Hongrak **Pak**

Urban Resilience.AI Lab
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Professional appointments

Present Nov 2023	**Postdoctoral Researcher (Joint appointments)** Advisors : Dr. Ali Mostafavi and Dr. Kayode Atoba Urban Resilience.AI Lab, Texas A&M University, College Station, US Institute for a Disaster Resilient Texas (IDRT), Texas A&M University, College Station, US
Present Feb 2024	**Research Scientist** Resilitix Intelligence LLC, Houston, US
May 2023 Jan 2023	**Graduate Teaching Fellow (The Instructor of Record)** Department of Civil and Environmental Engineering, Texas A&M University, College Station, US
Oct 2023 Aug 2018	**Graduate Research Assistant & Teaching Assistant** Department of Civil and Environmental Engineering, Texas A&M University, College Station, US
Jun 2018 Mar 2018	**Adjunct Lecturer** Department of Environmental Engineering, Kimpo University, Kimpo, Republic of Korea
Jul 2018 Feb 2017	**Assistant Researcher** Department of Civil Engineering, Hongik University, Seoul, Republic of Korea
Feb 2017 Mar 2015	**Graduate Research Assistant & Teaching Assistant** Department of Civil Engineering, Hongik University, Seoul, Republic of Korea

Education

Dec. 2023 **Texas A&M University**, College Station, Texas, US
Doctor of Philosophy in Civil Engineering
- Dissertation : Data-driven knowledge transfer models and their transferability for estimating structural performance.
- Advisor : Dr. Stephanie Paal

Feb. 2017 **Hongik University**, Seoul, Republic of Korea
Master of Science in Civil Engineering
- Thesis : Structural behavior of a steel-concrete composite beam under fire conditions
- Advisor : Dr. Jun Won Kang

Feb. 2015 **Hongik University**, Seoul, Republic of Korea
Bachelor of Science in Civil Engineering

Research interests

- Intelligent infrastructure monitoring
- Smart and resilient communities
- Natural hazards engineering
- Knowledge transfer models
- Digital Twin
- Large language model

Fields of expertise

- Data analytics in disaster resilience
- Data-driven structural performance predictions
- Machine learning, Transfer learning
- Nonlinear structural analysis
- Nonlinear finite element analysis

Journal Papers

J1. **Pak, H.*** and Paal, S. (2023). A Knowledge Transferability Index to Estimate the Ability of Transfer Learning Models in the Structural Engineering Domains. (In preparation.)

J2. Weng, Y., Murphy, J., **Pak, H.*** and Paal, S. (2024). Transfer learning for advancing natural hazard mitigation in civil engineering : A scoping review and future directions. *Natural Hazards* (Under review.)

J3. Murphy, J.*, **Pak, H.** and Paal, S. (2024). A Transfer Learning-based Genetic Expression Programming Approach to estimate the Shear Capacity of Reinforced Concrete Beams. *Computer & Structures* (1st revision.)

J4. **Pak, H.*** and Paal, S. (2024). A Real-time Structural Seismic Response Prediction Framework based on Transfer Learning and Unsupervised Learning. *Engineering Structures* (2nd revision.)

J5. **Pak, H.***, Leach, S., Yoon, S., and Paal, S. (2023). A Knowledge Transfer Enhanced Ensemble Approach to Predict the Shear Capacity of Reinforced Concrete Deep Beams without Stirrups. *Computer-Aided Civil and Infrastructure Engineering*, 38, 1520– 1535.

J6. **Pak, H.*** and Paal, S. (2022). Evaluation of Transfer Learning Models for Predicting the Lateral Strength of Reinforced Concrete Columns. *Engineering Structures*, 266, 114579.

J7. Kang, M. S., **Pak, H.**, Kang, J. W.*, Kee, S. H., and Choi, B. J. (2018). Structural Behavior of a Steel-Concrete Composite Beam under Fire Condition. *In Maintenance, Safety, Risk, Management and Life-Cycle Performance of Bridges*, 2146-2153.

J8. **Pak, H.**, Kang, M. S., Kang, J. W.*, Kee, S. H., and Choi, B. J. (2018). A Numerical Study on the Thermo-mechanical Response of a Composite Beam Exposed to Fire. *International Journal of Steel Structures*, 18(4), 1177-1190.

J9. Lim, H. K., Kang, J. W.*, **Pak, H.**, Chi, H. S., Lee, Y. G., and Kim, J. (2018). Seismic Response of a Three-dimensional Asymmetric Multi-storey Reinforced Concrete Structure. *Applied Sciences*, 8(4), 479.

J10. **Pak, H.**, Kang, J. W.*, and Lee, J. (2016). Nonlinear Thermo-mechanical Analysis Considering Heat Flow under Fire Conditions. *Journal of Computational Structural Engineering Institute of Korea*, 29(4), 369-376.

Databases

D1. **Pak, H.** and Paal, S. (2022). A Knowledge Transfer Enhanced Ensemble Approach to Predict the Shear Capacity of Reinforced Concrete Deep Beams without Stirrups. *DesignSafe-CI*. https://doi.org/10.17603/ds2-pnw4-9y53

D2. **Pak, H.** and Paal, S. (2022). Evaluation of Transfer Learning Models for Predicting the Lateral Strength of Reinforced Concrete Columns. *DesignSafe-CI*. https://doi.org/10.17603/ds2-b5z3-4m42

Conference Proceedings

P1. **Pak, H.**, and Paal, S. (2023). A Knowledge Transfer LSTM model to Estimate the Seismic Response of Existing Structures. *The 30th EG-ICE : International Conference on Intelligent Computing in Engineering*. London, UK.

P2. **Pak, H.**, and Paal, S. (2023). A Knowledge Transfer LSTM model to Predict the Seismic Response of Structures. *2023 Engineering Mechanics Institute (EMI) Conference*. Atlanta, GA, US.

P3. **Pak, H.**, and Paal, S. (2022). Knowledge Transfer-enhanced LSTM Model to Predict the Structural Dynamic Response. *2022 NHERI SimCenter Symposium*. Austin, TX, US.

P4. **Pak, H.**, and Paal, S. (2022). Evaluation of Knowledge Transfer Models for Estimating the Lateral Strength of Reinforced Concrete Columns. *2022 Engineering Mechanics Institute (EMI) Conference*. Baltimore, MD, US.

P5. **Pak, H.** (2019). In situ Deficiency Detection and Characterization for Automated Structural Repair. *President's Excellence Fund Symposium*. College Station, TX, US.

P6. **Pak, H.**, Kang, M. S., Kang, J. W., Kee, S. H., and Choi, B. J. (2017). Numerical Thermo-mechanical Analysis of a Steel-concrete Composite Beam Exposed to Fire. *The 9th International Symposium on Steel Structures (ISSS 2017)*. Jeju, Korea.

P7. **Pak, H.**, and Kang, J. W. (2016). Nonlinear Thermo-mechanical Analysis of a Reinforced Concrete Beam Exposed to Fire. *2016 Engineering Mechanics Institute (EMI) International Conference*. Metz, France.

P8. **Pak, H.**, and Kang, J. W. (2016). Multiphysics Analysis of a Steel-concrete Composite Bridge under Fire Conditions. *The 12th World Congress on Computational Mechanics (WCCM XII)*. Seoul, Korea.

P9. Kang, M. S., **Pak, H.**, Kang, J. W., Kee, S. H., and Choi, B. J. (2017). Structural Behavior of a Steel-concrete Composite Beam Subjected to Standard Fire. *Korean Society of Civil Engineers (KSCE) 2017 CONFERENCE & CIVIL EXPO*. Busan, Korea.

P10. **Pak, H.**, Kang, M. S., and Kang, J. W. (2017). Numerical Evaluation of Structural Behavior of a Steel-concrete Composite Beam at High Temperatures. *2017 Computational Structural Engineering Institute of Korea (COSEIK) Annual Conference*. Buyeo, Korea.

P11. **Pak, H.**, Kang, M. S., and Kang, J. W. (2017). Numerical Thermo-mechanical Analysis of a Steel-concrete Composite Beam Exposed to Fire. *2017 Symposium on the Multiscale & Multiphysics Mechanics (MMM)*. Ulsan, Korea.

P12. **Pak, H.**, and Kang, J. W. (2016). Structural Behavior of Non-protection Steel-concrete Composite Bridge under Fire Conditions. *2016 Academic Symposium on Computational Structural Engineering of Korea*. Wonju, Korea.

P13. **Pak, H.**, and Kang, J. W. (2016). Nonlinear Thermo-mechanical Analysis of a Steel-concrete Composite Beam Exposed to Fire. *2016 Korean Institute of Bridge and Structural Engineers Annual Conference*. Mokpo, Korea.

P14. **Pak, H.**, and Kang, J. W. (2016). Nonlinear Thermo-mechanical Analysis of a Reinforced Concrete Beam Exposed to Fire. *Korean Society of Civil Engineers (KSCE) 2016 CONFERENCE & CIVIL EXPO*. Jeju, Korea.

P15. **Pak, H.**, Ko, M. H., Bae, S. M., Hwang, J. H., and Kang, J. W. (2016). Analysis of Physical/Chemical Properties of Hydration Reaction in Cement/Slag Composites. *Korean Society of Civil Engineers (KSCE) 2016 CONFERENCE & CIVIL EXPO*. Jeju, Korea.

P16. Kim, E. H., **Pak, H.**, Kang, J. W., Choi, E. S., and Hwang, J. H. (2016). Application of Impedance Spectroscopy to Cement-based Materials. *2016 Spring Meeting of the Korean Ceramic Society*. Pyeongchang, Korea.

P17. **Pak, H.**, and Kang, J. W. (2016). A Study on the Evaluation of Structural Behavior of Steel-concrete Composite Bridge Exposed to Fire. *2016 Computational Structural Engineering Institute of Korea (COSEIK) Annual Conference*. Daejeon, Korea.

P18. **Pak, H.**, Kim, E. H., Hwang, J. H., Kang, J. W., and Suh, C. (2015). Impedance Spectroscopy Monitoring of Hydration Processes in Cement Paste Containing Admixtures. *Korean Society of Civil Engineers (KSCE) 2015 CONFERENCE & CIVIL EXPO*. Gunsan, Korea.

Honors and Awards

May. 2023 **Texas A&M Institute of Data Science Graduate Travel Grants**, Texas A&M University
Apr. 2023 **CVEN Graduate Student Travel Funds**, Texas A&M University
Sep. 2022 **Travel Award**, NHERI SimCenter at UC Berkeley
Apr. 2022 **Graduate Student Research and Presentation Travel Award**, Texas A&M University
Mar. 2022 **CVEN Graduate Student Travel Funds**, Texas A&M University
Feb. 2020 **SEI Student Scholarship**, ASCE Structural Engineering Institute
Jun. 2019 **Zachry Department of Civil Engineering Excellence Fellowship**, Texas A&M University
May. 2018 **Zachry Department of Civil Engineering Fellowship**, Texas A&M University
Oct. 2017 **Best Poster Award**, Korean Society of Civil Engineers (KSCE)
Nov. 2017 **Best Paper Award**, Computational Structural Engineering Institute of Korea (COSEIK)
Jan. 2017 **Best Poster Award**, 2017 Symposium on Multiscale & Multiphysics Mechanics (MMM)
Mar. 2015 **Science and Engineering Scholarship of Excellence (4 semesters)**, Hongik University
Dec. 2013 **Certificate of Academic Excellence**, Hongik University
Sep. 2013 **Full Scholarship (3 semesters)**, Hongik University
Oct. 2013 **Best Design and Presentation Award**, Korean Society of Civil Engineers (KSCE)

Certification

Jan. 2022 **Academy for Future Faculty Fellow**, Center for Teaching Excellence, Texas A&M University
Oct. 2021 **Engineer-in-Training (EIT)**, Texas Board of Professional Engineers
Aug. 2014 **Certified Civil Engineer**, Human Resources Development Service of Korea

Skills

Language English, Korean
OS Mac OS, Linux, Windows
Programming Python, MATLAB, Fortran, LaTeX
Engineering tool ABAQUS, ANSYS, ANSYS Mechanical APDL, AutoCAD, MIDAS civil, GIS