

Dongjun Mah, Ph.D.

Assistant Professor
Department of Civil, Environmental & Architectural Engineering
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EDUCATION

Purdue University, IN, USA Aug. 2019 – Dec. 2024
Ph.D. in Civil and Construction Engineering (Architectural Engineering group)

- Dissertation: “*Inferring Personal Visual Preferences and Heat Gain Estimation in Buildings using HDRI and Deep Learning Techniques*”
- Academic advisor: Dr. Thanos (Athanasios) Tzempelikos

Purdue University, IN, USA Aug. 2017 – Aug. 2019
M.S. in Civil and Construction Engineering (Structural Engineering group, non-thesis)

- 1-year project: Modification of a finite element program for storage tanks
- Academic advisor: Dr. Sukru Guzey

Hanyang University, Seoul, Korea Mar. 2011 – Feb. 2017
B.S. in Architectural Engineering

RESEARCH AND TEACHING INTERESTS

- Privacy-preserving Smart Sensing and Control; Human-Building Interactions; Sustainable Buildings; Building Energy Efficiency; User-centered Building Automation; Grid-interactive Buildings
- Deep Learning; Reinforcement Learning; Advanced User-Interfaces
- Computer Vision; Pattern Recognition; Image Processing

PROFESSIONAL AND RESEARCH EXPERIENCE

University of Kansas, Lawrence, KS
Department of Civil, Environmental & Architectural Engineering
Assistant Professor Aug. 2026 – Present

Purdue University, West Lafayette, IN
Lyles School of Civil and Construction Engineering, Ray W. Herrick Laboratories

Postdoctoral Research Assistant Aug. 2025 – May. 2026

- Privacy-preserving real-time thermal load estimation in buildings using deep learning
 - Developed a privacy-preserving, low-cost sensing system that integrates a convolutional neural network (CNN)-based feature extractor with calibrated noise to achieve local differential privacy
 - Developed a Vision Transformer-based reasoning model for accurate building thermal load estimation for optimal HVAC operations while preserving occupant privacy
- Collaborative Research: The impact of daylighting on behavioral response of children with ASD: evidence and implementation strategies for improving learning environments (National Science Foundation, No. 2434194)
 - Evaluated fundamental relationships between daylight exposure, luminance distribution patterns, and behavioral responses of children with ASD using deep learning

Research Associate (Pre-Appointment Period) Jan. 2025 – Aug. 2025

- Conducted ongoing research with Dr. Tzempelikos prior to formal postdoctoral appointment
- Published one first-author and two co-authored journal papers
 - Supported manuscript revisions and project coordination within the research group
- Served as peer reviewer for Building and Environment

Research Assistant

Aug. 2019 – Dec. 2024

- Real-time estimation of internal and solar heat gains in buildings using deep learning
 - Developed a CNN-based multi-head classification model to estimate capture dynamic heat source patterns in an open-plan office
 - Evaluated model transferability to various office types to validate its practical applicability
 - Conducted real-time thermal load estimation using captured dynamic internal and solar heat gain patterns with an EnergyPlus model
- Inferring personal daylighting preferences using high dynamic range imaging (HDRI) and deep learning techniques
 - Developed a novel feature metric that quantifies both the direction and magnitude of daylight condition changes to enhance visual preference vote estimation
 - Evaluated effectiveness of the developed feature metric against deep learning models using conventional lighting parameters for daylighting preference classification
- A convolutional autoencoder (CAE)-based method for learning and ranking personal daylighting preference
 - Developed a CAE-based visual preference learning framework with an ordinal ranking concept to estimate the most preferred visual conditions as target environments for daylighting control
 - Evaluated the model's capability to recognize unseen input luminance patterns for updating and improving practical implementation under various daylight conditions

Lyles Teaching Assistant

Jan. 2020 – Dec. 2024

- CE 311: Architectural Engineering (24' Fall semester) - Design and analysis of buildings and their environmental system
 - Office hours, grading
- ME 539: Introduction to Scientific Machine Learning (22' Summer semester) - Introduction to data analytics techniques using Python
 - Office hours, grading
- CE 298: Basic Mechanics 2 (Dynamics) (22' Spring semester)
 - Quiz generation, office hours, grading, holding 1-hour review sessions before exams
- CE 211: Thermal & Energy Sciences for Civil Engineers (20' Fall, 21' Spring, 21' Fall semesters)
 - In-class discussion assistant, office hours, grading, holding 1-hour review sessions before exams

Research Assistant (during M.S.)

Jan. 2018 – Dec. 2018

- Frangible Roof Computer Program Update Phase 2: Technical and Visual Updates
 - Modified and updated a finite element program for storage tanks technically and visually using MFC (C++ object-oriented library)

Hanyang University, Seoul, Korea

Seismic Engineering & Structural Dynamics Lab

Undergraduate Research Assistant

Jul. 2016 – Jun. 2017

- Analyzed the inelastic displacement and collapse strength ratios of modified IMK bilinear SDF systems using the Opensees program
- Contributed to developing an analytical model in MATLAB for predicting the cyclic behavior of rectangular steel HSS braces

AWARDS & SCHOLARSHIP

Crooks Graduate Scholarship, Purdue University	Oct. 2022
Civil Engineering Grad Student Travel Awards, Purdue University	Sept. 2022
Best Student Paper Award 1 st place, 7th International High Performance Buildings Conference	Jul. 2022
Goldberg Fellowship, Purdue University	Jan. 2018

PUBLICATIONS

In Referred Journals

1. D. Mah, A. Tzempelikos (2026) *A Two-Stage Privacy-Preserving Framework for Occupancy and Internal Heat Gain Estimation in Buildings using Deep Learning*. Energy and Buildings
2. S. Lu, D. Mah, A. Tzempelikos (2025) *Non-invasive assessment of the visual environment using Conditional Generative Adversarial Networks*. Building and Environment
3. S. Lu, D. Mah, A. Tzempelikos (2025) *Toward AI-assisted, human-centered daylighting operation: Non-invasive daylighting preference evaluation using deep learning*. Building and Environment
4. D. Mah, A. Tzempelikos (2025) *A Convolutional Autoencoder-based method for learning and ranking personal daylighting preference*. Building and Environment
5. D. Mah, A. Tzempelikos (2024) *Real-Time Estimation of Internal and Solar Heat Gains in Buildings using Deep Learning*. Energy and Buildings
6. D. Mah, A. Tzempelikos (2024) *Inferring Personal Daylighting Preferences using HDRI and Deep Learning Techniques*. Building and Environment

In Referred Conference Proceedings

1. D. Mah, A. Tzempelikos (2026), *Privacy-Preserving Occupancy and Internal Heat Gains Detection using Deep Learning for Demand-Driven Building Control*, 9th International High Performance Buildings Conference, West Lafayette, Indiana, July 12-16, 2026
2. D. Mah, H. Cai, K.J. Kircher, A. Tzempelikos (2024), *Deep Learning-Based Quantification of Heat Gains and Impact on Building Energy Demand*, 8th International High Performance Buildings Conference, West Lafayette, Indiana, July 15-18, 2024
3. S. Lu, D. Mah, A. Tzempelikos (2024), *Enabling Human-Centered Daylighting Operation Using Non-Intrusive Luminance Monitoring And Deep Learning*, 8th International High Performance Buildings Conference, West Lafayette, Indiana, July 15-18, 2024
4. D. Mah, A. Tzempelikos (2024), *Predicting daylight preferences using HDRI and deep learning*, 6th Building Simulation Applications Conference, Bozen-Bolzano, Italy, June 26-28, 2024
5. D. Mah, A. Tzempelikos, K.J. Kircher (2024), *Real-Time Detection of Internal and Solar Gains Toward Demand-Driven Building Control Using Deep Learning*, 2024 ASHRAE winter conference, Chicago, January 20-24, 2024
6. D. Mah, J. Xiong, A. Tzempelikos (2022), *A Luminance-based Approach for Inferring Personal Daylight Preferences Using a New Composite Similarity Index*, 7th International High Performance Buildings Conference, West Lafayette, Indiana, July 10-14, 2022
7. D. Mah, M. Kim, A. Tzempelikos (2021) *Utilization of programmable cameras for web-based sensing and control of daylight in buildings*. CISBAT 2021 Carbon-neutral cities - energy efficiency and renewables in the digital era, EPFL Lausanne, Switzerland, September 8-10, 2021

PRESENTATION

Workshop

1. D. Mah (2023) *Inferring personal lighting preferences using HDR imaging and deep learning techniques*. FoBI workshop (2023 Building Performance Analysis Conference - ASHRAE), Austin, Texas, September 11-13, 2023

TEACHING EXPERIENCE

Student Mentor, Purdue University

2019 – May. 2026

- Mentored 3 Ph.D students in developing research plans, designing experiments, post-processing collected data, and developing deep learning models.

Teaching Assistant, Purdue University

2020 – 2022

- Held 3 official 1-hour review sessions each semester to review background knowledge and solve example problems for midterm and final exams.

Engineering Mathematics Tutor, Hanyang University

Aug. – Dec. 2016

- Mentored 5 undergraduate students in reviewing fundamental course concepts and preparing for quizzes and exams (received Best Engineering Mathematics Tutor Award)

PROFESSIONAL SERVICES

Technical Reviewer for Refereed Journals

- Building and Environment Since 2024
- Energy and Buildings Since 2026
- Measurement Since 2026

Technical Reviewer for Conferences

- 9th International High Performance Buildings Conference at Purdue 2026
- 8th International High Performance Buildings Conference at Purdue 2024
- 7th International High Performance Buildings Conference at Purdue 2022
- 6th International High Performance Buildings Conference at Purdue 2021

Conference Organizing Committee

- Vice-Chair, 7th International High Performance Buildings Conference at Purdue 2022

Conference Session Chair

- Session Chair, 9th International High Performance Buildings Conference, Purdue July. 2026

Conference Session Vice Chair

- Session Vice Chair, 8th International High Performance Buildings Conference, Purdue July. 2024
- Session Vice Chair, 7th International High Performance Buildings Conference, Purdue July. 2022

Outreach Activities, Ray W. Herrick Laboratories, Purdue University

2019 – 2024

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

MEMBERSHIP

- American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), Associate member. 2019 – Present