Sungwon Kim

swkim@kaist.ac.kr • Homepage • Google Scholar • Github

RESEARCH INTEREST

AI Surrogate Modeling for CAE, Developing **high-fidelity AI surrogate models** to replace computationally intensive **3D CAE simulations**. Research focuses on designing **effective 3D representations** for maximal speed and accuracy, and integrating **LLMs** to significantly enhance model **usability** and streamline engineering workflows.

Keywords: Physics AI (Engineering), 3D Simulation, Data-driven AI, Data-Efficient Learning

PROFESSIONAL EXPERIENCE

AI SOFTWARE Of KOREA, Seoul, South Korea

- Co-CEO, Co-Founder — Jul 2019 – Feb 2022
  - Development of AI for Socially Vulnerable Groups (information disadvantaged, older persons, children)
  - Management

EDUCATION

KAIST (Korea Advanced Institute of Technology), Daejeon, South Korea

- Ph.D. in Graduate School of Data Science — Feb 2024 – Present
  - Research Interest: Learning-based 3D Simulation
  - Adviser: Prof. Chanyoung Park
- M.S. in Graduate School of Data Science — Feb 2022 – Feb 2024
  - Research Interest: Data-efficient Learning, Federated Learning
  - Adviser: Prof. Chanyoung Park

Korea University, Seoul, South Korea — Mar 2014 – Feb 2022

- B.S. in Civil, Environmental and Architectural Engineering

PUBLICATIONS

(*: Equal contribution)

CONFERENCES

[C10] **Disentangling Hyperedges through the lens of Category Theory**
Yoonho Lee, Junseok Lee, Sangwoo Seo, **Sungwon Kim**, Yeongmin Kim, Chanyoung Park
NeurIPS 2025 - The Thirty-Ninth Annual Conference on Neural Information Processing Systems

[C9] **Thickness-aware E(3)-Equivariant 3D Mesh Neural Networks**
Sungwon Kim, Namkyeong Lee, Yunyoung Doh, Seungmin Shin, Guimok Cho, Seung-Won Jeon, Sangkook Kim, Chanyoung Park
ICML 2025 - Forty-Second International Conference on Machine Learning

[C8] **Subgraph Federated Learning for Local Generalization**
Sungwon Kim, Yoonho Lee, Yunhak Oh, Namkyeong Lee, Sukwon Yun, Junseok Lee, Sein Kim, Carl Yang, Chanyoung Park
ICLR 2025 (Oral, top 1.8%) - The Thirteenth International Conference on Learning Representations

[C7] **Self-Explainable Temporal Graph Networks based on Graph Information Bottleneck**
Sangwoo Seo, **Sungwon Kim**, Jihyeong Jung, Yoonho Lee, Chanyoung Park
KDD 2024 - ACM SIGKDD Conference on Knowledge Discovery and Data Mining

[C6] **Unsupervised Episode Generation for Graph Meta-learning**
Jihyeong Jung, Sangwoo Seo, **Sungwon Kim**, Chanyoung Park
ICML 2024 – International Conference on Machine Learning

[C5] **DSLR: Diversity Enhancement and Structure Learning for Rehearsal-based Graph Continual Learning**
Seungyoon Choi*, Wonjoong Kim*, **Sungwon Kim**, Yeonjun In, Sein Kim, Chanyoung Park
WWW 2024 (Oral) – The Web Conference

[C4] **Interpretable Prototype-based Graph Information Bottleneck**
Sangwoo Seo, **Sungwon Kim**, Chanyoung Park
NeurIPS 2023 - In Conference on Neural Information Processing Systems (NeurIPS)
- Gold Prize at the 2023 Samsung Humantech Paper Award

[C3] **Density of States Prediction of Crystalline Materials via Prompt-guided Multi-Modal Transformer**
Namkyeong Lee*, Heewoong Noh*, **Sungwon Kim**, Dongmin Hyun, Gyoung S. Na, Chanyoung Park
NeurIPS 2023 - In Conference on Neural Information Processing Systems (NeurIPS)

[C2] **Task-Equivariant Graph Few-shot Learning**
Sungwon Kim, Junseok Lee, Namkyeong Lee, Wonjoong Kim, Seungyoon Choi, Chanyoung Park
KDD 2023 - ACM SIGKDD Conference on Knowledge Discovery and Data Mining

[C1] **Conditional Graph Information Bottleneck for Molecular Relational Learning**
Namkyeong Lee, Dongmin Hyun, Gyoung S Na, **Sungwon Kim**, Junseok Lee, Chanyoung Park
ICML 2023 - International Conference on Machine Learning

JOURNALS

[J1] **Deep Single-cell RNA-seq Data Clustering with Graph Prototypical Contrastive Learning**
Junseok Lee, **Sungwon Kim**, Dongmin Hyun, Namkyeong Lee, Yejin Kim, Chanyoung Park
Bioinformatics 2023 (SCI)

WORKSHOPS

[W4] **Capturing Functional Context of Genetic Pathways through Hyperedge Disentanglement**
Yoonho Lee, Junseok Lee, Sangwoo Seo, Sungwon Kim, Yeongmin Kim, Chanyoung Park
ICLR 2025 - Workshop on Machine Learning for Genomics Explorations (MLGenX)

[W3] **Subgraph Federated Learning for Local Generalization**
Sungwon Kim, Yoonho Lee, Yunhak Oh, Namkyeong Lee, Sukwon Yun, Junseok Lee, Sein Kim, Carl Yang, Chanyoung Park
KDD 2024 (Best Paper Award) - Workshop on Federated Learning for Data Mining and Graph Analytics

[W2] **Interpretable Graph Model with Prototype-Based Graph Information Bottleneck**
Sangwoo Seo, **Sungwon Kim**, Chanyoung Park
KDD 2024 (Best Paper Award) - Workshop on Human-Interpretable AI

[W1] **Deep single-cell RNA-seq data clustering with graph prototypical contrastive learning**
Junseok Lee, **Sungwon Kim**, Dongmin Hyun, Namkyeong Lee, Yejin Kim, Chanyoung Park
ICML 2023 - Workshop on Computational Biology

PROJECTS

- **3D Geometry-Based Graph Neural Networks for Engineering Simulation**, LG Electronics 2025 –
- **3D Geometry-Based Graph Neural Networks for Injection Molding**, LG Electronics 2024
- **Translating Korean Legal Case's Sentences into Common Terms**, AISoftKorea 2021– 2022
  Best award project at Seoul R&D research center (2021)
- **Sentence Similarity Model for Korean Legal Sentences**, AISoftKorea 2020
  Best award project at Seoul R&D research center (2020)
- **Big Data Analysis of Color Cognition in Older Adults and Disabled Children**, AISoftKorea 2017
  Development of Color Cognitive Test Kit and Multivariate Regression Analysis

HONORS & AWARDS

- **Best Paper Award** 2024
  KDD 2024 -Workshop on Federated Learning for Data Mining and Graph Analytics (FedKDD), Barcelona, Spain
- **Best Paper Award** 2024
  KDD 2024 -Workshop on Human-Interpretable AI, Barcelona, Spain
- **30th Samsung Humantech Paper Award** 2024
  Gold Prize
- **Seoul Renovation Challenge**, Seoul Business Agency 2020
  Awarded for the best team out of 444 participants [news][news]
  Systems and methods for providing quantified AI answering services for legal questions
- **National University Rowing Conference**, Korean Rowing Association 2015
  First place, Crew of Korea University Rowing Team [YouTube]

PROFESSIONAL SERVICES

Conference Reviewer/Program Committee

- International Conference on Learning Representations (ICLR) 2025 – 2026
- The Web Conference (WWW) 2026
- Conference on Neural Information Processing Systems (NeurIPS) 2024 – 2025
- International Conference on Machine Learning (ICML) 2025
- Conference on Information and Knowledge Management (CIKM) - Short/Applied Research 2025

Journal Reviewer

- IEEE Transactions on Network Science and Engineering (TSNE) 2025
- IEEE Transactions on Neural Networks and Learning Systems (TNNLS) 2024
- IEEE Transactions on Cognitive and Developmental Systems (TCDS) 2024

TEACHING EXPERIENCE

- **AI Specialist Course**, Samsung Electronics 2024
  Teaching Assistant
- **AI Specialist Course**, Samsung Electronics 2023
  Teaching Assistant
- **DS503: Machine Learning for Data Science**, KAIST 2023
  Teaching Assistant
- **AI Business Transformation Program**, KAIST 2022
  Researcher
- **IE343: Statistical Machine Learning**, KAIST 2022
  Teaching Assistant

TALKS AND SEMINARS

- **Top Conference Session**, Korea Computer Congress (KCC) 2025
  Subgraph Federated Learning for Local Generalization
- **Top Conference Session**, Korea Software Congress (KSC) 2023
  Task-Equivariant Graph Few-shot Learning

REFERENCES

- **Prof. Chanyoung Park**, Assistant Professor, KAIST
  Email: cy.park@kaist.ac.kr

[*CV compiled on 2025-11-04*]