

# RAHMAN AZARI

---

Associate Professor  
Founding Director, RE<sup>2</sup> Lab  
College of Arts & Architecture  
Institutes of Energy and the Environment  
Pennsylvania State University

230 Stuckeman Family Building  
University Park, PA 16802  
[razari@psu.edu](mailto:razari@psu.edu)  
<https://sites.psu.edu/re2lab/>  
<https://arts.psu.edu/faculty/rahman-azari/>

---

## RESEARCH AREAS

Innovative materials for energy production and carbon sequestration  
Assessment of life cycle environmental impacts of buildings  
Operational and embodied carbon efficiency

## EDUCATION

2008-2013 Ph.D. in *Built Environment (Sustainability)*  
University of Washington, Seattle, WA

1996 – 2002 Master of *Architecture*  
Sahand University of Technology, Iran

## ACADEMIC APPOINTMENTS

2020-present Associate Professor, Architecture  
Pennsylvania State University, University Park, PA

2017-2020 Assistant Professor, Building Technology  
Illinois Institute of Technology (IIT), Chicago, IL

2013-2017 Assistant Professor, Building Technology  
University of Texas San Antonio, San Antonio, TX

2008-2013 Pre-doctoral Teaching/Research Associate  
University of Washington, Seattle, WA

2007-2008 Adjunct Professor, Architecture  
Department of Architecture, University of Kashan, Iran

2005-2007 Lecturer, Architecture  
Department of Architecture, I.A. University of Tabriz, Iran

## ADMINISTRATIVE

01.2018 – 06.2019 Interim Director of Architecture PhD Program  
Illinois Institute of Technology (IIT), Chicago, IL

06.2016 – 05.2017 Graduate Advisor of Record  
Department of Architecture, University of Texas San Antonio, San Antonio, TX

## TEACHING

Penn State ARC 431/491/536 High-Performance Building design studio (undergraduate/graduate, required)

IIT ARCH 602 Crafting a Dissertation (doctoral, required)  
ARCH 601 Doctoral Methodology (doctoral, required)  
ARCH 403/404 Environment and Building Systems (undergraduate students, required)

University of Texas  
San Antonio ARC 6973 Computational Lighting (graduate, elective)  
ARC 6136 High-Performance Design Studio (graduate, elective)  
ARC 5773 Environmental Life-cycle Assessment (graduate, elective)  
ARC 4183/5953 Environmental Systems (undergraduate, required)  
ARC 2233/5943 Principles of Environmental Systems (undergraduate, required)  
ARC 1223 Design II (undergraduate, required)

## AWARDS

Recognized as a 2019 'Researcher to Know' by the Illinois Science and Technology Coalition.  
Best Research Development Hackathon Award, NSF-funded WAFES workshop, 2019  
Faculty co-sponsor to COTE Top Ten student awards by AIA & AGSA in 2016 and 2017  
Co-instructor in the 'New Housing Models' studio accepted into *Architecture 2030 Curriculum Project* (2016).  
College nominee for *President's Distinguished Achievement Award – Teaching Excellence*, UT San Antonio, 2017  
*Dean's Outstanding Teaching Award*, College of Architecture, Construction and Planning, UT San Antonio, 2016  
*ASC Travel Grant*, Associated Schools of Construction, 2013  
*SBSE Scholarship*, Society of Building Science Educators, 2012  
*Fellowship*, University of Washington, total \$24,000 (tuition-waiver, monthly stipend), 2008-2009  
*Jeffery Cook Memorial Scholarship*, Society of Building Science Educators, 2007

## PATENT

Artificial Leaf-based Facade Cladding (ALFC) system for energy production and carbon sequestration; International Publication Number: WO 2020/005483 A1  
Co-inventors: Rahman Azari, Mohammad Asadi

## FUNDED RESEARCH

- 2020 [1] **AMERICAN INSTITUTE OF ARCHITECTS** (AIA Upjohn Grant) & Penn State  
*Evaluation of Thermal and Energy Generation Performance of Artificial Leaf-based Facade Cladding (ALFC) systems*  
Role: Lead PI; Value: \$50,000; Other PI: M. Asadi (IIT)
- 2019 [2] **AMERICAN INSTITUTE OF ARCHITECTS** (AIA Upjohn Grant) & IIT  
*Development of Artificial Leaf-based Facade Cladding (ALFC) systems for energy production and carbon sequestration*  
Role: Lead PI; Value: \$50,000; Other PI: M. Asadi (IIT); Collaborator: F. Pour (HOK)
- 2018 [3] **COUNCIL FOR TALL BUILDING AND URBAN HABITATS** (CTBUH)  
*Curtain wall facade for water collection on tall buildings.*  
Role: PI; Value: \$20,000 (student grant); Student researchers: J. Pinto, A. Maradni, J. Paul
- 2018 [4] **AMERICAN INSTITUTE OF ARCHITECTS**  
*Research Partnership with AIA in Design and Health Research*  
Role: PI; Co-PIs: Brent Stephens (IIT), Nicole Ditchman (IIT)
- 2015 – 2016 [5] **UNIVERSITY OF TEXAS SAN ANTONIO** INTRA SEED GRANT  
*Benchmarking of Environmental Impacts of Buildings*  
Role: PI; Value: \$5,000
- 2014 – 2015 [6] **UNIVERSITY OF TEXAS SAN ANTONIO** INTRA SEED GRANT  
*STEM Principles Implementation in Building Technology Education*  
Role: Co-PI; Value: \$5,000; PI: Saadet Beeson (UTSA)
- 2013 – 2015 [7] **UNIVERSITY OF TEXAS SAN ANTONIO** QLP PROGRAM  
*Redesigning ARC4183 for Improved Quantitative Literacy*  
Role: Co-PI; Value: \$15,000; PI: Hazem Rashed-Ali (UTSA), Co-PI: Saadet Beeson (UTSA)
- 2013 [8] **OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)**  
*Training of Construction Workers for Fall Fatality*  
Role: Research Associate; PIs: Giovanni Migliaccio, Ken-Yu Lin. Univ. of Washington
- 2012 – 2013 [9] **SKANSKA USA BUILDING**  
*Modular Prefabricated Mid-rise Buildings*  
Role: Research Lead; PIs: Carrie Dossick, Kate Simonen, Omar Al-Anwar. Univ. of Washington
- 2012 – 2013 [10] **AIA AND GENERAL SERVICES ADMINISTRATION**  
*Integration at its Finest: Success in High-Performance Building Design and Project Delivery in the Federal Sector*  
Role: Pre-doctoral Research Associate; PIs: R. Cheng (Univ. of Minnesota), Consultant: Carrie Dossick (Univ. of Washington)
- 2012 – 2013 [11] **NATIONAL SCIENCE FOUNDATION**  
*Cyber-enabled Global Research Infrastructure for Design Networks.*  
Role: Pre-doctoral Research Associate; PIs: Carrie Dossick (Univ. of Washington), John Taylor

(Virginia Tech)

2010 – 2012

[12] **CONSTRUCTION INDUSTRY INSTITUTE**

*Innovative Project Delivery Paradigm*

Role: Pre-doctoral Research Associate; PIs: Yong-Woo Kim (Univ. of Washington), Glenn Ballard (UC Berkeley)

2010

[13] **UNIVERSITY OF WASHINGTON**

*Next City Project*

Role: Pre-doctoral Research Associate; PIs: Dean Daniel Friedman and Dr. Margaret O'Mara

## JOURNAL EDITORIAL

Guest Co-editor, Journal of Energy and Buildings' Special Issue on Embodied Energy and Carbon Efficiency, 2017-2018

## JOURNAL ARTICLES

- [1] Mahdavinejad, M., Talaei, M., **Azari, R.** (2020). Thermal and Energy performance of Algae Bioreactive Façades: A review. *Journal of Building Engineering* (28).
- [2] **Azari, R.** et al. (2018). Embodied energy of buildings; a review of data, methods, challenges and research trends. *Energy and Buildings* 168, pp. 225-235.
- [3] Lin, K.Y., Lee, W., **Azari, R.**, Migliaccio, G. (2018). Training of Low-Literacy and Low-English-Proficiency Hispanic Workers on Construction Fall Fatality, *ASCE Journal of Management in Engineering* 34(2). 10.1061/(ASCE)ME.1943-5479.0000573
- [4] **Azari, R.**, Garshasbi, S., Amini, P., Rashed-Ali, H., Mohammadi, Y. (2016). Multi- objective optimization of building envelope design for environmental performance. *Energy and Buildings* 126. pp.524-534.
- [5] **Azari, R.**, Kim, Y. (2016). An integration evaluation framework for integrated design teams of green projects: development and validation. *ASCE Journal of Management in Engineering* 32(3), 10.1061/(ASCE)ME.1943-5479.0000416, 04015053
- [6] **Azari, R.** (2014). Integrated energy and environmental life cycle assessment of office building envelopes. *Energy and Buildings* 82, pp.156-162.
- [7] Dossick, C., Anderson, A., **Azari, R.**, Taylor, J. (2014). Messy talk in virtual teams; achieving knowledge synthesis through shared visualization. *ASCE Journal of Management in Engineering*. 31(1). DOI: 10.1061/(ASCE)ME. 1943-5479.0000301, A4014003
- [8] Kim, Y., **Azari, R.**, Yi, J.S., Bae, J. (2013). Environmental impact comparison of onsite vs. prefab-JIT rebar supply systems. *Journal of Civil Engineering and Management*, 19(5), pp. 647-655.
- [9] **Azari, R.**, Kim, Y. (2012). Comparative assessment of environmental life cycle impacts of curtain wall mullions. *Building and Environment*, 48(2), pp. 135-145.

## BOOK CHAPTERS

- [10] **Azari, R.** (2019). Life-Cycle Energy Consumption in Buildings; Embodied + Operational. In: V. Tam and K.N. Le (Eds.), *Sustainable Construction Technologies: Life-Cycle Assessment*; Elsevier Science Ltd.
- [11] **Azari, R.**, Singery, M. (2013). Sustainable buildings and relationship with humans and nature. In: A. Sayigh (Eds.), *Sustainability, Energy and Architecture*; Elsevier Science Ltd.

## PEER-REVIEWED CONFERENCE PAPERS

- [12] Khan, Z., **Azari, R.**, Stephens, B. (2020). Outdoor thermal comfort in human interaction-based studies; a review. Building Performance Analysis and SimBuild Conference, Chicago, IL.
- [13] **Azari, R.**, Palomera-Arias, R. (2019). Environmental and economic implications of building envelope design. Architectural Research Centers Consortium (ARCC) Conference, Toronto, May 29-June 1.
- [14] **Azari, R.**, Caine, I. (2017). Applying performative tools in the academic design studio: a systemic pedagogical approach, Architectural Research Centers Consortium (ARCC) Conference Proceedings, pp. 38-46.
- [15] Beeson, S., **Azari, R.** (2016). STEM Principle Implementation in Building Technology Education in Texas Universities. International Conference on Structures and Architecture Proceedings. pp. 919-926.
- [16] Kim, Y., **Azari, R.**, Angeley, J. (2016). Benchmarking Tool for Integrated Design Process. International Group for Lean Construction Conference, Boston, July 20-22.
- [17] **Azari, R.**, Garshasbi, S., Mohammadi, Y., Amini, P., Rashed-Ali, H. (2015). Optimization of an

- office building envelope for environmental impact minimization. 5<sup>th</sup> International Construction Specialty Conference. Vancouver, June 8-10.
- [18] **Azari, R.**, Farahbakhsh, E. (2015). Energy efficiency through building envelope in high-rise buildings. 2<sup>nd</sup> International Sustainable Building Symposium. Turkey. May 28-30.
- [19] **Azari, R.**, Palomera-Arias, R. (2015). Building envelopes; a comparison of impacts on the environment. 2015 ASCE Architectural Engineering Institute Conference (Milwaukee) Proceedings, pp. 230-236.
- [20] Palomera-Arias, R., **Azari, R.** (2014). Thermal performance analysis of un-insulated and owner insulated masonry residential buildings in northwestern Mexico using state-space simulation and lumped parameter modeling. 2014 World Sustainable Building Conference, Barcelona, Oct. 28-30.
- [21] **Azari, R.**, Kim, Y. (2014). Development and validation of a framework for evaluation of integrated design teams of sustainable high-performance buildings. Proceedings of 2014 Construction Research Congress (Atlanta), pp. 584-593.
- [22] Anderson, A., Dossick, C., **Azari, R.**, Taylor, J. (2014). Exploring BIMs as avatars: using 3D virtual worlds to improve collaboration with models. Proceedings of Construction Research Congress (Atlanta), pp. 179-188.
- [23] **Azari, R.**, Kim, Y., Ballard, G., Cho, S. (2014). Starting from scratch: new project delivery paradigms. Proceedings of 2014 Construction Research Congress (Atlanta), pp. 2276-2285.
- [24] **Azari, R.**, Kim, Y. (2013). Evaluation of integrated design process of high-performance green buildings. 49<sup>th</sup> ASC Annual International Conference Proceedings, California, US, April 9-13.
- [25] Dossick, C., **Azari, R.**, Kim, Y., El-Anwar, O. (2013). IPD in practice: sustaining collaboration in healthcare design and construction. Proceedings of ASCE Architectural Engineering Institute conference, pp. 377-386.
- [26] **Azari, R.**, Pena, R. (2012). Integrated design to achieve net-zero energy in an urban office building, American Solar Energy Society (ASES) and World Renewable Energy Forum (WREF) 2012 conference, Denver, Colorado, May 13-17.
- [27] **Azari, R.**, Kim, Y. (2012). A comparative study on environmental life-cycle impacts of curtain walls. Proceedings of 2012 Construction Research Congress, 1610-1619.
- [28] Lin, K., Migliaccio, G., **Azari, R.**, et al (2012). 3D safety training materials on fall-related hazards for limited English proficiency and low literacy construction workers. Proceedings of ASCE Computing in Civil Engineering Conference, pp. 113-120.
- [29] **Azari, R.**, Ballard, G., Cho, S., Kim, Y. (2011). A dream of ideal project delivery systems, Proceedings of ASCE Architectural Engineering Conference, pp. 427-436.
- [30] Cho, S., Ballard, G., **Azari, R.**, Kim, Y. (2011). Development of innovative project delivery systems for healthcare projects, Proceedings of International Public Procurement Conference, South Korea, August.

## RESEARCH REPORTS

- [31] **Azari, R.**, Asadi, M. (2020). Evaluation of Thermal and Energy Generation Performance of Artificial Leaf-based Facade Cladding (ALFC) systems. Report to the American Institute of Architects (AIA).
- [32] **Azari, R.** (2016). Benchmarking of Environmental Impacts of Buildings. Research Report to UT San Antonio.
- [33] Beeson, S., **Azari, R.** (2015). STEM principles implementation in building technology education in Texas universities. Research Report to UT San Antonio.
- [34] **Azari, R.**, Dossick, C., Al-Anwar, O., Kim, Y. (2013). Leveraging collaboration for productivity improvement in healthcare construction projects. Research Report to University of Washington.
- [35] Dossick, C., Al-Anwar, O., Simonen, K., **Azari, R.**, et al (2013). Modular prefabricated mid-rise residential construction. Research Report to Skanska USA Building.
- [36] Ballard, G., Kim, Y., **Azari, R.**, Cho, S. (2012). Starting from scratch: new project delivery paradigms, Research Report to Construction Industry Institute (CII), Austin, Texas.

## BOOK TRANSLATION

- [37] Co-translated (into Farsi): Lechner, N. (2002). Heating, cooling, lighting; design methods for architects, John Wiley & Sons, US; (620 pages). Translation book published in Iran by Tabriz I.A. University Press, 2007.
- [38] Co-translated (into Farsi): Moore, F. (1993). Environmental control systems; heating, cooling, lighting, McGraw-Hill, US; (427 pages). Translation book published in Iran by Tabriz I.A.

University Press, 2003.

## PRESENTATIONS

- [1] Trends in Energy Research, Swiss-US Energy Innovation Days, Austin, TX, October 2019.
- [2] Doctoral Research workshop: From topic definition to communication of dissertation components; an overview. ARCC Conference doctoral workshop, Toronto, May 2019.
- [3] Environmental and economic implications of building envelope design. ARCC Conference, Toronto, May 2019.
- [4] Do net-zero energy buildings save energy from net cumulative perspective? Advanced Building Skins Conference, Bern, Switzerland, October 2, 2018
- [5] Energy and Environmental Impacts of Built Environments. IIT College of Engineering, 2018.
- [6] LCA Research in the Built Environment. Lake Flato Architects, May 9, 2016
- [7] Benchmarking Tool for Integrated Design Process. International Group for Lean Construction Conference, Boston, July 20-22, 2016
- [8] Building envelopes; a comparison of impacts on the environment. 2015 Architectural Engineering Institute Conference, Milwaukee. March 24-27, 2015
- [9] LCA of building envelopes. CACP Symposium, San Antonio. November 22, 2014
- [10] A framework for evaluation of integrated design teams of sustainable high-performance buildings. Construction Research Congress, Atlanta. May 19-21, 2014
- [11] Starting from scratch: new project delivery paradigms. Construction Research Congress, Atlanta. May 19-21, 2014
- [12] New trends in sustainable architecture research and practice. Texas Aggregates and Concrete Association Conference, San Antonio. September, 2013
- [13] Evaluation of integrated design process of high-performance green buildings. 49<sup>th</sup> ASC Annual International Conference, California. April 9-13, 2013
- [14] Integrated design to achieve net-zero energy in an urban office building, American Solar Energy Society (ASES) conference, Denver, May 13-17, 2012
- [15] Towards sustainable built environments, US Gypsum company. September, 2012

## MASTER & PHD COMMITTEES

IIT (2017-2020)

### Doctoral Advisor

- Agent-based Modeling of Thermal-Comfort Induced Human Behavior in Outdoor Public Spaces. *Zahidah Khan* (expected to complete in 2021).
- Life cycle environmental impacts of tall buildings. *Lijian Ma* (expected to complete in 2022).
- Built environment and mental health. *Liwen Kang* (expected to complete in 2022).

### Doctoral committee member (defended projects)

- Space We-Q: Architecture for Collaborative Creativity: A Catalyst in Forming a Culture of 'We' in Learning-Driven Environments, *Anat Mor-Avi* (2020, defended)
- The Spatial Block: Natural Ventilation in Hot and Dry Climates of Turkey, *Ezgi Bay* (2020, defended)
- Making A Hot, Arid, Desert Arab City More Livable: Investigating the Role of Street Design in Enhancing Walkability in Riyadh, Saudi Arabia, *Omar Al-Mahdy* (2020, defended)
- A Risk-Based Approach in Selecting Design Natural Hazard Loads for Temporary Structures, *Eman Saleh* (2020, defended)

### Doctoral committee member (projects not completed)

Students: *Piyush Khairnar, Lobna Mitkees, Amjad Alkoud, Mina Geng, Nadia Shah, Yohan Kim*

UTSA (2013 – 2017)

### Master committee member

- Energy-efficient buildings in Turkey, *Muharram Kaya*
- User behavior in high-performance buildings, *Mohamed Abo Issa*
- Impacts of Green Facade and Green Roof on Annual Building Energy Consumption in Hot-Humid and Hot-Dry Climates, *Anupam Satumane*

### Faculty Mentor

- *Samantha Seyler*. Photovoltaic systems for residential buildings; Lead to UTSA's Undergraduate Scholarship Research Award of \$2000, 2014

External

### **Committee member**

Thermal and Energy performance of Algae Bioreactive Façades. *Maryam Talaei*. Tarbiat Modarres University (Iran). Defended in September 2020.

Multi-objective optimization of large-scale building envelope for life cycle energy use and environmental performance in Alberta. *Negar Badri*. University of Calgary (Canada)

### **SERVICE**

Penn State

- Sustainability Council, College of Arts and Architecture, 2020 – present

IIT

- Hosted and mentored visiting doctoral researchers from India, Iran, Italy, and Turkey for 1-year short-term visits
- Served as Interim Director of PhD Program (01.2018-06.2019).
- Co-developed the proposal for the new Master of High-Performance Building Design program as a joint degree between College of Architecture and College of Engineering at IIT.
- Co-organized IIT WISER Carbon Management Symposium, 2018
- Faculty Appointment and Retention Committee, College of Architecture, 2018-2020
- University Faculty Council's Library Committee (UFCLC), 2017-2020
- College's Curriculum Committee. 2018-2020
- College's Library Committee, 2017-2020

UTSA

- Graduate Advisor of Record (2016-2017)
- Committee Membership, 2013 – 2017  
Building Technology Curriculum Committee, Department of Architecture  
Development of Annual Evaluation Scorecard, Department of Architecture Faculty Search Committee, Department of Architecture  
University Graduate Council, Faculty-Elected Representative  
Data Sub-committee (Lead), Graduate Committee for Master of Architecture  
Graduate Program Committee for Master of Architecture  
Graduate Program Committee for Master of Science in Architecture  
PhD Program Feasibility Taskforce for the College of Architecture

UW

- Student Representative in BE doctoral admission, University of Washington, 2010 – 2013

External

- Program committee member in the NSF-funded Workshop on Environmental Sustainability Research (Toronto, 2019).
- Chaired a session and co-lead the Doctoral Workshop in ARCC Conference in Toronto, May 2019.
- Ex-officio member and PhD programs' liaison of the Architectural Research Centers Consortium (ARCC) Board of Directors (since August 2018).
- Organizing Committee Member, 2019 International Sustainable Building Symposium, Dallas.
- Scientific Committee Member, 2018 Passive and Low-Energy Architecture Conference, Hong Kong.
- Founding Member, Built Environment Education now (BEE*now*; a non-profit organizing promoting education of sustainability in architecture schools), (2015-present)
- Scientific Committee, International Conference of Sustainable and Healthy Cities, UAE. 2014.
- Scientific Committee, International Conference of Advanced Methods of Design and Construction, Iran. 2014.
- Peer-Reviewer  
Elsevier; Book proposal review  
Elsevier Journal of Building and Environment  
Elsevier Journal of Energy and Buildings  
Elsevier Journal of Renewable Energy  
Elsevier Journal of Energy Storage  
Elsevier journal of Cleaner Production  
ASCE Journal of Architectural Engineering  
ASCE Journal of Management in Engineering  
Journal of Sustainable Building Technology and Urban Development  
Smart and Sustainable Built Environment (SASBE) Journal  
PLEA Conference, Los Angeles 2016  
Symposium on Integrated/Sustainable Building Equipment and Systems 2015  
Construction Research Congress 2012

## PROFESSIONAL WORK

Experience	Consulting services on building performance, 2011 – Present Sustainability Intern, Capital Projects Office, University of Washington, 2010
Accreditation	Building Performance Analysis Certificate, Autodesk, 2013 LEED Green Associate, US Green Building Council, 2011 Registered Architect, Iranian Organization of Building Engineering Board, Iran, 2008
Affiliation	International Building Performance Simulation Association (IBPSA-USA) American Society of Heating, Refrigeration and Air-conditioning Engineers (ASHRAE) Society of Building Science Educators (SBSE) Iranian Organization of Building Engineering Board

## SKILLS

Architecture	AutoCAD, SketchUP, Revit
Simulation	Gabi, Athena IE, Tally, Sefaira, eQuest, IESVE, EnergyPlus, Radiance
Statistics	STATA, Lisrel
Graphics	Adobe Photoshop, Adobe InDesign, Adobe Illustrator

## MEDIA

2020	<a href="#">Architect Magazine (3)</a> <a href="#">American Institute of Architects – 2019 AIA Upjohn Research</a> <a href="#">Illinois Institute of Technology – Curiosity Unplugged Podcast</a>
2019	<a href="#">Illinois Science and Technology Coalition – 2019 Researchers to Know</a> <a href="#">Illinois Institute of Technology</a> <a href="#">American Institute of Architects – 2018 AIA Upjohn Research</a> <a href="#">Architect Magazine (2)</a>
2017	<a href="#">American Institute of Architects – Past Recipients: COTE Top Ten Competition</a> <a href="#">ACSA – 2017 COTE Top Ten Competition</a>
2016	<a href="#">Architect Magazine (1)</a> <a href="#">Architecture 2030 Challenge</a> <a href="#">ACSA – 2016 COTE Top Ten Competition</a> <a href="#">UT San Antonio</a>