Dec 2019
**EWHA Scholarship** - $1,700 USD — 2018 – 2020
**EWHA Merit-Based Scholarship (full tuition)** - Top 10% upon admission — 2017