Sang Min Lee

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RESEARCH INTERESTS

Automated non-destructive testing; Structural health monitoring; Data-driven wind engineering; Language models for building codes; Machine learning for concrete properties

EDUCATION

2023–2027 (expected) **Ph.D. in Artificial Intelligence**
Interdisciplinary Program in Artificial Intelligence, Seoul National University
- Research: AI for resilient infrastructure and wind engineering
- Advisor: Prof. Thomas H.-K. Kang

2021–2023 **M.S. in Structural Engineering**
Department of Architecture and Architectural Engineering, Seoul National University
- Thesis: Machine Learning Application to Automated Impact-Echo Test for Concrete Structures
- Advisor: Prof. Thomas H.-K. Kang

2016–2021 **B.S. in Architectural Engineering**
Department of Architecture and Architectural Engineering, Seoul National University
- Double major: Electrical and Computer Engineering (2017–2021)

2013–2016 **Diploma**
Korea Science Academy of KAIST, science high school for gifted students
- Senior Vice President, 24th Student Council; Deputy Head of International Affairs, 23rd Student Council
- Exchange programs at Moscow Chemical Lyceum, Russia (2014) and G.T. (Ellen Yeung) College, Hong Kong (2015)

RESEARCH AND PROFESSIONAL EXPERIENCE

Mar 2021 – present **Graduate Research Assistant**
Hi-performance Structural Engineering Lab, Seoul National University
- Advisor: Prof. Thomas H.-K. Kang
- Machine learning for impact-echo testing, structural health monitoring, wind engineering, and building codes

Oct–Nov 2025 **Visiting Researcher**
National Weather Center, University of Oklahoma, Norman, OK, USA
- Hydrometeorology and Remote Sensing Lab, hosted by Prof. Yang Hong
- Visiting student, School of Civil Engineering and Environmental Sciences, Gallogly College of Engineering
- Collaborated on machine learning for remote sensing and wind engineering

Dec 2018 – Feb 2021 **Undergraduate Research Assistant**
Seoul National University

- Jan–Feb 2021, HpSE Lab: wind pressure coefficient prediction for wind-resistant building design
- Oct 2019 – Feb 2020, SNUCEM: AHP analysis for improving military dining facilities
- Dec 2018 – Feb 2019, AEPRL: designed and built an IoT device (hardware and software) that detects surface condensation indoors

Jul–Aug 2018 **Research Engineer (Intern)**
Chungyeon Architects, Seoul, Korea

- Data analysis for building energy performance evaluation with ECO2, AutoCAD, and Python

PUBLICATIONS

6 journal articles · 20 conference papers

Journal Articles

J6 **Lee, S. M.**, Hong, J., Choi, H., & Kang, T. H.-K. (2025). **Machine learning assisted method for automated impact-echo testing of concrete structures**. Journal of Nondestructive Evaluation, 44(4), 121. SCIE doi:10.1007/s10921-025-01260-3

J5 **Lee, S. M.**, Choi, H. S., Kim, C., & Kang, T. H.-K. (2025). **Lightweight alternative machine learning model for automating concrete crack image classification**. ACI Structural Journal, 122(5). SCIE

J4 Lee, Y. I., **Lee, S. M.**, & Kang, T. H.-K. (2025). **Multiclass deep support vector data description for structural health monitoring**. Journal of Structural Engineering, 151(12). SCIE doi:10.1061/JSENDH.STENG-14823

J3 Ahn, B., Lee, D., **Lee, S. M.**, & Kang, T. H.-K. (2023). **A methodology for predicting expected wind speed from satellite images using artificial neural networks** (in Korean). Journal of the Wind Engineering Institute of Korea, 27(4), 135–142. KCI

J2 **Lee, S. M.**, Choi, H., & Kang, T. H.-K. (2023). **Machine learning applications for smart impact-echo testing** (in Korean). Review of Architecture and Building Science (Architectural Institute of Korea), 67(3), 47–50.

J1 **Lee, S. M.**, Sung, H. S., & Kang, T. H.-K. (2022). **Comparison of performance for predicting compressive strength of concrete using machine learning**. Journal of the Korea Concrete Institute, 34(5), 505–513. KCI

Conference Papers

C20 **Lee, S. M.**, & Kang, T. H.-K. (2026). **CoMuRAG: Condition-mutated hard negatives for safety-sensitive Korean building-code retrieval**. ACM/IEEE Joint Conference on Digital Libraries (JCDL 2026).

C19 Park, H. G., **Lee, S. M.**, & Kang, T. H.-K. (2026). **Experimental study on impact-echo response characteristics of defects behind liner plates in nuclear containment buildings** (in Korean). Proceedings of the Korea Concrete Institute Conference, 38(2).

C18 Park, H. G., **Lee, S. M.**, & Kang, T. H.-K. (2026). **Modified impact-echo testing of liner-plate-backed concrete in nuclear containment buildings**. ACEM26 / Structures26.

C17 **Lee, S. M.**, & Kang, T. H.-K. (2026). **Deep learning-based reconstruction of wind load time histories from reduced pressure tap measurements** (in Korean). Proceedings of the 29th Annual Conference of the Wind Engineering Institute of Korea, 29(1), 73–74.

C16 **Lee, S. M.**, & Kang, T. H.-K. (2026). **Development of an edge-AI impact-echo system for detecting internal defects in concrete** (in Korean). Proceedings of the Korea Concrete Institute Conference, 38(1), 267–268.

C15 Park, H. G., **Lee, S. M.**, & Kang, T. H.-K. (2026). **Applying impact-echo testing to simulated internal defects in concrete behind liner plates of nuclear containment buildings** (in Korean). Proceedings of the Korea Concrete Institute Conference, 38(1), 273–274.

C14 **Lee, S. M.**, & Kang, T. H.-K. (2025). **Retrieval augmented generation for assistance of using wind load design codes**. The 10th Asia-Pacific Conference on Wind Engineering (APCWE10).

C13 **Lee, S. M.**, & Kang, T. H.-K. (2025). **Clustering of façade wind pressure coefficients on concrete buildings using deep learning** (in Korean). Proceedings of the Korea Concrete Institute Conference, 37(1), 13–14.

C12 Lee, Y. I., **Lee, S. M.**, & Kang, T. H.-K. (2024). **Monitoring of concrete buildings using multiclass deep SVDD** (in Korean). Proceedings of the Korea Concrete Institute Conference, 36(2), 345–346.

C11 **Lee, S. M.**, & Kang, T. H.-K. (2024). **A large language model framework specialized for building structural design codes using a mixture-of-experts architecture** (in Korean). Proceedings of the Korea Concrete Institute Conference, 36(2), 343–344.

C10 **Lee, S. M.**, Lee, Y. I., & Kang, T. H.-K. (2024). **Multi-sphere deep SVDD for system identification of building structure**. The 2024 World Congress on Advances in Civil, Environmental, and Materials Research (ACEM24).

C9 **Lee, S. M.**, Choi, H. S., Kim, C., & Kang, T. H.-K. (2024). **Representation learning for classification of concrete crack images**. The 2024 Structures Congress, Seoul, Korea.

C8 **Lee, S. M.**, Choi, H. S., Kim, C., & Kang, T. H.-K. (2024). **Lightweighting concrete crack image classification machine learning models for on-device AI**. Proceedings of the Korea Concrete Institute Conference, 36(1), 57–58.

C7 **Lee, S. M.**, Choi, H., & Kang, T. H.-K. (2023). **Automating impact-echo testing with machine learning** (in Korean). Proceedings of the Korea Concrete Institute Conference, 35(1), 187–188.

C6 **Lee, S. M.**, & Kang, T. H.-K. (2022). **Clustering wind pressure tap using dynamic time warping**. 8th European-African Conference on Wind Engineering (EACWE2022), Bucharest, Romania.

C5 **Lee, S. M.**, & Kang, T. H.-K. (2022). **Shear strength prediction of prestressed concrete based on machine learning**. The 2022 Structures Congress, Seoul, Korea.

C4 **Lee, S. M.**, Sung, H. S., & Kang, T. H.-K. (2022). **Machine learning-based prediction of concrete compressive strength** (in Korean). Proceedings of the Korea Concrete Institute Conference, 34(1), 179–180.

C3 **Lee, S. M.**, & Kang, T. H.-K. (2021). **Prediction of wind pressure coefficients on high-rise building façade using LSTM RNN model for sensor reduction**. The 2021 World Congress on Advances in Structural Engineering and Mechanics (ASEM21).

C2 **Lee, S. M.**, & Kang, T. H.-K. (2021). **Prediction of façade wind pressure coefficients on concrete buildings using long short-term memory recurrent neural networks** (in Korean). Proceedings of the Korea Concrete Institute Conference, 33(2), 155–156.

C1 **Lee, S. M.**, & Kang, T. H.-K. (2021). **Prediction of façade wind pressure coefficients on concrete buildings using LSTM networks** (in Korean). Proceedings of the Korea Concrete Institute Conference, 33(1), 189–190.

Theses

T3 **Lee, S. M.** (2023). **Machine learning application to automated impact-echo test for concrete structures** [Master's thesis]. Seoul National University.

T2 **Lee, S. M.** (2021). **Design of an illuminance-responsive automatic shading device and an IoT-based motion optimization algorithm** (in Korean) [Bachelor's thesis]. Department of Architecture and Architectural Engineering, Seoul National University.

T1 **Lee, S. M.** (2021). **Optimal operation of energy storage systems (ESS) in microgrids** (in Korean) [Bachelor's thesis]. Department of Electrical and Computer Engineering, Seoul National University.

PATENTS

2023 **AI-based defect detection system inside concrete members**
Lee, S. M., & Kang, T. H.-K. Korean Patent 10-2611457, registered

2022 **Wind load estimation system based on artificial intelligence**
Lee, S. M., & Kang, T. H.-K. Korean Patent 10-2480382, registered

RESEARCH PROJECTS

2021–2027	**Hyper-converged Forensic Research Center for Infrastructure**, NRF Korea, funded by MSIT
2024–2025	**Smart City Innovative Technology Demonstration Project**, KAIA, funded by MOLIT
2024	**AI for Construction Research Project**, SNU, funded by Sejong Construction
2023	**Outstanding Patent Prototype Development Project**, Seoul National University

TEACHING EXPERIENCE

Teaching assistant, Seoul National University

2022–2024	**Architecture and AI**, Spring 2022, 2023, and 2024 Taught hands-on sessions on deep neural networks
2021–2022	**Introduction to IoT, AI, and Big Data**, Spring and Fall 2021 and 2022; head TA in Fall 2022 Evaluated IoT projects and ran Arduino UNO labs
2021–2022	**IoT and Creative Engineering Design**, Fall 2021 and Spring 2022 Evaluated IoT projects; labs on Arduino UNO, Teensy, ESP32, and STM boards
2021–2022	**Creative Engineering Design**, Fall 2021 and Spring 2022 Evaluated IoT projects; labs on Arduino UNO and ESP32
2022	**Structural Experiment and Material**, Spring 2022 Euler buckling, truss deflection, and two-way shake-table seismic design experiments
2021	**Mechanics of Materials for Architectural Engineering**, Fall 2021 Problem sessions on structural engineering fundamentals
2021	**Prestressed Concrete**, Fall 2021 Course management, with a focus on post-tensioned structures
2021	**Computation in Architectural Engineering**, Spring 2021 MATLAB labs for structural engineering students

HONORS AND AWARDS

2025–2026	**SNU AI Fellowship**, Interdisciplinary Program in Artificial Intelligence, SNU Four semesters, Spring 2025 to Fall 2026
2025	**Excellence Award, SNU AI Paper Competition**, Interdisciplinary Program in Artificial Intelligence, SNU Included travel support to attend NeurIPS
2023–2024	**SNU AI Graduate School Scholarship**, Interdisciplinary Program in Artificial Intelligence, SNU Four semesters, Spring 2023 to Fall 2024
2022	**Outstanding Teaching Assistant Award**, College of Engineering, SNU Fall 2022
2022	**Outstanding Presentation Award**, Korea Concrete Institute Spring Conference 2022
2021	**Sen Engineering Group Scholarship**, Department of Architecture and Architectural Engineering, SNU Fall 2021
2019	**Gwanakhoe Foundation**, Gwanakhoe, SNU Spring and Fall 2019

CERTIFICATIONS

Jul 2025	**Big Data Analysis Engineer**, Korea Data Agency

PROFESSIONAL SERVICE

Reviewing

2024–present — **Wind and Structures**, Reviewer
SCIE journal in wind engineering

Conference Organization

2025 — **28th WEIK Annual Conference**, Organizing committee member
Held at Seoul National University

Professional Memberships

since 2021 — **Korea Concrete Institute (KCI)**, regular member

since 2021 — **American Concrete Institute (ACI)**, student member

since 2023 — **Architectural Institute of Korea (AIK)**, regular member

since 2023 — **Korea Institute for Structural Maintenance and Inspection (KSMI)**, student member

since 2023 — **Wind Engineering Institute of Korea (WEIK)**, student member

since 2025 — **American Society of Civil Engineers (ASCE)**, student member

Outreach

2016–2018 — **Edushare Korea**, Mathematics teacher; lead teacher of the Uiwang Bugok center
Taught mathematics to students from low-income families

SKILLS

Programming: Python, MATLAB, C
Embedded and IoT: Arduino UNO, ESP32, Teensy, STM boards
Engineering tools: ECO2, AutoCAD, Microsoft Excel