Ramyar Tajik

ARCHITECTURAL ENGINEERING PH.D. CANDIDATE
ACADEMIC CURRICULUM VITAE
Philadelphia, PA | rt626@drexel.edu | tajikramyar@gmail.com | linkedin.com/in/ramyar-tajik | ramyartajik.com

RESEARCH PROFILE

Architectural engineering Ph.D. candidate studying how buildings and environmental conditions affect occupants. Research spans building energy and thermal performance, indoor air quality and environmental sensing, and lighting and human factors. Methods include building simulation, connected sensing, human-subject field studies, time-series analysis, and evidence synthesis.

EDUCATION

Drexel University, Philadelphia, PA - Ph.D., Architectural Engineering | **Expected December 2026**

Dissertation: *Personal Light Exposure and Feedback for Circadian-Supportive Lighting: Evidence Mapping, Wearable Sensing and Feedback Platform Development, and a Field Pilot*
Advisor and GPA: Dr. S. Hoque | 3.71/4.00

Politecnico di Milano, Milan, Italy - M.Sc., Building & Architectural Engineering | **2021**

Thesis: *User-Specific Automated Kinetic Shading Design Implementing Multi-Objective Optimization and Machine Learning Tools*
Advisor and grade: Dr. G. Masera | 110/110

University of Guilan, Rasht, Iran - B.Sc., Architectural Engineering | **2017**

Thesis: *Designing a Sustainable Off-Grid Ski Resort and Mountain Accommodation*
Advisor and GPA: Dr. A. Agharabie | 15.01/20

ACADEMIC APPOINTMENTS

Graduate Research Assistant, Drexel University | **2021–Present**

Teaching Assistant and Grader, Drexel University | **2022–2026**

Teaching Assistant and Junior Tutor, Politecnico di Milano | **2019–2021**

RESEARCH EXPERIENCE AND SELECTED PROJECTS

Building Performance & Energy Efficiency

Building Energy Simulation and HVAC Analysis, Drexel University | **2022**

- Modeled a U.S. Department of Energy Small Office reference building in EnergyPlus and OpenStudio. Combined envelope, infiltration, lighting, and shading measures reduced modeled annual site energy by 20.8%, from 363.95 to 288.13 GJ.
- Performed separate PTAC and VAV sensitivity analyses and compared zone and surface heat balances under three HVAC cooling scenarios.

Intelligent Shading Retrofit, M.Sc. Thesis Research, Politecnico di Milano | **2019–2021**

- Co-developed a Rhino/Grasshopper workflow linking daylight, glare, thermal, and energy simulations with NSGA-II optimization and regression-based user preferences. Compared four shading alternatives with an unshaded baseline and developed a user-specific control approach for dynamic shading.
- Generated and exported weather data with Meteonorm, including TMY2, TMY3, and EPW files. Published the case study as first author in the Journal of Green Building.

Home for Life Residential Energy and Comfort Study, Politecnico di Milano | **2020**

- Led a collaborative TRNSYS study of a Danish house, comparing ventilation and shading controls for adaptive comfort. Modeled combined annual sensible heating and cooling loads of 4.20 kWh/m² at the final stage, compared with 34.46 kWh/m² in the starting model.

Nature-Based Solutions to Overheating for Equitable Heat Health | **2023–2025**

- Contributed to a published Springer chapter on behavioral, building-scale, and landscape strategies for equitable heat-health protection.

Adapting Vernacular Cooling Strategies for Philadelphia Housing

- Developed comparative climate and precedent analyses linking passive cooling from Guilan to overheating in Philadelphia rowhouses, including cross-ventilation and shading. Working paper.

Schools as Community Critical Infrastructure, Drexel and Temple Universities | **2023–2026**

- Contributed statistical analysis and a decision-support matrix for evaluating services public schools can provide during and beyond disruptive events.

RESEARCH EXPERIENCE AND SELECTED PROJECTS (CONTINUED)

Indoor Air Quality & Environmental Sensing

Residential Indoor Air Quality in Low-Income Philadelphia Homes, Drexel University | 2022–2024

- Supported calibration and deployment of Awair Element and IQAir AirVisual Pro monitors in partnership with the Philadelphia Energy Authority and Energy Coordinating Agency. The study targeted 54 households; monitors were installed in 11 homes, and five yielded usable sensor data.
- Aligned sensor timestamps and checked data quality. As first author, reported lessons from interviews, surveys, and fieldwork on monitor placement, connectivity, and participant follow-up.
- Developed a separate exploratory workflow using feature engineering, principal component analysis, and K-means clustering to examine patterns in household sensor data.

Occupant-Centric Building Technologies Roadmap (ET4WIBE), Lead Author | 2023–Present

- Led writing, workshop synthesis, and literature integration for a 17-author roadmap on building sensors, controls, occupant interfaces, interoperability, data governance, and adoption.
- Organized expert discussions into technology layers, research gaps, and implementation priorities. Available as an SSRN preprint.

Risk-Based Ventilation for Indoor Sports, Drexel University | 2021

- Co-authored a technical study comparing ventilation and portable air cleaning in sports centers using Wells–Riley modeling and clean air delivery calculations.

Lighting & Human Factors

LuxRest Personal Light Exposure and Feedback Study, Drexel University | 2023–2026

- Led requirements, systems integration, field deployment, participant protocols, and analysis for a fixed-order, within-participant feasibility pilot. Developed the backend, frontend, and custom web dashboards; collaborated with Lucerne University of Applied Sciences and Arts on companion hardware and MQTT firmware.
- Integrated near-eye LiDo sensing with a Pico W companion, Raspberry Pi gateway, cloud routing, n8n workflows, and survey tools. Built a Telegram assistant for reminders and questions about personal exposure.
- Analyzed 18 operational records and data from 14 completers. Built reproducible workflows for sensor quality checks, time-series analysis, repeated measures, mixed-effects models, and survey and qualitative analysis. Traced sensor acquisition, delivery, and participant uptake separately.

Circadian-Supportive Lighting Triad, First Author and Project Lead | 2025–Present

- Developed a framework linking biological responses to light, exposure systems, and occupant engagement. Led multi-database searching, researcher-verified screening, structured coding, visualization, and synthesis for an evidence map of applied human studies.

Controlled Multisensory Indoor Environment Pilot, Drexel University | 2021–2023

- Contributed to a controlled study with nine adults and 16 test conditions, examining thermal, acoustic, lighting, olfactory, physiological, and perceptual measures of stress and comfort in a healthcare-oriented setting.

PUBLICATIONS AND PREPRINT

Hoque, S., Schinasi, L., Hesson, M., & Tajik, R. (2026). Nature-based solutions to overheating for equitable heat health protection. In Towards a Nature-Positive Built Environment (pp. 247–258). Springer Nature. DOI

Tajik, R., Soltanmohammadlou, S., Kianfar, A., Masera, G., & Hoque, S. (2024). A case study: Intelligent shading retrofit to existing home-office using multi-objective optimization. Journal of Green Building, 19(1), 123–155. DOI

Tajik, R., & Hoque, S. (2024). Challenges in mixed methods research: Data collection and assessment of indoor air quality (IAQ) in low-income households. Proceedings of the 7th Residential Building Design and Construction Conference, pp. 471–487. Proceedings

Hoque, S., & Tajik, R. (2024). ChatGPT: Perspectives of an international Ph.D. student and his PI. Current Trends in Civil and Structural Engineering, 11(1). DOI

Tajik, R., et al. (2026). Charting the future of occupant-centric enabling technologies for well-being in buildings: Challenges, gaps, and a research and application roadmap. SSRN preprint. DOI

MANUSCRIPTS AND WORKING PAPERS

The Circadian-Supportive Lighting Triad: A conceptual framework and evidence map of applied human research. First author. Manuscript in preparation.

Tajik, R., et al. LuxRest: Field feasibility of a personal circadian-supportive light measure-to-action system. Manuscript in preparation.

Tajik, R., et al. Characterizing indoor air quality in low-income urban households through unsupervised machine-learning clustering. Manuscript in preparation.

Tajik, R., et al. Adapting vernacular passive-cooling strategies from Guilan to mitigate residential overheating in Philadelphia. Working paper.

TECHNICAL REPORTS AND THESES

Tajik, R., Ebrahimkhanlou, A., & Hoque, S. (2024). Characterizing Indoor Air Quality in Low-Income Urban Households Through Unsupervised Machine Learning Clustering. Technical report, AE 580, Drexel University.

Edske, V., Moussa, J., & Tajik, R. (2022). Artificial Neural Network for Predictive CFD. Technical report, AE 555, Drexel University.

Edske, V., Moussa, J., & Tajik, R. (2022). Relational Database for LEED-Certified Buildings. Technical report, AE 555, Drexel University.

Tajik, R. (2022). EnergyPlus Analysis and Optimization of a DOE Small Office Reference Building. Technical report, AE 551, Drexel University.

Tajik, R. (2022). Building Zone and Surface Heat-Balance Modeling Under Three HVAC Cooling Scenarios. Technical report, AE 551, Drexel University.

Moussa, J., & Tajik, R. (2021). Risk-Based Ventilation to Control the Airborne Transmission of COVID-19 in Sports Centers. Technical report, AE 550, Drexel University.

Tajik, R., Moussa, J., Varman, N., & Teo, J. (2021). Review of Numerical Methods Used in Engineering Research. Technical report, MEM 591, Drexel University.

Tajik, R., Kianfar, A., & Soltanmohammadlou, S. (2021). User-Specific Automated Kinetic Shading Design Implementing Multi-Objective Optimization and Machine Learning Tools. Master's thesis, Politecnico di Milano.

Tajik, R., et al. (2020). NEO-TULOU Architectural Design Book. Technical report, Politecnico di Milano.

Tajik, R., et al. (2020). Sustainable Building Technologies: NEO-TULOU Technical Design. Technical report, Politecnico di Milano.

Tajik, R. (2017). Design of a Sustainable Off-Grid Ski Resort and Mountain Accommodation. Bachelor's thesis, University of Guilan.

PRESENTATIONS AND RESEARCH FACILITATION

The Missing Link in Circadian-Supportive Lighting Solutions | Mar 2026

Invited seminar, Centre for Chronobiology, Basel, Switzerland

- Presented the design of a personal light exposure feedback system and its use in circadian-supportive lighting research.

Challenges in Mixed Methods Research on Residential Indoor Air Quality | Mar 2024

- Conference presentation, 7th Residential Building Design and Construction Conference, Pennsylvania State University (March 27, 2024).

Experts and Tools for Well-Being in Built Environments | Sep 2023

- Facilitated an interdisciplinary research-roadmap workshop at Drexel University.

SELECTED COURSEWORK

Ph.D. Drexel University: Comfort Analysis and Indoor Air Quality; Building Energy Systems I; Data Analytics for the Built Environment; Applied Engineering Analysis Methods II; Risk Assessment; Introduction to AI for Engineers; Fundamentals of Independent Research

M.Sc. Politecnico di Milano: Sustainable Multidisciplinary Design Process and Studio; Building Physics; Energy-Efficient Buildings; Sustainable Building Technologies and Studio; Building Services; Building Renovation and Studio; Integrated Project Management and Design Tools; Urban Design and Studio; Conservation; Structural Design

B.Sc. University of Guilan: Architectural Design Studios and Final Project; Environmental Control; Building Construction and Materials; Concrete and Steel Structures; Mechanical and Electrical Installations; Rural Architecture; Urban Space Analysis; Historic Building Survey and Restoration; Surveying and Estimating; History and Theory of Architecture

TEACHING AND MENTORING

Teaching Assistant and Grader - Drexel University | **2022-2026**

- Supported instruction, laboratories, design reviews, technical writing, and assessment in First-Year Engineering Design, HVAC and building systems, daylighting, hydraulics, and construction materials.
- Guided students through prototyping, eQUEST energy modeling, room-by-room load calculations, daylight assessment, fluid and materials laboratories, graphing, and technical reports.
- Supported teaching of building-performance analysis in Revit using Autodesk Insight / Insight 360.

Teaching Assistant and Junior Tutor - Politecnico di Milano | **2019-2021**

- Supported Urban Design and Studio and Energy-Efficient Buildings through design reviews and workshops on passive strategies, climate analysis, building simulation, and performance-based decisions.

Program Facilitator - Eureka STEM Summer Program | **2022-2023**

- Facilitated hands-on sustainability and engineering activities for rising eighth- and ninth-grade girls through an NSF-supported informal STEM program at Drexel and Girls Inc.

Earlier Teaching | **2012-2016**

- Taught high-school mathematics and intermediate to upper-intermediate English; served as a SketchUp and V-Ray tutor at AHG Institution in 2016.

ARCHITECTURAL AND BUILDING DESIGN

Behavioral Health Emergency Department Expansion - AIA AAH and ASHE PDC Student Design Challenge | **2025**

- Worked in a 48-hour multidisciplinary team to design a behavioral-health emergency department and EmPATH crisis-unit expansion for Grady Memorial Hospital; team received third place.

Carbon-Free Development at Greco-Breda - Milan, Italy | **2019**

- Developed a mixed-use urban-regeneration strategy integrating housing, mobility, passive design, renewable energy, urban agriculture, and water and waste strategies; project received second place in the 17th Laure Larouze Sustainable Built Environment Study Award.

NEO-TULOU, Politecnico di Milano | **2020**

- Developed a nearly zero-energy residential complex proposal for Hong Kong. Integrated architectural design with daylight, energy, comfort, and HVAC analysis; used Meteonorm and Skelion for weather inputs and PV layout, shading, and production analysis.

  Supervisors: Dr. G. Masera, Prof. M. Brasca, and Arch. F. Pagliani

Additional Graduate Design Studios, Politecnico di Milano | **2018–2021**

- reGreeneration: Adaptive reuse of an industrial site in Lecco as a mountain sports hub (Dr. M. Grecchi).
- The Vitality Chain: A Lecco sustainability and livability proposal centered on the Caldone corridor (Dr. A. Colucci). Used QGIS in urban coursework.

Undergraduate Design Studios, University of Guilan | **2012–2017**

- Architect’s Villa; Contemporary Art Museum; and Residential Complex, Rasht. Supervisors: Dr. A. Tarkashvand, Dr. M. Khakpour, and Dr. M. Javaherian, respectively.
- Hospital Design, Tehran (Dr. J. Mirbazel); Rural Housing, Energy Efficiency, and Local Job Creation (Dr. A. Agharabie).
- Additional projects included a physics-focused high school and the sustainable off-grid ski resort developed for the bachelor’s thesis.

Interior Design Assistant - 123 Studio, Tehran, Iran | **Jan-Jul 2018**

- Developed interior-design models for two small real estate offices in Tehran; prepared technical drawings in Rhino and parametric forms and geometric design elements in Grasshopper.
- Modeled mechanical, electrical and plumbing (MEP) systems using Autodesk Revit.

TECHNICAL AND RESEARCH SKILLS

Building Performance & Simulation

Whole-building energy modeling, building physics and envelope heat transfer, academic HVAC loads and systems analysis, passive design, daylight and glare analysis, adaptive shading, and thermal and visual comfort.

Tools: EnergyPlus, OpenStudio, TRNSYS/TRNBUILD, Ladybug/Honeybee, Radiance, eQUEST, Sefaira, THERM, Meteonorm, and Skelion.

Environmental Sensing & Connected Systems

Environmental, IAQ, and light sensors and controls; data acquisition, field deployment, sensor calibration and QA/QC, sensor networks, and edge-to-cloud workflows.

Tools: Raspberry Pi, Pico W, Arduino, MQTT, n8n, Ubidots, and Notecard/Notehub.

Research Methods & Data Analysis

Human-subject research, IRB protocols, experimental design, mixed methods, surveys, qualitative analysis, evidence mapping, time series, repeated measures, regression, mixed-effects models, PCA, and K-means clustering.

Tools: Python, MATLAB, Excel, Git/GitHub, APIs and JSON; basic R and SQL.

BIM, CAD & Visual Communication

Building and urban design, drafting, 3D modeling, parametric design, architectural visualization, and design deliverables.

Tools: Revit/BIM, Autodesk Insight / Insight 360, AutoCAD, Rhino, Grasshopper, SketchUp, V-Ray, Lumion, QGIS, Photoshop, Illustrator, InDesign, and DaVinci Resolve.

LEADERSHIP, ENTREPRENEURSHIP, AND SERVICE

President - Persian Students Association at Drexel University | 2023-2024

- Led a four-person executive team and event teams of 8-10; organized cultural, wellness, networking, and service programs, including events for more than 150 and 400 attendees.
- Expanded resources from approximately $500 to more than $25,000 through ticket sales, partnerships, and more than $7,000 in fundraising; helped secure an $11,000 budget for the following year and launched the organization's Instagram presence.
- The organization received a 2024 Drexel Student Life IMPACT Award during the leadership term.

Technical Lead - NSF I-Corps Hub Northeast Regional Program | Spring 2026

- Participated in customer-discovery and research-commercialization training covering customer archetypes, value propositions, hypothesis testing, market opportunity, and pathways from research to products and services.

Ad Hoc Peer Reviewer | 2023-2024

- Completed three reviews for the Journal of Green Building and one review for the Residential Building Design and Construction Conference proceedings.

Additional Service

- Member, Scientific Association of Students, Faculty of Art and Architecture, University of Guilan, 2013-2014; elected core member of the Association of Student Council, 2015.

HONORS AND RECOGNITION

- Third Place, AIA Academy of Architecture for Health and ASHE PDC Student Design Challenge, 2025.
- Nominee, Drexel Common Good Award for scholarship, civic engagement, and community building, 2024.
- Kling-Lindquist Endowed Grant, Drexel University College of Engineering, 2023.
- Second Place, 17th Laure Larouze Sustainable Built Environment Study Award, Politecnico di Milano, 2019.
- 98th percentile among more than 400,000 participants, Iran's national university entrance examination, 2012.
- Advanced to the second level of Iran's National Mathematics Olympiad, 2011, and National Informatics Olympiad, 2010.

PROFESSIONAL AFFILIATIONS

ASCE and AEI: Member, American Society of Civil Engineers and Architectural Engineering Institute

IEEE: Member, Philadelphia Section; Consumer Technology Society and Internet of Things community

ASHRAE: Student member, Philadelphia Chapter

LANGUAGES AND ADDITIONAL QUALIFICATIONS

Languages: Persian (native); English (fluent, C1); Italian (A2)

Standardized tests: TOEFL iBT 116/120, 2020; GRE 326 total: 167 Quantitative and 159 Verbal, 2017