

Jaewon Kim

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EDUCATION

Korea University

B.E. Semiconductor Engineering

2022.03 – Present

Seoul, Korea

- **GPA:** 4.35/4.5 (3.93/4.0)
- SK Hynix-KU Partnership Fellowship (Full tuition + monthly stipend)
- Leave of absence for mandatory military service (2025.03 – 2026.12)

RESEARCH INTEREST

- Generative Models
- Stochastic Partial Differential Equations
- Deep Reinforcement Learning
- Physics-Informed Machine Learning

RESEARCH EXPERIENCE

Complex Data Analytics Lab (CDAL)

2024.02 – Present

Undergraduate Researcher (Advisor: Prof. Seok Junhee)

Seoul, Korea

- **High-Dimensional Conditional Generation.** Extended continuous conditional diffusion models from scalar to multi-dimensional regression labels using Hutchinson-based random projections and prioritized sampling, achieving state-of-the-art performance on nanophotonic device inverse design.
- **Reinforcement Learning for Super Resolution.** Developed a novel RL-based approach for image super resolution that overcomes diffusion model limitations by formulating the task as a Markov decision process, enabling flexible optimization of multiple quality metrics (PSNR, SSIM, LPIPS) through reward design.
- **Physics-Informed Policy Learning.** Proposed Fokker-Planck Soft Actor-Critic (FP-SAC) that reformulates policy improvement as solving partial differential equations, enabling capture of multi-modal distributions beyond traditional Gaussian-constrained approaches.

PUBLICATIONS

(P: Preprint, J: Journal, C: Conference, W: Workshop & Demos, *: Equal contribution, †: Equal senior role)

[P3] **EMF3D: Physics-Informed Diffusion Modeling of Electromagnetic Fields for 3D Nanophotonic Design**
Insoo Kim, Jaewon Kim, Jangwon Seo, Junhee Seok[†], Bohyung Han[†]
Under Review, 2025

[P2] **Scalable Continuous Conditional Diffusion via Random Projections and Prioritized Sampling**
Jaewon Kim^{*}, Hyo-Seok Hwang^{*}, Junhee Seok
Under Review, 2025

[P1] **Fokker-Planck Soft Actor-Critic**
Hyo-Seok Hwang, Jaewon Kim, Junhee Seok
Under Review, 2025

HONORS & AWARDS

SK Hynix-KU Partnership Fellowship

2022.02 – Present

- Full tuition and stipend awarded upon admission to the highly selective SK Hynix-KU Fellowship program.

KU Alumni Scholarship, Korea University

2022.02 – Present

- Merit-based scholarship funded by the KU alumni association, granted to high-achieving students.

Semester High Honors, Korea University

2022.03 – Present

- Awarded for achieving top academic performance each semester.

Outstanding Poster Award, 12th SK Hynix Academic Conference

2024

- Recognized for excellence in research presentation among selected poster submissions.

Dean's List, Korea University

2022

- Granted for achieving a perfect GPA (4.5/4.5) in the 1st semester of 2022.

EXTRACURRICULAR ACTIVITIES

Young Engineers' Honor Society (YEHS)

- Honor Society sponsored by the National Academy of Engineering of Korea (NAEK).

2024.03 – Present

BITAmin

- Intercollegiate offline study group focusing on ML/DL research and projects

2023.08 – 2024.08

Korea University International Student Assistant (KUISA)

- Voluntary student organization under Global Services Center, Korea University.

2023.02 – 2024.02

SKILLS & INTERESTS

Language Skills: Korean(Native), English(Fluent)

Computer Skills: Python (Pytorch, Tensorflow), Matlab, C, C++

Interests: Music, Basketball, Badminton, Cooking, Traveling, Math

SELECTED COURSEWORKS

Statistics & Mathematics: Engineering Mathematics I, Engineering Mathematics II, Probability and Random Process, Introduction to Linear Algebra, Fundamentals of Data Science, Data Learning and Intelligence

Electrical and Computer Engineering: Introduction to Computers, Object-Oriented Programming, Microprocessor, Computer System, System Software, Signal and Systems, Digital Image Processing, Digital Signal Processing, Deep Signal Processing