JINWOO KIM

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Research Interest

My focus is in making deep learning models generalize better out of their training data so that they can be used to solve challenging problems, such as those in scientific domains. I have been studying this problem primarily from the viewpoint of invariances, focusing on all-purpose deep neural networks that can reliably reason upon novel transformed inputs. I often use tools from theories of graphs, (semi)groups and manifolds, and Markov processes such as random walks, diffusions and flows.

Academic Placement and Employment

KAIST, Technical Research Personnel (host: Seunghoon Hong) 03/2026 – 02/2027
New York University, Visiting Scholar (host: Kyunghyun Cho, Rajesh Ranganath) 11/2025 – 01/2026
LG AI Research, Research Intern (host: Moontae Lee, Honglak Lee) 01/2022 – 07/2022

Education

KAIST, M.S./Ph.D. in Computer Science (advisor: Seunghoon Hong) 03/2021 – 02/2026
- Ph.D. Thesis: Architecture-Agnostic Invariances for Deep Learning
KAIST CoE Best Ph.D. Dissertation Award

KAIST, B.S. in Brain Engineering and Computer Science (double major) 03/2016 – 02/2021
- GPA 4.05/4.3 (Summa Cum Laude)

Publications

C: conference, J: journal, W: workshop, P: preprint, *: equal contribution, †: equal advising

P2. **Continuous Denoising Enables One-step Language Modeling**
Chanhyuk Lee, Jaehoon Yoo, Manan Agarwal, Sheel Shah, Jerry Huang, Aditi Raghunathan, Seunghoon Hong, Nicholas M. Boffi†, Jinwoo Kim†
Preprint

P1. **Inverting Data Transformations via Diffusion Sampling**
Jinwoo Kim*, Sékou-Oumar Kaba*, Jiyun Park, Seunghoon Hong†, Siamak Ravanbakhsh†
Preprint

C12. **Flock: A Knowledge Graph Foundation Model via Learning on Random Walks**
Jinwoo Kim*, Xingyue Huang*, Krzysztof Olejniczak, Kyungbin Min, Michael Bronstein, Seunghoon Hong, İsmail İlkan Ceylan
ICLR 2026

C11. **Sequence Modeling with Spectral Mean Flows**
Jinwoo Kim, Max Beier, Petar Bevanda, Nayun Kim, Seunghoon Hong
NeurIPS 2025

C10. **Revisiting Random Walks for Learning on Graphs**
Jinwoo Kim, Olga Zaghen*, Ayhan Suleymanzade*, Youngmin Ryou, Seunghoon Hong
ICLR 2025
Spotlight Presentation (380/11672=3.26%)
ELLIS Mobility Grant, ICML 2024 GRaM Workshop

C9. **3D Denoisers are Good 2D Teachers: Molecular Pretraining via Denoising and Cross-Modal Distillation**
Sungjun Cho, Dae-Woong Jeong, Sung Moon Ko, Jinwoo Kim, Sehui Han, Seunghoon Hong, Honglak Lee, Moontae Lee
AAAI 2025
Oral Presentation

C8. **Simulation-Free Training of Neural ODEs on Paired Data**
Semin Kim*, Jaehoon Yoo*, Jinwoo Kim, Yeonwoo Cha, Saehoon Kim, Seunghoon Hong
NeurIPS 2024

C7. **Learning Probabilistic Symmetrization for Architecture Agnostic Equivariance**
Jinwoo Kim, Tien Dat Nguyen, Ayhan Suleymanzade, Hyeokjun An, Seunghoon Hong
NeurIPS 2023
Spotlight Presentation (378/12345=3.06%)

C6. **Universal Few-shot Learning of Dense Prediction Tasks with Visual Token Matching**
Donggyun Kim, Jinwoo Kim, Seongwoong Cho, Chong Luo, Seunghoon Hong
ICLR 2023
Outstanding Paper Award (4/4955=0.08%)
Silver Prize, Samsung Humantech Paper Award, 2023

C5. **Pure Transformers are Powerful Graph Learners**
Jinwoo Kim, Tien Dat Nguyen, Seonwoo Min, Sungjun Cho, Moontae Lee, Honglak Lee†, Seunghoon Hong†
NeurIPS 2022

C4. **Transformers meet Stochastic Block Models: Attention with Data-Adaptive Sparsity and Cost**
Sungjun Cho, Seonwoo Min, Jinwoo Kim, Moontae Lee, Honglak Lee, Seunghoon Hong
NeurIPS 2022

C3. **Equivariant Hypergraph Neural Networks**
Jinwoo Kim, Saeyoon Oh, Sungjun Cho, Seunghoon Hong
ECCV 2022

C2. **Transformers Generalize DeepSets and Can be Extended to Graphs and Hypergraphs**
Jinwoo Kim, Saeyoon Oh, Seunghoon Hong
NeurIPS 2021
Qualcomm Innovation Fellowship Korea, 2021

C1. **SetVAE: Learning Hierarchical Composition for Generative Modeling of Set-Structured Data**
Jinwoo Kim*, Jaehoon Yoo*, Juho Lee, Seunghoon Hong
CVPR 2021

J1. **Spontaneous Retinal Waves Can Generate Long-Range Horizontal Connectivity in Visual Cortex**
Jinwoo Kim*, Min Song*, Jaeson Jang, Se-Bum Paik
The Journal of Neuroscience 40(34) 2020

W1. **Learning Symmetrization for Equivariance with Orbit Distance Minimization**
Tien Dat Nguyen*, Jinwoo Kim*, Hongseok Yang, Seunghoon Hong
NeurIPS 2023 NeurReps Workshop

Honors

Awards

Best Ph.D. Dissertation Award, KAIST College of Engineering	2026
Outstanding Researcher Award, KAIST-Mila Prefrontal AI Research Center	2024
ELLIS Mobility Grant [C10], ICML 2024 GRaM Workshop	2024
Outstanding Paper Award [C6], ICLR 2023	2023
Silver Prize, Samsung Humantech Paper Award [C6]	2023
Qualcomm Innovation Fellowship Korea [C2]	2022
KAIST Engineering Innovator Award (five recipients), KAIST College of Engineering	2020

Scholarships and Fellowships

Kwanjeong Education Foundation Scholarship	2022 – 2023
Korea National Science & Technology Scholarship	2018 – 2019
KAIST Alumni Fellowship	2017 – 2020
KAIST Presidential Fellowship	2016 – 2020
Hansung Scholarship for Gifted Students	2015 – 2016

Invited Talks

Sequence Modeling with Spectral Mean Flows [C11]

• Ben-Gurion University of the Negev (BGU) (host: Ilan Naiman) 12/2025

Architecture-Agnostic Invariances for Deep Learning [C7, W1, C10, C12, P1]
• Mila - Quebec AI Institute (host: Minsu Kim, Junyeob Baek) 07/2025
• KAIST AI899 Geometric DL (host: Sungsoo Ahn) 05/2025
• Mila - Quebec AI Institute (host: Siamak Ravanbakhsh, Sékou-Oumar Kaba) 12/2024
• KAIST-Mila Prefrontal AI Research Center (host: Sungjin Ahn) 11/2024
• Sungkyunkwan University (SKKU) (host: Chang Woo Myung) 08/2024
• Pohang University of Science and Technology (POSTECH) (host: Sungsoo Ahn) 11/2023

Universal Few-shot Learning of Dense Prediction Tasks with Visual Token Matching [C6]
• KAIST–Samsung Electronics DS Division Exchange Meetup (host: Chulmoo Kang) 08/2023

Pure Transformers are Powerful Graph Learners [C5]
• Microsoft USA (host: Nabiha Asghar) 01/2023
• NeurIPS 2022 at KAIST (host: Dongkwan Kim) 11/2022
• Learning on Graphs and Geometry Reading Group (LoGaG) (host: Hannes Stärk) 08/2022

Higher-order Transformers for Sets, Graphs, and Hypergraphs [C2]
• Qualcomm Korea (host: Jaewon Choi) 01/2023
• KAIST AI Workshop 21/22 (host: Dongkwan Kim) 01/2022
• NeurIPS 2021 Social: ML in Korea (host: Jung-Woo Ha) 12/2021

Hierarchical Variational Autoencoders for Generative Modeling of Sets [C1]
• Naver AI Author Meetup for CVPR 2021 (host: Jung-Woo Ha) 09/2021
• Korean Conference on Computer Vision 2021 (host: Jongwoo Lim) 09/2021

Retinal Waves and Prenatal Wiring of Primary Visual Cortex [J1]
• Society for Neuroscience, Chicago, IL, US 10/2019

Academic Services

Conference Reviewer: NeurIPS, ICLR, ICML, CVPR, ICCV, AISTATS, LoG, TAG-DS, IJCNN, ACCV
Journal Reviewer: TMLR, Neural Networks, IJCV

Teaching

Teaching Assistant, KAIST School of Computing
Undergraduate Research Program (URP) 2022, 2024
Introduction to Deep Learning (CS492I) 2021, 2022, 2023
Computer Vision (CS576) 2022, 2023
School of Computing Colloquium (CS966, CS986) 2021

Teaching Assistant, Samsung Electronics
Samsung Research AI Expert Program 2021 – 2024

Mentoring

Chanhyuk Lee, M.S. student @ KAIST [P2] 2025 – present
Jiyun Park, B.S. student @ KAIST [P1] → M.S. student @ KAIST 2024 – present
Kyungbin Min, B.S. student @ KAIST [C12] → M.S. student @ KAIST 2025 – present
Nayun Kim, B.S. student @ KAIST [C11] → Intern @ EPFL LTS4 2024
Youngmin Ryou, B.S. student @ KAIST [C10] → on leave for mandatory military service 2023 – 2024
Nicole Shen, B.S. student @ MIT → Intern @ MIT LIDS 2024
Semin Kim, M.S. student @ KAIST [C8] → Ph.D. student @ KAIST 2023 – 2024
Ayhan Suleymanzade, B.S. student @ KAIST [C7, C10] → Intern @ TU Munich 2023 – 2024
Olga Zaghen, M.S. student @ UniTrento [C10] → Ph.D. student @ UvA Amsterdam 2023
Tien Dat Nguyen, B.S. student @ KAIST [C5, C7, W1] → M.S. student @ UWaterloo 2021 – 2023
Daniel Sungho Jung, B.S. student @ Penn State → Ph.D. student @ SNU 2021
Saeyoon Oh, B.S. student @ KAIST [C2, C3] → Engineer @ FuriosaAI 2021

Projects

Korea National Research Foundation (NRF), Physical Reasoning in Language Models	2024 – 2025
Korea Ministry of Science and ICT, Visual Commonsense Reasoning	2021 – 2023
Korea National Research Foundation (NRF), Cooperative Robotic Intelligence	2021 – 2023

References

Seunghoon Hong, Associate Professor at KAIST	seunghoon.hong@kaist.ac.kr
Kyunghyun Cho, Full Professor at New York University	kyunghyun.cho@nyu.edu
Moontae Lee, Head of Superintelligence Lab at LG AI Research	moontae.lee@lgresearch.ai
Siamak Ravanbakhsh, Associate Professor at McGill University	siamak.ravanbakhsh@mcgill.ca
İsmail İlkan Ceylan, Associate Member at University of Oxford	ismail.ceylan@cs.ox.ac.uk