Sunghyun **Park**

psh040@yonsei.ac.kr | sunghyunp-ark.github.io | SunghyunP-ark | sunghyun-park-6rn

"AI for Understanding the World, bridging science and technology to explore the unknown."

Education

Yonsei University
B.S. in Biochemistry and Computer Science (Double Major)
Seoul, South Korea
Mar. 2020 – Present (Expected Aug. 2026)

- GPA : 3.91/4.3 (Cumulative), 3.94/4.3 (CS Major)
- Oct. 2022- Jul. 2024 : Compulsory Military Service, Served as a sergent in R.O.K Air Force.

Research Interest

My research interest is **AI for Science**, especially the development of computational and machine learning methods for modeling and analyzing complex scientific systems. Recently, I emphasize two directions - **(1) World Model** that combines data-driven approaches with established domain models to build more accurate and robust simulators, and **(2) Scientific reasoning in LLMs** as practical tools for science, paired with alignment techniques to improve faithfulness and safe decision support in scientific workflows.

AI For Science | Machine Learning | World Model | LLM

Experience

Undergraduate Research, Mechanobiology Lab (Prof. Hyunkyu Choi)
Seoul, South Korea
Research Intern
Dec. 2024 - Feb. 2025

- Conducted high-resolution microscopy (TIRF, RICM) analysis of bioloical samples and gained hands-on experience with biophysical experimental techniques.
- Applied Unsupervised Machine Learning techniques to classify cells on their orientation.

Extracurricular Activity

PoolC (Yonsei Programming Club)
Member
Seoul, South Korea
Mar. 2024 - PRESENT

- Participated in AI-related paper studying groups.
- Organized seminars on the mathematical foundations of deep Learning - including information theory, maximum likelihood estimation(MLE), maximum a posterior(MAP), and convex optimization.

Seoul-Learn (Mentoring Program)
Mentor
Seoul, South Korea
Mar. 2024 - PRESENT

- Guided middle and high school students in mathematics learning and academic planning.
- Provided guidance on choosing a major-overview of CS/AI and any science major curricula, prerequisites and study habits.

Biochemistry Student Academic Club
Member
Seoul, South Korea
Mar. 2020 - Mar. 2022

- Participated in collaborative study groups on core biochemistry subjects.
- Engaged in systematic study of Organic Chemistry, focusing on reaction mechanisms through problem-solving sessions.
- Conducted group discussions on Immunology, deepening understanding of immune system functions and disease mechanisms.

Projects

Prompt Optimization with OPRO and Evolutionary algorithm
Seoul, South Korea
LLM Course project
Jul. 2025

- Implemented a prompt optimization loop combining **OPRO with an evolutionary algorithm** (selection, crossover, mutation).
- Used an LLM scorer to evaluate candidates and drive self-rewriting and selection
- Evaluated on `GSM8K` with `Llama-3.1-8B-Instruct` and `Mistral-7B-Instruct`.

LLM Application | Prompt Engineering

Reducing WebOS Boot Latency through Build and Boot-Time Optimization *Seoul, South Korea*

YONSEI CAPSTONE DESIGN *Jun. 2025*

- Analyzed **function call traces** using `ftrace` to identify critical bottlenecks in WebOS boot process.
- Distinguished kernel-level and user-level execution delays, contributing to optimization of binary layout and page fault handling.

Operating System | Embedded System | Boot-Time Optimization

Force-Driven Mechano-Typing of B Cells: Multi-Channel Image Analysis of CD40-CD40L Interactions Using autoencoder *Seoul, South Korea*

UNDERGRADUATE RESEARCH INTERN *Dec. 2024 - Feb. 2025*

- Built a dataset with multi-threshold molecular tension probe sensors and microscopy for CD40-CD40L mechanics in B cells and automated single-cell segmentation.
- Compressed each cell into a low dimension and estimated local intrinsic dimension for each cell data.
- Visualized the global landscape with `UMAP` and conditional-wise trajectories.

AI For Science | Immunology | Computer Vision

Honors & Awards

DOMESTIC

2021 **Honors Award,** Yonsei University *Seoul, South Korea*

2025 **Honors Award,** Yonsei University *Seoul, South Korea*

"Honors Award" is granted to students with outstanding academic achievement, typically ranking in the top 10%.

Relevant Coursework

CS/AI	Discrete Mathematics, Data Structures, Introduction of Computer science, Computer Architecture, Linear Algebra, **Machine Learning**, Algorithm Analysis, Computer Network, **Computer Vision**, Operating System, **Large Language Model**, Cloud Computing ,Introduction of Deep Learning, **Mathematics for Deep Learning**, **Distributed Learning and inference**
Biochem	Biochemistry, Organic Chemistry, Neuroscience, **Biophysical chemistry**, Biological Statistics

** Courses in **bold** indicate areas of particular interest.*

Skills

DevOps	AWS, Docker
Programming	Python, JAVA, C/C++, MATLAB, LaTeX
Framework	Pytorch, OpenCV, PyMOL
Languages	Korean (Native) , English (Intermediate / TEPS : 340)
Video Editing	Adobe Premiere Pro
Lab Techniques	PCR, Western blot, Gel electrophoresis, Single Cell RNA sequencing