

# JINWOO KIM

[jw9730.github.io](https://jw9730.github.io)   [jinwoo-kim@kaist.ac.kr](mailto:jinwoo-kim@kaist.ac.kr)

## 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. One-step Language Modeling via Continuous Denoising

Chanhyuk Lee, Jaehoon Yoo, Manan Agarwal, Sheel Shah, Jerry Huang, Aditi Raghunathan, Seunghoon Hong, Nicholas M. Boffi<sup>†</sup>, [Jinwoo Kim](#)<sup>†</sup>  
Under review

### P1. Inverting Data Transformations via Diffusion Sampling

[Jinwoo Kim](#)<sup>\*</sup>, Sékou-Oumar Kaba<sup>\*</sup>, Jiyun Park, Seunghoon Hong<sup>†</sup>, Siamak Ravanbakhsh<sup>†</sup>  
arXiv 2026

### C12. Flock: A Knowledge Graph Foundation Model via Learning on Random Walks

[Jinwoo Kim](#)<sup>\*</sup>, Xingyue Huang<sup>\*</sup>, Krzysztof Olejniczak, Kyunghyun 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<sup>\*</sup>, Ayhan Suleymanzade<sup>\*</sup>, 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<sup>\*</sup>, Jaehoon Yoo<sup>\*</sup>, [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<sup>†</sup>, Seunghoon Hong<sup>†</sup>  
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<sup>\*</sup>, Jaehoon Yoo<sup>\*</sup>, Juho Lee, Seunghoon Hong  
CVPR 2021

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

W1. **Learning Symmetrization for Equivariance with Orbit Distance Minimization**  
Tien Dat Nguyen<sup>\*</sup>, Jinwoo Kim<sup>\*</sup>, 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]
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• 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

Jiyeon 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

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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

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