SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
COLLEGE OF DESIGN AND ENGINEERING
Website: https://cde.nus.edu.sg/ece

Area: Microelectronic Technologies & Devices (MTD)

Host: Asst Prof Song Junghwan

TOPIC	:	**Interfacing Artificial and Biological Neural Networks**
SPEAKER	:	**Dr YoungJu Jo** **Postdoctoral Scholar, Department of Bioengineering, Stanford University**
DATE	:	**Friday, 10 October 2025**
TIME	:	**2:30PM-3:30PM**
VENUE	:	**E4-04-05 - E-Cube 1**

ABSTRACT

Artificial neural networks (AI) and biological neural networks (e.g., the brain) have a deeply intertwined history. Over the past decade, advances in neuroengineering have enabled large-scale electrical and optical recordings of neuronal activity in vivo. These datasets have powered AI to create unprecedented “mind-reading” brain-computer interfaces (BCIs). However, “writing” complex information into the brain remains in its early days due to challenges in both hardware and software, which I have been tackling over the years. Specifically, I co-developed state-of-the-art optogenetic technology to arbitrarily control the activity of individual neurons in the brain, using engineered genetic tools and holographic illumination. This exciting capability presents a fundamental computational challenge: designing input patterns in a way that is meaningful to the brain. Toward this goal, I devised a data-driven framework for system identification and control of neural computations by integrating “read-write” BCIs with interpretable AI, culminating in biological discoveries relevant to cognitive computations. These converging advances set the stage for AI-guided manipulation of neural computations in vivo, closing the loop between artificial and biological neural networks.

BIOGRAPHY

YoungJu Jo is a physicist-turned-neurobiologist who develops computational, optical, and genetic tools to understand and control neural computations in behaving animals. He is currently a postdoctoral scholar in Bioengineering at Stanford University, where he completed his Ph.D. in Applied Physics (2024) and M.S. in Biology (2020) under the mentorship of Karl Deisseroth, David Sussillo, and the late Krishna Shenoy. Prior to his neuroscience career, he received his B.S. in Physics and Mathematics from KAIST (2018), where his undergraduate research on AI-powered holographic microscopy was recognized with KAIST’s 2022 Agarwal Award for life science paper of the year and later commercialized by Tomocube (IPO 2024).

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