Aslihan Karatas-Fredenburg*, PhD, LEED AP

+1(734)277-6582 https://uicbeilab.github.io/ akaratas@uic.edu
***(she/her/hers)**

EDUCATION

University of Illinois Urbana-Champaign
Doctor of Philosophy in Civil and Environmental Engineering, May 2014
Dissertation Title: Optimizing the Sustainability of Single-Family Housing Units

University of Florida
Master of Science in Civil and Coastal Engineering, May 2009
Thesis Title: Survey of Supply Chain Management as Perceived by the US Construction Industry

Bogazici University
Bachelor of Science in Civil Engineering, Istanbul; Turkey, June 2007

ACADEMIC APPOINTMES

University of Illinois Chicago, Fall 2021 – present
Assistant Professor in Civil, Mat., & Env, Engineering Department
Principal Investiagor of Built Environment and Infrastructure Laboratory (BEI Lab)

Lawrence Technological University, Fall 2015 – Spring 2021
Assistant Professor in Civil and Architectural Engineering Department

University of Michigan, Aug 2014 – July 2015
Postdoctoral Research Fellow in Civil and Environmental Engineering Dept

Warsaw Technological University, June 2006 – Aug 2006
Undergrad Research Fellow in Civil Engineering Department

NON-ACADEMIC APPOINTMENTS

Walbridge Construction Company, May 2019 – Feb 2021
Project Controls Engineer at Scheduling Group
Research Analysts at Innovation & Improvement Leadership Group

LEADERSHIP EXPERIENCES

[1] ISEC-12 Conference Chair, August 2023 https://www.isec-society.org/ISEC_12/

[2] Judge for the Department of Energy (DOE) JUMP into STEM Program (August 2023- 2024)

[3] National Association of Women in Construction Foremost Leadership Award, 2019

[4] '*Thought Leaders Policy Conference and Black Caucus Foundation Michigan Briefing*', White House, DC, September 2016 (invited Panelist).

[5] President of Turkish Student Association at the University of Florida, 2008-2009

INVITED TALKS

[1] 'Digital Twin Technology for Measuring Thermal Bridging in Wall Systems', National Instituite of Building Science, Building Innovation Emerging Building Technology Series, Digital Twins, Dec 2024, National Harbor/MD (upcoming)

[2] 'Community-Driven, AI-Powered Thermal Imaging for Accessible Window Air Infiltration and Leakage Measurement', NSF CIVIC Forum, October 2024, Washington DC

[3] 'Understanding Air Leakage Through Windows Based on Households' Socio-economic Level', Georg Nemetschek Institute (GNI) Symposium, Sep 2024, Munich/Germany

[4] 'Climate Adaptation Strategies for Building Technology', Fraunhofer Institute for Building Physics, Sep 2024, Holzkirchen/Germany

[5] 'Advancements in Sustainable Building Science Technologies: Enhancing Climate Resilience and Adaptation Strategies in Built Environment', Distinguished Women Researchers in the Built Environment – Purdue University President's Seminar Series, March 2024

[6] 'Disaster Management Plan for Aftermath of Eartquakes', Istanbul Aydin University, May 2023

[7] 'Building Technology and Science", Oak Ridge National Laboratory, Dec 2022, Oak Ridge /TN

[8] 'Sustainability, Efficiency, and Workforce Development in Construction', University of Washington Tacoma, College of Engineering Seminar, April 2021.

[9] 'Critical Path Method (CPM) in Scheduling Construction Projects'. UIC Civil, Materials, & Environ Engineering Seminar, March 2021.

[10] 'Sustainability, Efficiency, and Workforce Development in Construction', Eastern Michigan University, Department of Engineering Seminar, February 2021.

[11] 'Integrated Conceptual Framework for Reducing Hotel Guest Energy Consumption'. Seventeenth International Conference on Environmental, Cultural, Economic & Social Sustainability, Amsterdam, Netherlands, 2021.

[12] 'Sustainability and Efficiency in Construction Industry', Jefferson University, Dep. of Construction Management Seminar, January 2021.

[13] 'Maximizing the Sustainability of Residential Units', Bowling Green State Unv, Dep. of Construction Management Seminar, April 2019, Bowling Green/OH.

[14] 'Maximizing the Sustainability of Residential Units', George Mason University, Department of Civil and Environmental Engineering Seminar, March 2018, Fairfax/VA

[15] 'Accelerating Women's Workforce in Construction Industry', BUILD Initiative Annual Graduation Ceremony. July 2016, July 2017, July 2018, July 2019, Southfield/MI,

[16] 'Maximizing Sustainability in Residential Houses', SEDAC Seminars, May 2014, Urbana/IL

[17] 'A Pathway to Green Cities: Evaluating Sustainability for Urban Neighborhoods'. IIE Annual Conference and Expo. May 2013, Puerto Rico

[18] 'Evaluating and Quantifying Sustainable Development for Urban Neighborhoods'. International Conference on Sustainable Design and Construction. Fort Worth/TX. Nov 2012.

[19] NSF Workshop for Sciences behind Sustainability Quantification for Building and Infrastructure Design, Engineering and Construction (S2QBIDEC) (invited Panelist) Fort Worth/TX. Nov 2012.

JOURNAL PUBLICATIONS

[1] Palani, H., & **Karatas, A.** (2025) Digital Twin Platform for Evaluating Thermal Bridging Effects on Aggregate Thermal Performance of Prefabricated Wall Panel Systems*, Applied Thermal Engineering* (under review).

[2] Palani, H., West, J., Bhandari, M, & **Karatas, A.** (2025) Data-Driven Study on Measuring the Role of Windows in Residential Buildings' Air Leakage, *Energy & Buildings* (under review)

[3] Khaleghi, H., Ozevin, D., & **Karatas, A**. (2025). Non-Destructive Argon Concentration Assessment within Insulating Glass Units (IGUs) using Ultrasonic Technique, *ASCE Journal of Architectural Engineering* (under review).

[4] Khaleghi, H., Parisa S., Xu, C., Ozevin, D., & **Karatas, A**. (2025). Quantifying Argon Concentration within Insulating Glass Units using Low Frequency Ultrasonic Technique, *Measurements* (under review).

[5] Khaleghi, H., & **Karatas, A**. (2024). Assessing the Dynamic Thermal Performance of Prefabricated Wall Panels in Extreme Hot Weather Conditions. *Journal of Building Engineering*, 108351.

[6] Palani, H., & **Karatas, A.** (2024). Investigating the Disparities between Experimental and Computational Analyses of Thermal Performance in Prefabricated Wall Panels. *Applied Thermal Engineering*, 121568.

[7] Samardzic, N., Best, V., Hammond, C., **Karatas, A.**, Esmaeili, B., & Sarsam, H. (2024). Construction Site Noise Exposure Assessment Using Binaural Measurements and Analysis. *Safety*, *10*(4), 92.

[8] Palani, H., Acosta, J. G., **Karatas, A.**, & Derrible, S. (2023). The Role of Socio-Demographic and Economic Characteristics on Energy-Related Occupant Behavior. *Journal of Building Eng*, 106875.

[9] Palani, H., & **Karatas, A.** (2023). Innovative Environmental Chamber Construction for Accurate Thermal Performance Evaluation of Building Envelopes in Varied Climates. *Buildings*, 13(5), 1259.

[10] Acosta, J. G., Palani, H., Movahedi, A., **Karatas, A.**, & Derrible, S. (2023). Residential Electricity Consumption Patterns and their Relationship to Commute Times by Mode. *Findings*.

[11] Rener, A., **Karatas, A.**, & Videan, B. (2022). Innovative Design and Execution Model for Improving Productivity of Interior Prefabricated Commercial Wall Assemblies. *Buildings*, 13(1), 68.

[12] Palani, H., & **Karatas, A.** (2022). Holistic Approach for Reducing Occupants' Energy Consumption in Hotel Buildings. *Journal of Cleaner Production*, 365, 132679.

[13] Palani, H., & **Karatas, A.** (2021). "Identifying Energy-Use Behavior and Energy-Use Profiles of Hotel Guests". *Applied Sciences*, 11(13), 6093.

[14] Li, Da, Carol C. Menassa, and **Karatas, A.** (2017) "Energy Use Behaviors in Buildings: Towards an İntegrated Conceptual Framework." *Energy Research & Social Science* 23: 97-112.

[15] **Karatas, A.** & El-Rayes, K. (2016) "Optimal Tradeoffs between Housing Cost and Environmental Performance." *Journal of Architectural Engineering*, 04015018.

[16] **Karatas, A.**, Stoiko, A., & Menassa, C. C. (2016). "Framework for Selecting Occupancy-Focused Energy İnterventions in Buildings". *Building Research & Information*, *44*(5-6), 535-551

[17] **Karatas, A.,** & El-Rayes, K. (2015). "Evaluating the Performance of Sustainable Development in Urban Neighborhoods Based on the Feedback of Multiple Stakeholders". *Sustainable Cities and Society*, *14*, 374-382.

[18] **Karatas, A.** & El-Rayes, K. (2015) "Optimizing Tradeoffs among Housing Sustainability Objectives", Automation in Construction, Elsevier 53: 83-94.

[19] **Karatas, A.**, & El-Rayes, K. (2015). "Parallel Computing Framework for Optimizing Environmental and Economic Performances of Housing Units". *Journal of Computing in Civil Engineering*, 04015026.

[20] **Karatas, A.**, & El-Rayes, K. (2014) "Optimal Trade-Offs between Social Quality of Life and Life-Cycle Cost in Housing Units". *Journal of Construction Engineering and Management* 140.12.

BOOK CHAPTERS

[1] Alsharif S., **Karatas, A.**, "Data-Driven Approach For Improving Schedule and Cost Estimation of Nuclear Power Plant Projects", *Nuclear Power Plants: Recent Progress and Future Directions*. Nova Science Publiswea, 2022. ISBN: 978-1-68507-686-3

[2] **Karatas, A.**, Stoiko, A., & Menassa, C. C.. "Framework for Selecting Occupancy-Focused Energy İnterventions in Buildings", *Building Governance and Climate Change*, 2019. 535-551.

[3] **Karatas, A.**, Stoiko, A., & Menassa, C. C.. "A Framework to Achieve Large Scale Energy Savings for Building Stocks through Targeted Occupancy Interventions: Foundations, Principles, and Applications." *Smart Cities: Foundations, Principles, and Applications*. John Wiley & Sons, 2017. doi: 10.1002/9781119226444.ch17.

PEER-REVIEWED CONFERENCE PUBLICATIONS

[1] Shuaiang, R., Hamdan, E., Khaleghi, H. **Karatas, A.**, and Cetin E. (2025) "Air Leak Detection Using Sobel-Enhanced YOLO Algorithm from Infrared Images", The IEEE International Symposium on Circuits and Systems (IEEE ISCAS 2025), (under review).

[2] Salehi, P., & **Karatas, A.**, (2025) "Towards to Climate Change Adaptive Whole Building Energy Simulation Models", ASHRAE 2025 Winter Conference, (accepted).

[3] Khaleghi, H., Salehi, P., Ozevin D., & **Karatas, A.**, (2025) "Nondestructive Assessment for Detection and Classification of Low-E Coatings on Insulating Glass Units", CIB World Building Congress (accepted).

[4] Palani, H., Salonvaara, M., & **Karatas, A.**, (2025) "Improving Thermal Performance of Prefabricated Wall Systems by Minimizing Thermal Bridging of Steel Brackets and Connectors with Minimal Investment Cost", ASHRAE 2025 Winter Conference, (accepted).

[5] Palani, H., T. Vo, & **Karatas, A.** (2025) "A Review of the State-of-the-Art of Rainscreen Cladding Performance in Residential Building Walls", CIB World Building Congress (accepted).

[6] Palani, H. and **Karatas, A.**, and Taylor T. (2024) "Cost-Effective Hot Box Apparatus to Measure Thermal Performance of Building Envelopes", Construction Research Congress 2024, (pp. 739-747).

[7] Khaleghi, H. and **Karatas, A.**, (2024) "An Experimental Framework to Measure Dynamic Thermal Resilience of Wall Panels under Extreme Weather Conditions". Construction Research Congress 2024 (pp. 327-335).

[8] Luna H., Palani, H., and **Karatas, A.**, (2023) "Cost-Effective, Scalable and User-Friendly Temperature Control System for Measuring Thermal Performance of Building Envelope Systems in Environmental Chambers", I3 Computing in Civil Engineering (pp. 815-823).

[9] Khaleghi, H. and **Karatas, A.**, (2023) "Arctic Architectures: Unleashing Energy Efficiency and Resilience in Extreme Cold Regions". Proceedings of International Structural Engineering & Construction, 10(1).

[10] Palani, H., Acosta J, Derrible, S., and **Karatas, A.**, (2023) "Predicting Energy Use Intensity of Us Hotel Buildings Using CBECS Microdata". Proceedings of International Structural Engineering & Construction, 10, 1-6.

[11] Rener, A., **Karatas, A.**, and Cole, Matt, (2022) "Innovative Model for Forecasting Trailer Usage for Prefabricated Exterior Wall Panels", ISARC 2022, Bogota, Colombia.

[12] Palani, H., Acosta J., **Karatas, A.**, and Derrible, S. (2022) "Understanding the Interrelationship between Energy-Use Behavior and Socio-Demographic Profile", ITISE-2022, Gran Canaria, Spain

[13] Palani, H. and **Karatas, A.**, (2022) "Integrated Energy-Use Model to Identify Energy-Use Profile of Hotel Guests", Computing in Civil Engineering Orlando, FL, 688-695

[14] Palani, H. and **Karatas, A.**, (2021) "Identifying Energy Use Behaviors of Hotel Guests", *CSCE 2021*.

[15] **Karatas, A.**, & Al-Sharif, S., (2020). Schedule and Cost Forecasting Model for Nuclear Power Plant Projects. In Construction Research Congress 2020: Project Management and Controls, Materials, and Contracts (pp. 721-729). Reston, VA: American Society of Civil Engineers.

[16] Palani, H. and **Karatas, A.**, (2020) "Reducing Occupants Energy Consumptions in Hotel Buildings" *Building Performance Analysis Conference and SimBuild*, *ASHRAE and IBPSA-USA.*

[17] Albayati A. and **Karatas, A.** (2019) "Fall Prevention Supplementary Devices for Bridge Construction Workers: A Life Cycle Cost Analysis", *Proceedings of the Canadian Society for Civil Engineering International Construction Specialty Conference (ICSC'19)*, Montreal, Canada.

[18] Staple N. and **Karatas, A.** (2019) "A Study of the U.S. Roofing Industry and its Workforce", *Proceedings of the Canadian Society for Civil Engineering International Construction Specialty Conference (ICSC'19)*, Montreal, Canada.

[19] Alwerfalli, D., **Karatas, A.**, & Alshammari, M. (2017). "Application of quality management systems (QMS) in construction industry". *In Proceedings of the International Conference on Industrial Engineering and Operations Management* (p. 46).

[20] Alsharif, S. and **Karatas, A**. "A Framework for Identifying Causal Factors of Delay in Nuclear Power Plant Projects." *Procedia Engineering* 145 (2016): 1486-1492.

[21] **Karatas, A**, Carol C. Menassa, and Allisandra Stoiko. (2015)"A Framework for Delivering Targeted Occupancy Interventions to Reduce Energy Usage in Buildings." *Procedia Engineering* 118.

[22] **Karatas, A.**, and El-Rayes, K. (2014) 'Optimal Configurations of Design and Construction Decisions for Maximizing Social Quality-of-Life for Housing Residents'. Construction Research Congress (CRC) 2014: pp. 436-443. doi: 10.1061/9780784413517.045.

[23] **Karatas, A.**, and El-Rayes, K. (2014) "Maximizing Occupants Comfort in Affordable Housing Units." *Computing in Civil and Building Engineering* pp. 2040-2046). ASCE. doi: 10.1061/9780784413616.253.

[24] **Karatas, A.** and El-Rayes, K. (2012) 'Evaluating and Quantifying Sustainable Development in Urban Neighborhoods' ICSDEC 2012: pp. 214-221. doi: 10.1061/9780784412688.025.

GRANTS

[1] NSF, Role: Principal Investigator (PI), *"CIVIC-PG Stage-1 Track B: Community-Driven, AI-Powered Thermal Imaging for Accessible Window Air Infiltration and Leakage Measurement"*, **Ongoing** October 2024-April 2025 (Budget: $74,996), With Co-PIs: Enis Cetin, Lauryn Spearing, Lucio Soibelman, Yu Hu; Community Partners: Pilsen Neighorhood Community Council, Rebuilding Together Metro Chicago, Alivio Medical Center

[2] NSF, Role: Principal Investigator (PI), *"CIVIC-PG Stage-2 Track B: Community-Driven, AI-Powered Thermal Imaging for Accessible Window Air Infiltration and Leakage Measurement"*, **Under Preparation** will be submitted in Feb 2025 (Budget: $1M), With Co-PIs: Enis Cetin, Lauryn Spearing, Lucio Soibelman, Yu Hu; Community Partners: Pilsen Neighorhood Community Council, Rebuilding Together Metro Chicago, Alivio Medical Center, Hispanic Health Coalition Center

[3] HUD, Role: Principal Investigator (PI), *"Advancing Urban Resilience: The MoldMap Development for Predictive Risk Assessment in Low-Income Neighborhoods"*, **Ongoing** September 2024-2007 (Budget: $998,764). With Co-PIs: Michael Cailas, Andrew Foell, Apostolis Samabanis.

[4] STO Corp., Role: Principal Investigator (PI), *"Analyzing the Thermal Performance of Prefab Walls with Automated Thermal Imaging Process"*, **Ongoing** Dec 2023-2024 (Budget: $24,000), With Co-PI: Cetin

[5] DOE/ORNL, Role: Principal Investigator (sole-PI), *"Finding the Impact of Window Replacement on Houlseholds' Air Leakage"*, **Ongoing** Aug 2023-2025 (Budget: $72,950).

[6] STO Corp., Role: Principal Investigator (Sole-PI), *"Comparing the Thermal Performances of Joints on Prefab Walls and Precast Walls"*, **Ongoing** Aug 2023-Feb 2025 (Budget: $199,550).

[7] Tisue Bank Asbestos Research Charitable Trust (TBAR), Role: Principal Investigator (PI), *"Synthesizing Current Challenges in Aging Infrastructure for Mechanical Heat and Frost Insulation Workforce"*, **Ongoing** April 2024-2025 (Budget: $61,996). With Co-PIs: Sogand Hasanzadeh, Behzad Esmaeili.

[8] NSF, Role: Senior Personnel, *Removing the Disparity in Success-Related Outcomes Between Academically Talented Low-Income Engineering Students and Other Engineering Students"*, **Ongoing**), June 2024-2027 (Project Budget: $2.5M). With PI/Co-PIs: Houshang Darabi, Pete Nelson, Betul Bilgin, Shanon Reckinger, Renata A. Alonso, Miiri Kotche.

[9] STO Corp., Role: Principal Investigator (sole-PI), *"Comparing Actual and Theoretical Environmental Performances of Prefab Wall Assemblies"*, **Completed** April 2022-Dec 2023 (Budget: $212,000).

[10] UIC Covid Relief Funding, Role: Principal Investigator (sole-PI), "*Investigating Hygrothermal Performance in Building Walls Engineered for Extreme Cold Climate Environments"*, **Completed** Aug 2023-2024 (Budget: $15,000).

[11] UIC Teaching Sustainability Initiative, "Developing a Module for CME 481 Sustainable Construction Course, **Completed** (Amount: $1,000)

[12] 2023 ASCE Remote ExCEEd Teaching Workshop Scholarship, **Completed** July 18-27 2023 (Amount: $500)

[13] CPWR, Role: Co- Investigator (Co-PI), *"Improving the Assessment of Noise Exposure and Warning Signal Audibility on Construction Sites"*, **Completed** Aug 21-Feb 2023 (Budget: $25,000; Co-PI Budget: $5,000). With Nikolina Samardzic (PI) and Behzad Esmaeili (Co-PI).

[14] Centrepolis Accelerator, Role: Principal Investigator (PI), *IEQ-EP: Indoor Environmental Quality and Energy Performance System for Buildings*, **Completed**. Jan 2021- April 2021 (Budget - $2,000).

[15] Kern Family Foundation (KEEN) *Foundation Course Module Development Grant*, **Completed** in 2017 (Amount:- $3,000).

[16] Kern Family Foundation (KEEN) *Foundation PBL/ACL Development*, **Completed** in 2016 (Amount - $2,000).

[17] LTU Presidential Undergrad. Research Award. Role: PI, *"Identifying Effective Occupancy Interventions to Reduce Energy in Commercial Buildings"*, **Completed** in 2016 (Budget -$1,000).

PROFESSIONAL REGISTRATIONS, MEMBERSHIPS, HONORS, AWARDS

- UIC Chris Burke Teaching Award, October 2024
- LEED Accredited Professional (AP), Credential ID: #10773918-AP-BD+C
- Certificate for Excellence in Sustainable Management and Technology, UIUC Dept. of Business Administration

- Professional Memberships:
  - National Associate of Women in Construction (NAWIC)
  - US Green Building Council (USGBC), Member
  - ASCE Associate Member
  - ASHRAE
- W. E. O'Neil Construction Company Fellowship Award, 2014 ($50,000).

PROFESSIONAL and ACADEMIC SERVICES

- Editor for the Proceedings of International Structural Engineering and Construction, Innovative Theory and Practices in Structural Engineering and Construction, Volume 10, Issue 1 (August 2023)
- Department of Energy (DOE) JUMP into STEM Program Professor Team Member, Aug 2022 - 2025
- UIC, Advancing Racial Equity - Strategic Planning Committee Member, 2021- present
- UIC, Office Furniture Subcommitte Member, 2023 – present
- Lawrence Technological University Faculty Senate Member, 2017-2020
- Lawrence Technological University Campus Affairs Committee Chair, 2018-2019
- NSF Panel Reviewer
- Journal Paper and Book Reviewer:
  - Oxford Press
  - Construction Research Conference (CRC)
  - Journal of Computing in Civil Engineering
  - Journal of Construction Eng. & Management
  - Journal of Energy & Buildings
  - Journal of Infrastructure Systems
  - Buildings
  - Energies
- THE BUILD INITIATIVE Academic Advisor and Advisory Board Member, 2015- 2021
- Conference Technical Session Chair:
  - The 39th International Symposium on Automation and Robotics in Construction, 18-22 July 2022, Bogota, Colombia.
  - International Conference Time Series and Forecasting, 12-14 June 2022, Gran Canaria, Spain.
  - International Conference on Sustainable Design Eng. and Cons., 18-20 May 2016, Tempe AZ.
  - Technical Session Chair, International Conference CSCE on Sustainable Design Engineering and Construction, June 2019, Montreal, Canada.

COURSES TAUGHT

- UIC Course from Fall 2021-Ongoing
  CME 112 Evolution of Infrastructure
  CME 201 Statics
  CME 481 Decision Making and Risk Management in Construction
  CME 488 Sustainable Construction
  CME 587 Construction Estimating and Scheduling
  CME 594 Pre-Construction and Contract Administration