MINJUN KANG

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Overview

My research focuses on **computational modeling** of brain functions, exploring the brain's unique representations that differ from those of artificial systems. I aim to identify the **biological priors** that shape these representations and investigate how they give rise to complex behaviors.

Education

University of California San Diego Sep. 2025 - Current
Ph.D. student in Biological Sciences San Diego, CA

Korea Advanced Institute of Science and Technology (KAIST) Feb. 2017 - Aug. 2023
B.S. in Bio and Brain Engineering Daejeon, South Korea
Magna Cum Laude, KAIST

Publications

Kang M.J., Baek S.D., & Paik S.-B. (2026). Prewired static visual receptive fields for environment-agnostic perception. *Patterns*. [Link]

Shin J.H., ***Kang M.J.***, & Lee S.A. (2024). Wearable fNIRS-based measurement of dissociable activation dynamics of prefrontal cortex subregions during a delayed match-to-sample task. *Human Brain Mapping*. [Link]

Poster Presentations

2024 Korean Society for Brain and Neural Sciences (**KSBNS**) Oct. 2024
Kang M.J., Baek S.D. & Paik S.-B. Stable receptive fields for flexible adaptation in dynamic environments

2024 Society for Neuroscience (**SfN**) Oct. 2024
Kang M.J., Baek S.D. & Paik S.-B. Stable receptive fields in the early visual pathway for flexible adaptation

2024 Cognitive Computational Neuroscience (**CCN**) Aug. 2024
Kang M.J., Baek S.D. & Paik S.-B. Stable receptive fields in the early layer enable robust continual learning under dynamic environments

2024 Computational and Systems Neuroscience (**COSYNE**) Feb. 2024
Kang M.J., Kim G.S. Lee H.S., & Paik S.-B. Stable receptive fields in the early layer enable robust continual learning

2023 Korean Society for Brain and Neural Sciences (**KSBNS**) Sep. 2023
Kang M.J., Shin J.H. & Lee S.W. Does the prefrontal cortex guide optimal foraging?

2020 Korean Society for Cognitive & Biological Psychology (**KSCBP**) Aug. 2020
Kang M.J., Shin J.H. & Lee S.A. Temporal dynamics of prefrontal cortex subregion activity during working memory task: an fNIRS study

Awards and Honors

Shirl and Kay Curci Foundation (SKCF) PhD Scholarship Sep. 2025
Poster Presentation Award at 2024 KSBNS Oct. 2024
Best Presentation Award at 2020 KSCBP Aug. 2020

Research Experiences

Cognitive Intelligence Lab, KAIST Jun. 2023 - Current
Research Assistant *1 year 5 months*

- Advisor: Prof. Se-Bum Paik
- Study of early visual pathway's functional role using deep neural network (DNN)
- Examine whether inherent receptive fields enable environment-agnostic object recognition
- Incorporated Gabor filters in the first layer of DNN to model biological brains
- Showed our model robustly recognizes objects under domain shifts through shape-biased feature encoding
- 1 preprint, 4 conference presentations

Brain and Machine Intelligence Lab, KAIST Mar. 2022 - Jun. 2023
Undergraduate Research Assistant *1 year 4 months*

- Advisor: Prof. Sang Wan Lee
- Study of human model-based (MB) reinforcement learning system using fMRI
- Examine whether MB system would use temporal difference to estimate drifting rewards and generate reward-prediction-error (MB-RPE)
- Constructed behavior model, designed foraging tasks, conducted human experiments
- Showed our model best explained behaviors and found MB-RPE from prefrontal cortex
- 1 conference presentation

Developmental Cognitive Neuroscience Lab, KAIST Dec. 2018 - Aug. 2020
Undergraduate Research Assistant *1 year 8 months*

- Advisor: Prof. Sang Ah Lee
- Study of prefrontal cortex subregions' temporal dynamics during working memory using fNIRS
- Designed working memory task, conducted human experiments
- Constructed novel MATLAB-based preprocessing toolbox for fNIRS data
- Devised new method for accessing decoding performance over time
- 1 journal paper, 1 conference presentation

Experiences

2022 Summer-Fall Undergraduate Research Participation Program Jun. 2022 - Dec. 2022
* Supported 2,000,000 KRW

Undergraduate Student President, Department of Bio and Brain Engineering Mar. 2019 - Dec. 2019
* Planned one-year student welfare projects and promoted department

2020, 2023 KSBNS Division of High-level Cognition Workshop (Neurosplash) Aug. 2020, 2023

2023, 2024 Korean Society for Computational Neuroscience Winter School Jan. 2023, 2024

Harvard-MIT MGH Summer Internship Program Jan. 2020
* Selected as KAIST representative (top 5), but canceled due to COVID-19

Military Service Sep. 2020 - Mar. 2022

Skills

Software	MATLAB, Python, LaTex, R, Illustrator
Research skills	Neural network simulation, Neural data analysis (fMRI, fNIRS), Behavioral task design
Languages	Korean (Native), English (TOEFL iBT: 105)