# Sungwon Kim

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

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| **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 |

## 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

## 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

## 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

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| **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 | |

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| **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**

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|---|---|---|
| ▪ 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**

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|---|---|---|
| | ▪ 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*]