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Department of Electrical and Computer Engineering
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EDUCATION

Ph.D. in Electrical and Computer Engineering Seoul National University Advisor: Prof. Namkyoo Park & Prof. Sunkyu Yu	Feb 2023 Seoul, South Korea
B.S. in Electrical and Computer Engineering Seoul National University	Feb 2017 Seoul, South Korea

PROFESSIONAL EXPERIENCES

University of Wisconsin-Madison <i>Research Associate</i> Conducted research on various topics of optical computing: visual perception application, hardware design, and 3D face recognition with neuromorphic metasurfaces.	Madison, WI, United States Apr 2023 – Present
Seoul National University <i>Research Assistant</i> Conducted research on band engineering in photonic ordered and disordered systems. Photonic Systems Laboratory & Intelligent Wave Systems Laboratory	Seoul, South Korea Mar 2017 – Feb 2023
<i>Teaching Assistant</i> ECE202B: Introduction to Electromagnetism (Fall 2018, 2019, 2020); ECE326: Applied Quantum Mechanics (Spring 2018, 2019); ECE832A: Nanophotonics (Spring 2018)	Mar 2017 – Feb 2023

RESEARCH INTERESTS

Main field: **Photonics**
Current focus: **Optical computing theory and simulation**

PUBLICATIONS

Preprints

- Dissertation: [J. Kim](#), “*Manipulating Spatiotemporal Degrees of Freedom for Photonic Switching Devices: Theoretical and Machine-Learning Approaches*,” [Seoul National University \(Feb 2023\)](#). [[pdf](#)]
- [J. Kim](#),^{†,*} [Q. Zhou](#),^{†,*} and [Z. Yu](#), Photonic systolic array for all-optical matrix-matrix multiplication, [arXiv:2410.21671 \(2024\)](#).

Peer-Reviewed Articles

- [8] [J. Kim](#),^{*} [N. Yu](#), and [Z. Yu](#), Compute-First Optical Detection for Noise-Resilient Visual Perception, [ACS Photonics \(2025\)](#). [[arXiv](#)]
- [7] [J. Kim](#),[†] [J.-Y. Kim](#),[†] [J. Kim](#), [Y. Hyeong](#), [B. Neseli](#), [J.-B. You](#), [J. Shim](#), [J. Shin](#), [H.-H. Park](#), and [H. Kurt](#),^{*} Inverse design of nanophotonic devices enabled by optimization algorithms and deep learning: recent achievements and future prospects, [Nanophotonics 14](#), 121 (2025).
- [6] [J. Kim](#), [D. Lee](#), [S. Yu](#),^{*} and [N. Park](#),^{*} Unidirectional scattering with spatial homogeneity using correlated photonic time disorder, [Nature Physics 19](#), 726 (2023).
- [5] [S. Oh](#), [J. Kim](#), [X. Piao](#), [S. Kim](#), [K. Kim](#), [S. Yu](#), and [N. Park](#),^{*} Control of localization and optical properties with deep-subwavelength engineered disorder, [Optics Express 30](#), 28301 (2022).

- [4] S. Choi,[†] [J. Kim](#),[†] J. Kwak, N. Park,^{*} and S. Yu,^{*} Topologically Protected All-Optical Memory, [Advanced Electronic Materials](#) **8**, 2200579 (2022). [[cover](#)]
- [3] [J. Kim](#), S. Park, S. Yu,^{*} and N. Park,^{*} Machine-Engineered Active Disorder for Digital Photonics, [Advanced Optical Materials](#) **10**, 2102642 (2022). [[cover](#)]
- [2] S. Park,[†] I. Lee,[†] [J. Kim](#), N. Park,^{*} and S. Yu,^{*} Hearing the shape of a drum for light: isospectrality in photonics, [Nanophotonics](#) **11**, 2763 (2022).
- [1] [J. Kim](#), S. Yu,^{*} and N. Park,^{*} Universal Design Platform for an Extended Class of Photonic Dirac Cones, [Physical Review Applied](#) **13**, 044015 (2020).

[†] Equal contribution; ^{*} Corresponding author(s)

PRESENTATIONS

Talks

- [2] [J. Kim](#), Metalens design for noise resilience in machine visual perception, Seoul National University, Seoul, Korea (2024).
- [1] [J. Kim](#), S. Yu, and N. Park, Neural-network-based design of tunable multilayer films, GoGE/SDG Session on Electro-Physics, e-TEC Talks@SNU Summer 2021, virtual (2021).

Conferences

- [11] [J. Kim](#), N. Yu, and Z. Yu, Incoherent meta-imaging system for noise-robust object recognition, [CLEO-PacificRim 2024, Mo1A-4, Incheon, Korea \(2024\)](#).
- [10] D. Lee, [J. Kim](#), H. Park, I. Lee, S. Yu, and N. Park, Design of Correlated Photonic Time Disorder for Unidirectional Scattering, [Advanced Photonics Congress 2023, NoTu3C.4, Busan, Korea \(2023\)](#).
- [9] D. Lee, [J. Kim](#), N. Park, and S. Yu, Molecular Dynamics for Microscopic Analysis of Refractive Index in Amorphous Hafnium Oxides, [Frontiers in Optics 2022, FW5C.5, Rochester, NY, USA \(2022\)](#).
- [8] [J. Kim](#), S. Park, Dayeong Lee, S. Yu, and N. Park, Data-Driven Engineering of Active Photonic Disorder, [Frontiers in Optics 2022, JW4A.20, Rochester, NY, USA \(2022\)](#).
- [7] [J. Kim](#), S. Yu, and N. Park, Neural-network-based design of tunable multilayer films, [OSA Advanced Photonics Congress, JW4B.3, virtual \(2021\)](#).
- [6] [J. Kim](#), S. Park, I. Lee, S. Yu, and N. Park, Design of Multilayer-based Active Photonic Devices using Artificial Neural Networks, Photonics Conference, F2B-II.02, Pyeongchang, Korea (2021)
- [5] [J. Kim](#), S. Yu, and N. Park, Design of type-II photonic Dirac cone near Gamma point, A3 Metamaterials Forum, Sapporo, Japan (2019).
- [4] [J. Kim](#), S. Yu, and N. Park, Classification of deformed photonic Dirac cones, International Conference on Metamaterials, Photonic Crystals and Plasmonics (META), Lisbon, Portugal (2019).
- [3] [J. Kim](#), S. Yu, and N. Park, Inverse design of deformed photonic Dirac cone, OSK Winter meeting, Hoengseong, Korea (2019).
- [2] [J. Kim](#), S. Yu, and N. Park, Crystal-like Momentum in a Designed Disordered Medium, OSK Winter meeting, Gwangju, Korea (2018).
- [1] [J. Kim](#), S. In, and N. Park, Metasurface Back Reflectors for High-Efficiency Organic Solar Cells, OSK Summer meeting, Busan, Korea (2016).

PATENTS

- [1] Topologically-protected all-optical memory, KR #10-2624621 (Jan 2024).

HONORS & AWARDS

- Distinguished PhD Dissertation Award, ECE, SNU. Feb 2023
- Best Poster Award, OSK Winter Meeting. Feb 2019
- National Science & Engineering Undergraduate Scholarship
funded by Korea Student Aid Foundation. 2014–2016

ACADEMIC SERVICES

- Reviewer of:
Optics Express, Optics Letters, Photonics Research, Optica, Nature Communications, ACS Photonics

SKILLS & LANGUAGES

- Numerical tools and methods: Numpy, MATLAB (RCWA, Optimizations, etc.); COMSOL Multiphysics (FEM), Tidy3D (FDTD)
- Deep learning framework: PyTorch
- Languages: Korean (native), English (proficient)

Last updated: February 17, 2025.