

Yongjin Choi, Ph.D.

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EDUCATION

Ph.D. in Civil Engineering <i>University of Texas at Austin, Department of Civil, Architectural and Environmental Engineering, USA</i> • Specialty area: geotechnical engineering • Dissertation: Forward and Inverse Modeling of Granular Flows Using Differentiable Graph Neural Network Simulator • Advisor: Prof. Krishna Kumar	2024
M.S. in Civil Engineering <i>Pusan National University, Department of Civil and Environmental Engineering, South Korea</i> • Specialty area: geotechnical engineering • Thesis: Stiffness Evaluation of Open-Graded Aggregate Base Corresponding to Compaction Level Based on Plate Load Tests • Advisor: Prof. Jaehun Ahn	2019
B.S. in Civil Engineering <i>Pusan National University, Department of Civil and Environmental Engineering, South Korea</i>	2017

APPOINTMENTS

Assistant Professor (Incoming) <i>University of Massachusetts Amherst, USA</i>	09/2026
Postdoctoral Fellow (Supervisor: Seunghwa Ryu) <i>Korea Advanced Institute of Science & Technology (KAIST), South Korea</i>	2025 – Current
Affiliated Research Fellow (Supervisor: Jorge Macedo) <i>Georgia Institute of Technology, USA</i>	2024 – Current
Postdoctoral Fellow (Supervisor: Jorge Macedo) <i>Georgia Institute of Technology, USA</i>	2024 – 2025
Graduate Research Assistant (Supervisor: Krishna Kumar) <i>University of Texas at Austin, USA</i>	2021 – 2024
Graduate Research Assistant (Supervisor: Jaehun Ahn) <i>Pusan National University, South Korea</i>	2017 – 2020

PEER-REVIEWED JOURNAL PAPERS († Equal contribution; * Corresponding author)

1. (Under review) **Choi, Y.**, Ok, S., Lee, J., Ryu, S.*, Choo, J.* (2026) “An agentic-AI calibrate--diagnose--suggest workflow for parameter identification in soil constitutive models.” *Computers and Geotechnics*
2. (Under review) Kim, T.†, **Choi, Y.**†, Kwon, S., Kim, J.* (2026). “An interpretable DeepONet surrogate for real-time prediction of three-dimensional urban surface temperature fields.” *Sustainable Cities and Society*
3. (Under review) **Choi, Y.**†, Moon, H.†, Ryu, S.* (2026) “Critical evaluation of PINN for FWD inverse analysis and differentiable FEM as an alternative.” [\[Pre-print\]](#)
4. (Under review) Moon, H.†, **Choi, Y.**†, Ryu, S.* (2026). “A Hybrid GNN-FEM Framework for Phase-Field Fracture Simulation. Physics-Preserving Hybridization for Generalizable Surrogate Modeling.” *Engineering Fracture Mechanics* [\[Pre-print\]](#)
5. (Under review) Nguyen, H. T., **Choi, Y.**, Kang, S., Ahn, J.* (2026) “A Low-Cost Raspberry Pi Data Acquisition System for Lightweight Deflectometers with Synchronized Raw-Signal Access.” *IEEE Sensors*
6. (Under review) Ryou, J. E., Gang, S., **Choi, Y.**, Lee, E. H., Jung, J.* (2026) “Microstructure-Informed Prediction of Hydraulic Conductivity Using Pore Network Modeling and Interpretable Surrogate Learning.” *Journal of Hydrology*

7. (Under review) **Choi, Y.**, Macedo, J.* (2025) "Differentiable graph neural network simulator for the back-analysis of post-liquefaction residual strength from flow failure runout." *Canadian Geotechnical Journal* [\[Pre-print\]](#)
8. **Choi, Y.**, Lee, S.* (2026) "Accelerating stochastic simulation of post-failure landslide runout using a random graph neural network-based simulator." *Computers & Geotechnics*, 195, 108104 [\[Link\]](#)
9. **Choi, Y.**, Macedo, J.*, Liu, C. (2026) "Differentiable graph neural network simulator for forward and inverse modeling of multi-layered slope system with multiple material properties." *Soils and Foundations*, 66(3), 101773 [\[Link\]](#)
10. **Choi, Y.**, Liu, C., Macedo, J.* (2026) "Operator learning for consolidation: An architectural comparison for DeepONet variants." *Computers and Geotechnics*, 194, 108017 [\[Link\]](#)
11. Ryou, J. E., Gang, S., **Choi, Y.**, Dai, S., Jung, J.* (2026) "The Interplay Between Pore and Particle Characteristics in Sands Based on Computed Tomographic Image Analyses." *Powder Technology*, 122150 [\[Link\]](#)
12. Bae, B., **Choi, Y.***, Jung, H., Ahn, J.* (2025) "Tunnel lining segmentation from ground-penetrating radar images using advanced single-and two-stage object detection and segmentation models." *Computer-Aided Civil and Infrastructure Engineering*, 40(22), 3580-3592 [\[Link\]](#)
13. Kim, T., Shahriar, A. R., Lee, W.-D.*, **Choi, Y.**, Kwon, S., & Gabr, M. A. (2025) "Field data-based prediction of local scour depth around bridge piers using interpretable machine learning." *Transportation Geotechnics*, 52, 101567. [\[Link\]](#)
14. **Choi, Y.**, Bae, B., Han, T. H., Ahn, J.* (2024) "Application of Mask R-CNN and YOLOv8 Algorithms for Concrete Crack Detection." *IEEE Access*. [\[Link\]](#)
15. **Choi, Y.***, Kumar, K. (2024) "Inverse Analysis of Granular Flows Using Graph Neural Network-Based Simulator." *Computers and Geotechnics*, 171, 106374. [\[Link\]](#) [\[Code\]](#)
16. **Choi, Y.**, Nguyen, H. T., Han, T. H., Choi, Y., Ahn, J.* (2024) "Sequence Deep Learning for Seismic Ground Response Modeling: 1D-CNN, LSTM, and Transformer Approach." *Applied Science*, 14(15), 6658 [\[Link\]](#) [\[Code\]](#)
17. Lee, Y., Lee, D., Lee, H., Choe, H. S., Kim, J. H., **Choi, Y.***, Ahn, J.* (2024). "Removal Efficiency of Bottom Ash and Sand Mixtures as Filter Layers for Fine Particulate Matter." *Materials*, 17(11), 2749. [\[Link\]](#)
18. **Choi, Y.***, Kumar, K. (2024). "Graph Neural Network-based Surrogate Model for Granular Flows." *Computers and Geotechnics*, 116, 106015. [\[Link\]](#) [\[Code\]](#)
19. Kumar, K., **Choi, Y.** (2023). "Accelerating Particle and Fluid Simulations with Differentiable Graph Networks for Solving Forward and Inverse Problems." *The International Conference for High Performance Computing, Networking, Storage and Analysis (Top-tier conference in computer science)*, Denver, USA. [\[Link\]](#)
20. Lee, Y., **Choi, Y.**, Ahn, D., Ahn, J*. (2021). "Prediction Models Based on Regression and Artificial Neural Network for Moduli of Layers Constituted by Open-Graded Aggregates." *Materials*, 14(5), 1199. [\[Link\]](#)
21. **Choi, Y.**, Ahn, D., Lee, Y., Ahn, J*. (2020). "Compaction Quality Monitoring of Open-Graded Aggregates by Light Weight Deflectometer (LWD) and Soil Stiffness Gauge (SSG)." *Sustainability*, 12(6), 2521. [\[Link\]](#)
22. **Choi, Y.**, Ahn, D., Nguyen, T. H., Ahn, J*. (2018). "Assessment of Field Compaction of Aggregate Base Materials for Permeable Pavements Based on Plate Load Tests." *Sustainability*, 10(10), 3817. [\[Link\]](#)

PEER-REVIEWED JOURNAL PAPERS (Korean Journals) (* Corresponding author)

1. **Choi, Y.**, Son, S. (2024). "Sensitivity analysis of factors influencing the settlement of buried pipes installed beneath roads using explainable machine learning techniques." *Journal of the Korean Asphalt Institute*, 14(2), 269-278. [\[Link\]](#)
2. Jong, J., **Choi, Y.**, Ahn, J. (2021). "Evaluation of p -y Curves for Group Piles in Cohesive Soil Based on 3D Numerical Analysis." *Journal of the Korean Society of Hazard Mitigation*, 21(6), 193-200. [\[Link\]](#)
3. **Choi, Y.**, Ahn, J*. (2020). "Evaluation of p -y Curves and p -multiplier of Pile Groups Corresponding to Sand Properties Change Based on 3D Numerical Analysis." *Journal of the Korean Society of Hazard Mitigation*, 20(4), 207-2017. [\[Link\]](#) [\[Code\]](#)
4. **Choi, Y.**, Nguyen, T. H., Ahn, J*. (2019). "Resilient Modulus and Permanent Deformation of 40 mm Open-Graded Aggregates based on Repeated-Load Triaxial Tests." *Journal of the Korean Society of Hazard Mitigation*, 19(7), 367-374. [\[Link\]](#)
5. **Choi, Y.**, Oh, J., Han, S. I., Ahn, J., Shin, H. S*. (2017). "Elastic Modulus and Layer Coefficient of Permeable Block Pavements Based on Plate Load Tests." *Journal of the Korean Geotechnical Society*, 33(12), 75-80. [\[Link\]](#)

CONFERENCE PRESENTATIONS

1. **Choi, Y. (Oral presenter)**, Lee, S., Ryu, S. (2026) “Accelerating stochastic simulation of post-failure landslide runout using a random graph neural network-based simulator.” *17th World Congress on Computational Mechanics & 10th European Congress on Computational Methods in Applied Sciences and Engineering (WCCM-ECCOMAS 2026)*, Munich, Germany.
2. Alam, M. M. (Poster presenter), **Choi, Y.**, Yousaf, A., Seong, W. K., Ryu, S., Ruoff, R. S. (2026). “Geometry of a Non-Centrosymmetric ‘Truncated Octahedral’ Diamond Particle.” *Korean Institute of Metals and Materials Spring Conference 2026*, Jeju, South Korea.
3. **Choi, Y. (Oral presenter)**, Cornejo, R., Macedo, J., Kumar, K. (2024). “AI/MPM-based assessment of Dam break Failure modes and Runout.” TALENG Annual Meeting, Denver, Colorado.
4. **Choi, Y. (Poster presenter)**, Kumar, K. (2024). “Three-dimensional granular flow simulation using graph neural network-based learned simulator.” *Geo-Congress 2024*, Vancouver, Canada. [\[Link\]](#)
5. Kumar, K., Mehta, C., **Choi, Y. (Oral presenter)** (2023). “Graph Network Simulator and Differentiable Material Point Method.” *Advances in Computational Mechanics 2023*, Austin, USA.
6. **Choi, Y. (Oral presenter)**, Kumar, K. (2023). “Slope Inverse Analysis Using Accurate and Generalizable Data-Driven Surrogate Granular Flow Simulator.” *17th National Congress on Computational Mechanics*, Albuquerque, USA.
7. **Choi, Y. (Oral presenter)**, Kumar, K. (2022). “A Machine Learning Approach to Predicting Pore Pressure Response in Liquefiable Sands Under Cyclic Loading.” *Geo-Congress 2023*, Los Angeles, USA. [\[Link\]](#) [\[Code\]](#)
8. **Choi, Y. (Poster presenter)**, Lee, S., Jung, J., Oh, J., Ahn, J. (2018). “Coefficient of Subgrade Reaction for the Permeable Block and Base System at Korea GI and LID Center.” *Proceedings of the 5th GeoChina International Conference*, Hangzhou, China. [\[Link\]](#)
9. **Choi, Y. (Oral presenter)**, Ahn, D., Nguyen, H. T., Ahn, J. (2018). “Measurement of Elastic Modulus of 40 mm Crushed Stone Aggregate with Field Compaction Effort.” *Korean Society of Railway Spring Conference 2018*, Jeju, South Korea.
10. **Choi, Y. (Oral presenter)**, Jalmasco, M. M., Ahn, J. (2017). “Permeability Degradation of Permeable Pavement Material due to Clogging.” *JpGU-AGU Joint Meeting 2017*, Chiba, Japan.

TEACHING EXPERIENCES

Guest Lecturer

Fall 2025

Deep Learning and Its Application to Geotechnical Systems, Pusan National University, South Korea

- Delivered a two-hour lecture on physics-informed neural networks and graph neural networks for geotechnical modeling for graduate students.

Assistant Instructor

Spring 2025

Numerical Modeling and Data Science for Geotechnics (CEE-8813-H), Georgia Institute of Technology, USA

- Designed and delivered lectures and course materials on material point methods [\[link\]](#), finite element methods [\[link\]](#), and regression and classification machine learning models for geotechnical engineers, which are publicly available through open-source websites.

Classroom Project Mentor

Spring 2023

Scientific Machine Learning (CE 397), University of Texas at Austin, USA

- Mentored a graduate student team in developing a graph neural network-based simulator for slope failure, resulting in an “A” grade for the final project report.

Teaching Assistant

Spring 2023

Introduction to Computer Methods (CE 311K), University of Texas at Austin, USA

- Hosted weekly laboratory sessions for hands-on Python coding activities for engineering problems, held regular office hours, and managed grading tasks.

Teaching Assistant

Spring 2021

Probability and Statistics for Civil Engineers (CE 311S), University of Texas at Austin, USA

- Designed and hosted weekly laboratory sessions with hands-on problem-solving activities, held regular office hours, and managed grading tasks.

AWARDS & GRANTS

- Bright Spark Lecture Award, International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE), to be presented at the 4th International Workshop on the Future of Machine Learning in Geotechnics (FOMLIG 2026). **2026**
- Community of Practice (CoP) program fellowship, Korea Institute of Human Resources Development in Science and Technology (KIRD) **2026**
- Young Scholar Award, Korean Geotechnical Society **2023**
- Award for 2nd best poster presentation in graduate student symposium of civil, architectural, and environmental engineering, University of Texas at Austin **2022**
- Frontera compute resource award under the supervision of Dr. Kumar, Texas Advanced Computing Center (TACC). **2021**
- Award for outstanding graduate student research paper, Brain Korea 21 Plus **2019**
- Fellowship from “Earthquake Disaster Prevention Human Resource Development”, Korean Ministry of the Interior and Safety **2017 – 2018**
- Scholarship for academic excellence, Korea Student Aid Foundation **2015 – 2016**

INVITED TALKS

- RIT seminar, Department of Civil and Environmental Engineering, Yeonsei University, South Korea **05/2026**
- Geosystem Lab, Department of Civil, Environmental and Architectural Engineering, Korea University, South Korea **03/2026**
- School of Civil Engineering, Chungbuk National University, South Korea **01/2026**
- Korea Institute of Geoscience and Mineral Resources (KIGAM), South Korea **12/2025**
- Department of Civil, Urban, Earth, and Environmental Engineering, Ulsan National Institute of Science & Technology (UNIST), South Korea **12/2025**
- Computational Structural Mechanics and Design Lab, Department of Mechanical Engineering, Ulsan National Institute of Science & Technology (UNIST), South Korea **11/2025**
- GeoKAIST Seminar, Department of Civil and Environmental Engineering, Korea Advanced Institute of Science & Technology (KAIST), South Korea. **10/2025**

OUTREACH & SERVICE

Advisory Board in Revolutionizing Engineering Departments (RED) program, Georgia Institute of Technology **2025**

- Engaged in ongoing educational innovation to incorporate computational thinking and artificial intelligence into the Civil and Environmental Engineering program.

Machine Learning Model Developer in DesignSafe Academy/NHERI Hackathon **2022**

- Participated in team hackathon project for machine learning and high-performance computing held in Texas Advanced Computing Center, and developed p-wave arrival time detector from earthquake source using LSTM and CNN [\[Code\]](#)

President of Korean Civil Engineering Student Association at University of Texas at Austin **2022**

- Led and represented the organization, holding semester-wise social gatherings to foster a supportive environment for Korean civil engineering students.

Journal Reviewer

- Journal of Computing in Civil Engineering | Journal of Traffic and Transportation Engineering | Journal of Rock Mechanics and Geotechnical Engineering | Earthquake Spectra | Chemical Engineering Journal **2021-2026**

SOFTWARE DEVELOPMENT

Learn-MPM-2D **2024**

- Developed an open-source learning package for the 2-D material point method [\[link\]](#), guiding learners from core theory to hands-on practice in a beginner-friendly interactive Python notebook environment.

Cbgeopy: material point method model generator [\[Code\]](#) **2024**

- Developed a material point method model generator that supports various geometries from simple columns to multi-layered 3D topography, which can be integrated with CB-Geo MPM.

- GNS: A generalizable Graph Neural Network-based simulator for particulate and fluid modeling** [\[Code\]](#) **2023**
- Contributed as a core developer to implement mesh graph network for fluid modeling, multi-material features, and code maintenance work.

PROFESSIONAL LICENSES & CERTIFICATIONS

- Advanced teaching certificate, Center for Teaching and Learning, University of Texas at Austin, USA **2024**
- Engineering in Train (EIT), Civil Engineering, NCEES, USA **2023**
- Machine Learning, Stanford University and Coursera [\[Link\]](#) **2022**
- License of Engineer (FE), Civil Engineering, Human Resources Development Service of Korea **2016**

REFERENCES

Dr. Seunghwa Ryu, Ph.D. (Postdoctoral Research Supervisor)

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Dr. Jorge Macedo, Ph.D. (Postdoctoral Research Supervisor)

Associate professor, School of Civil and Environmental Engineering, Georgia Institute of Technology, USA

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Dr. Krishna Kumar, Ph.D. (Ph.D. Supervisor)

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Dr. Ellen Rathje, Ph.D. (Ph.D. Committee Member)

Professor, Department of Civil, Architectural and Environmental Engineering, University of Texas at Austin, USA

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Dr. Jaehun Ahn, Ph.D. (M.S. Supervisor)

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