

# 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

<b>University of California San Diego (UCSD)</b> <i>Ph.D.</i> student in Biological Sciences	Sep. 2025 - Current San Diego, CA
<b>Korea Advanced Institute of Science and Technology (KAIST)</b> <i>B.S.</i> in Bio and Brain Engineering GPA: 3.97/4.3, Major GPA : 4.11/4.3	Feb. 2017 - Aug. 2023 Daejeon, South Korea

## Publications

**Kang M.J.**, Baek S.D., & Paik S.-B. (2024). Hard-wired visual filters for environment-agnostic object recognition. *bioRxiv*. [\[Link\]](#)

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 ( <b>KSBNS</b> ) <b>Kang M.J.</b> , Baek S.D. & Paik S.-B. Stable receptive fields for flexible adaptation in dynamic environments	Oct. 2024
2024 Society for Neuroscience ( <b>SfN</b> ) <b>Kang M.J.</b> , Baek S.D. & Paik S.-B. Stable receptive fields in the early visual pathway for flexible adaptation	Oct. 2024
2024 Cognitive Computational Neuroscience ( <b>CCN</b> ) <b>Kang M.J.</b> , Baek S.D. & Paik S.-B. Stable receptive fields in the early layer enable robust continual learning under dynamic environments	Aug. 2024
2024 Computational and Systems Neuroscience ( <b>COSYNE</b> ) <b>Kang M.J.</b> , Kim G.S. Lee H.S., & Paik S.-B. Stable receptive fields in the early layer enable robust continual learning	Feb. 2024
2023 Korean Society for Brain and Neural Sciences ( <b>KSBNS</b> ) <b>Kang M.J.</b> , Shin J.H. & Lee S.W. Does the prefrontal cortex guide optimal foraging?	Sep. 2023
2020 Korean Society for Cognitive & Biological Psychology ( <b>KSCBP</b> ) <b>Kang M.J.</b> , Shin J.H. & Lee S.A. Temporal dynamics of prefrontal cortex subregion activity during working memory task: an fNIRS study	Aug. 2020

## Awards and Honors

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

## Research Experiences

### Cognitive Intelligence Lab, KAIST

Research Assistant

Jun. 2023 - Current

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

Undergraduate Research Assistant

Mar. 2022 - Jun. 2023

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

Undergraduate Research Assistant

Dec. 2018 - Aug. 2020

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

\* Supported 2,000,000 KRW

Jun. 2022 - Dec. 2022

### Undergraduate Student President, Department of Bio and Brain Engineering

\* Planned one-year student welfare projects and promoted department

Mar. 2019 - Dec. 2019

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)