Huijeong Kim, Ph.D.

Assistant Professor
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EDUCATION

Purdue University, IN, USA — Aug. 2017 – Aug. 2022

Ph.D. in Civil Engineering (Architectural Engineering group)

- Dissertation: *"Development of a user-interactive smart home energy management system for connected residential communities"*
- Academic advisor: Dr. Panagiota Karava

Hanyang University, Seoul, Korea — Mar. 2015 – Feb. 2017

M.S. in Architectural Engineering

- Thesis: *"Comparative analysis of the annual performance of a dedicated outdoor air system and a desiccant-enhanced evaporative air conditioner"*
- Academic advisor: Dr. Jea-weon Jeong

Hanyang University, Seoul, Korea — Mar. 2011 – Feb. 2015

B.S. in Architectural Engineering

RESEARCH AND TEACHING INTERESTS

- Smart and Connected Communities, Human-Building Interactions; Sustainable Buildings, Optimal Design and Control of Building Energy Systems; Equitable Clean Energy Transition
- Human Decision Making; Mechanism Design; Game-theoretic modeling.
- Statistical Causal Inference; Machine Learning; Bayesian Data Analysis.

PROFESSIONAL AND RESEARCH EXPERIENCE

University of Kansas, Lawrence, KS
Department of Civil, Environmental & Architectural Engineering
Assistant Professor — Aug. 2024 –

Purdue University, West Lafayette, IN
Lyles School of Civil Engineering (Architectural Engineering), Ray W. Herrick Laboratories.

Visiting Assistant Professor — Aug. 2023 – Dec. 2023

- Instructor of CE 413: Building Envelope Design and Thermal Loads (Fall 2023)

Postdoctoral Research Assistant — Aug. 2022 – Present

- SCC-IRG Track 1: Sociotechnical Systems to Enable Smart and Connected Energy-Aware Residential Communities (National Science Foundation, No. 1737591)
  - Patent application and commercialization of the visual and voice interactive smart home energy management system (i.e., "MySmartE").
  - Scaled the MySmartE deployment with a local utility company and local housing authorities, and developed the central administrative manager portal of MySmartE for the system maintenance.
  - Mechanism design for the sustainable operation of energy efficiency programs.

Research Assistant — Aug. 2017 – Aug. 2022

- SCC-IRG Track 1: Sociotechnical Systems to Enable Smart and Connected Energy-Aware Residential Communities (National Science Foundation, No. 1737591)
  - Development and field deployment of MySmartE (i.e., an eco-feedback and social gaming platform to promote energy conserving behaviors in multi-unit residential buildings).

- Investigation of occupant decision-making process and game-theoretic mechanisms for the optimal operations of social games.
- Sensor installation and baseline data collection in two multi-unit residential communities (e.g., smart thermostat, sub-circuit power meter)

Hanyang University, Seoul, Korea
Building Mechanical and Environmental Systems Laboratory

Research Assistant Mar. 2015 – Feb. 2017

- Development of liquid desiccant and evaporative cooling assisted 100% outdoor air system (National Research Foundation of Korea, No.2012001927)
  - Performance evaluation of indirect evaporative coolers through experiments and numerical simulation.
- Development of building integrated performance (Brain Korea 21 Plus, No. 22A20152613333)
  - Comparatively analyzed the performance of a dedicated outdoor air system and a desiccant-enhanced evaporative cooler through building energy simulation.
- Development of advanced heat pump technology using wasted energy (Ministry of Trade, Industry, and Energy, No.20164010200860)
  - Investigate the applicability of thermoelectric cooling systems in dedicated outdoor air systems.

Undergraduate Researcher Sept. 2014 – Feb. 2015

- Analyze the performance of various dedicated outdoor air systems through simulations
- Analyze the optimum tilt angle of photovoltaic system in South Korea

AWARDS & SCHOLARSHIP

BECC Fellow Scholarship, Behavior, Energy, and Climate Change conference	Sept. 2023
Postdoctoral Supplemental Travel Grant, Purdue University	Sept. 2023
College of Engineering Travel Award, Purdue University	Nov. 2022
Ross Fellowship, Purdue University	Aug. 2017 – Aug.2018

PATENTS

MySmartE: An Eco-feedback and Gaming Platform for Residential Energy Management (2023-KARA-69985), U.S. Filed on September 8, 2022 (link)

PUBLICATIONS

In Referred Journals

1. H. Kim, J. Go, I. Bilionis, J. E. Braun, P. Karava (In progress) *Social Energy Games for Smart and Energy-Efficient Multi-Unit Residential Buildings: Decision Simulations*
2. H. Kim, I. Bilionis, J. E. Braun, P. Karava (2023) *Human Decision Making During Eco-feedback Intervention in Smart and Connected Energy-aware Communities.* Energy and Buildings
3. H. Kim, S. Ham, M. Promann, H. Devarapalli, G. Bihani, T. Ringenberg, V. Kwarteng, I. Bilionis, J. E. Braun, J. T. Rayz, L. Raymond, T. Reimer, P. Karava (2022) *MySmartE – an Eco-feedback and Gaming Platform for Smart and Energy-efficient Residential Communities.* Building and Environment
4. H. Kim, S. Ham, D. Yoon, J. Jeong (2017) *Cooling Performance Measurement of Two Cross-flow Indirect Evaporative Coolers in General and Regenerative Operation Modes.* Applied Energy
5. S. Lee, H. Kim, H. Dong, J. Jeong, *Energy Saving Assessment of a Desiccant-enhanced* Evaporative *Cooling System in Variable Air Volume Applications*. Applied Thermal Engineering
6. H. Kim, S. Lee, S. Cho, J. Jeong, *Energy Benefit of a Dedicated Outdoor Air System over a Desiccant-enhanced Evaporative Air Conditioner.* Applied Thermal Engineering
7. M. Kim, D. Yoon, H. Kim, J. Jeong, *Retrofit of a Liquid Desiccant and Evaporative Cooling-assisted 100% Outdoor Air System for Enhancing Energy Saving Potential.* Applied Thermal Engineering
8. H. Kim, D. Yoon, J. Jeong, *Regional Optimum Dedicated Outdoor Air System and Energy Consumption Characteristics.* Journal of Architectural Institute of Korea Planning & Design

In Referred Conference Proceedings

1. (Abstract accepted) H.Kim, I.Bilionis, P.Karava, *Classifying And Evaluating Thermostat Adjustment Behaviors In Smart And Connected Energy-aware Residential Communities,* 8th International High Performance Buildings Conference, West Lafayette, July 15-18, 2024
2. H. Kim, I. Bilionis, J. E. Braun, P. Karava, *Social energy games for smart and energy-efficient multi-unit residential building: mechanism design,* 2024 ASHRAE winter conference, Chicago, January 20-24.
3. H.Kim, *MySmartE – A software platform for smart and connected energy-aware residential communities,* 2023 Indiana Housing Conference, Indianapolis, September 26-27.
4. H. Kim, S. Ham, M. Promann, H. Devarapalli, V. Kwarteng, G. Bihani, T. Ringenberg, I. Bilionis, J. E. Braun, J. T. Rayz, P. Karava, *MySmartE - A cloud-based smart home energy application for energy-aware multi-unit residential buildings,* 2023 ASHRAE winter conference, Atlanta, February 4-8.
5. H. Kim, I. Bilionis, J. E. Braun, P. Karava (2022), *Human Decision Making in Smart and Connected Energy-aware Residential Communities,* INFORMS annual meeting, Indianapolis, October 15-19.
6. H. Kim, E. Choi, J. Jeong (2016) *Optimization of an Indirect Evaporative Cooler in Liquid Desiccant and Evaporative Cooling-assisted 100% Outdoor Air Systems.* Proceedings of the 3rd Asia conference of International Building Performance Simulation Association, Jeju, Korea, November 27-29
7. H. Kim, H. Dong, J. Jeong (2016) *Performance Evaluation of Two Cross Type Indirect Evaporative Air Coolers.* CLIMA 2016 - proceedings of the 12th REHVA World Congress, May 22-25, Aalborg, Denmark
8. H. Kim, S. Lee, J. Jeong (2015) *Comparison of Energy Performance in Dedicated Outdoor Air System (DOAS) and Desiccant-enhanced Evaporative air Conditioner (DEVAP),* Proceedings of the 13th Asia Pacific Conference on the Built Environment, Hongkong, November 19-20
9. H. Kim, S. Cho, J. Jeong (2015) *Applicability Analysis of Thermoelectric Cooling System in Dedicated Outdoor Air System.* Proceedings of the Autumn Annual Conference of the Korean Institute of Architectural Sustainable Environment and Building Systems, Korea, November
10. H. Kim, S. Lee, J. Jeong (2015) *Performance Comparison of the Dedicated Outdoor Air System and Desiccant-enhanced Evaporative Cooling system.* Proceedings of the Autumn Annual Conference of Architectural Institute of Korea, Korea, October
11. H. Kim, H. Dong, J. Jeong (2015) *Optimum Dedicated Outdoor Air system for Korea and Energy Consumption Characteristics.* conference of Architectural Institute of Korea, Korea, April

PRESENTATION

Workshop

1. H. Kim (2022) *Implementation of an Eco Feedback and Gaming Platform for Smart and Energy Aware Residential Communities.* FoBI workshop (Future of the Building Industry)

Posters

1. Poster presentation planned during 2024 Smart and Connected Communities PI meeting at Smart Cities Connect Conference & Expo, Nashville, TN, February 28-29.
2. H. Kim, *MySmartE - An eco-feedback and gaming platform for Energy-aware Residential Communities,* 2023 Behavior, Energy & Climate Change Conference, Sacramento, CA, November 12-15
3. H. Kim, P. Karava, *Evaluating Energy-aware Thermostatadjustment Behaviors in Smart and Connected Communities.* Presented at 2023 Herrick annual Industrial Advisory Committee meeting (IAC), October
4. H. Kim, Vanessa Kwarteng, P. Karava, J. E. Braun, I. Bilionis, *Human Decision Making in Smart and Connected Energy-aware Residential Communities.* Presented at 2022 Herrick annual IAC meeting, October
5. Presented a poster at 2022 Smart and Connected Communities PI meeting, Arlington, VA, October 10-12.
6. H. Kim, S. Ham, M. Promann, P. Karava, J. E. Braun, I. Bilionis, *Implementation of a Social Game with User-centric Eco-feedback in a Multi-family Residential Building.* Presented at the Virtual 2021 annual Herrick IAC meeting, October
7. Presented a poster at Virtual 2021 Smart and Connected Communities PI meeting, April 7-9
8. H. Kim, S. Ham, M. Promann, P. Karava, J. E. Braun, I. Bilionis, *User-centric Eco-feedback Design for Multi-family Residential Buildings*. Presented at 2019 Herrick annual IAC meeting, October
9. Presented a poster during 2019 Smart and Connected Communities PI meeting at Smart Cities Connect Conference & Expo, Denver, CO, April 1-3.
10. Presented a poster during 2018 Smart and Connected Communities PI meeting at Smart Cities Connect Conference & Expo, Kansas City, MO, March 26-27.

PARTICIPATION IN RESEARCH PROPOSAL PREPARATION

- **(Proposal Submitted)** *SCC-CIVIC-PG Track B: AI for Social Good*, National Science Foundation, PI: P. Karava. 2024
- **(Funded)** *Trask Innovation Fund: MySmartE – An eco-feedback and gaming platform for home energy management*, $25,000, Purdue University, PI: P. Karava. 2023
- **(Funded)** *SCC-IRG Track 1: Smart energy assistants for affordable housing communities*, $1.7M, National Science Foundation, PI: P. Karava. 2023
- **(Not funded)** *NSF Engines: Type-1: Great Lakes Regional Innovation Engine for Smart and Affordable Housing through Modularity*, National Science Foundation, PI: J. E. Braun. 2023
- **(Not funded)** *CHPB-RXX-2023: Incentive-based Distributed Resource Coordination in Connected Residential Communities,* Center for High Performance Buildings at Purdue University, PI: P. Karava. 2022
- **(Not funded)** *SCC-IRG Track 1: A sociotechnical decision-making platform to enable the decarbonization of affordable housing communities* National Science Foundation, PI: P. Karava. 2022
- **(Not funded)** *A Cloud-Based DER Coordination Platform to Enable Connected Residential Communities* U.S. DOE, PI: P. Karava 2021

TEACHING EXPERIENCE

Visiting Assistant Professor, Purdue University Aug. – Dec. 2023

CE413: Building Envelope Design and Thermal Loads (Fall 2023).

- Instructor (Undergraduate Course), Course development, Teaching (Lectures / Labs), Grading
- Covered basic thermal processes in buildings and presented comprehensive methods for thermal design of envelope assemblies in commercial and residential building.

Student Mentor, Purdue University 2017 – Present

- Mentored 5 Ph.D students in developing research plans, designing experiments, processing field data, conducting post-experiment interviews, and developing Hierarchical Bayesian models.

Student Mentor, Hanyang University 2015 – 2017

- Mentored 5 master's students in managing the test equipment, designing the experiments, managing software programs, and developing numerical models.

PROFESSIONAL SERVICES

Technical Reviewer for Refereed Journals

- Energy and Buildings Since 2015
- Building and Environment Since 2022
- Neural Networks Since 2023

Technical Reviewer for Conferences

- 7th International High Performance Buildings Conference at Purdue 2022
- 6th International High Performance Buildings Conference at Purdue 2021
- 2020 Building Performance Analysis Conference and SimBuild 2020

Conference Session Chair

- Session Chair, 7th International High Performance Buildings Conference, Purdue July. 2022
- Co- Chair, 5th International High Performance Buildings Conference, Purdue July. 2018

Outreach Activities, Ray W. Herrick Laboratories, Purdue University 2017 - 2022

- Served as a tour leader of research facilities
- Assisted with various visits and outreach activities such as Mechanical Engineering Recruitment, Industrial Advisory Committee, and International High Performance Building Conferences.

MEMBERSHIP

- American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), Associate member. 2015 - Present
- Korean Institute of Architectural Sustainable Environment and Building Systems, Member. 2015 - 2017
- Architectural Institute of Korea, Member. 2015 - 2017