Ramyar Tajik

ARCHITECTURAL ENGINEERING PH.D. CANDIDATE
INDOOR AIR QUALITY & ENVIRONMENTAL SENSING
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PROFESSIONAL SUMMARY

Architectural engineering Ph.D. candidate with hands-on experience supporting monitor deployment in occupied homes, integrating connected sensors, and analyzing environmental time series. Combines field measurements, data quality checks, and participant interviews and surveys to understand what monitoring systems capture reliably and where data are lost.

CORE SKILLS

Indoor environmental quality: Occupied-home IAQ and environmental monitoring, airflow and ventilation analysis, and clean-air delivery comparisons (Wells–Riley coursework). Awair Element and IQAir AirVisual Pro; PM2.5, CO_2, TVOCs, temperature, and relative humidity.

Field deployment: Sensor specification, calibration, placement, installation, acquisition and logging; field testing, troubleshooting and retesting, resident protocols, timestamp normalization, anomaly and missing-data checks, and sensor QA/QC.

Connected sensing and smart buildings: Requirements, prototyping, gateway integration, sensor networks, Wi-Fi and MQTT/Mosquitto, cellular telemetry and edge-to-cloud routing. Raspberry Pi, Pico W, Arduino, Notecard/Notehub, Ubidots, and collaborative PCB/firmware integration and troubleshooting.

Software and data pipelines: Backend, frontend, and dashboards; device-to-dashboard traceability, n8n workflow automation, APIs/JSON, and Git/GitHub. AI-assisted programming and agent workflows (OpenAI Codex), Telegram feedback, and Qualtrics.

Analytics and visualization: Python/pandas, MATLAB, Excel, Power BI and Tableau; basic SQL and R. Reproducible data cleaning, harmonization and visualization, time series, regression, mixed-effects models, feature engineering, PCA, K-means, basic machine-learning model training, and relational databases (coursework).

Field and applied research: IRB/participant protocols, sampling, surveys and interviews, qualitative and mixed methods, technical reporting, and decision-support and evidence synthesis for heat health and community resilience.

SELECTED TECHNICAL PROJECTS

Graduate Research Assistant, Drexel University | 2021–Present

Residential Indoor Air Quality Monitoring, Philadelphia | 2022–2024

- Prepared, calibrated, and helped install Awair Element and IQAir AirVisual Pro monitors in a study 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 timestamps and checked data quality for fine particulate matter (PM2.5), carbon dioxide (CO_2), temperature, and relative humidity.
- First-authored the field-study paper. Used surveys, interviews, and field records to document barriers around monitor placement, connectivity, data retrieval, and participant follow-up.
- Built a retrospective workflow for identifying PM2.5 excursions from 10-minute medians and checking coverage before retaining six-hour windows.
- Summarized four measured channels using 12 features and applied principal component analysis (PCA) and K-means clustering. Compared groups against original sensor time series to interpret recurring air-quality patterns.

LuxRest Connected Sensing and Exposure Feedback | 2023–2026

- Led protocol development, system integration, field deployment, and analysis for a within-participant pilot. Connected near-eye light sensing to a Pico W companion, Raspberry Pi gateway, and cloud dashboard; built a Telegram assistant for participant reminders and feedback.
- Collaborated with Lucerne University of Applied Sciences and Arts colleagues on companion hardware and MQTT firmware. Tracked continuity from sensor acquisition to message delivery to distinguish technical failures from participant uptake.
- Retained local receiver records before cloud routing so missing or delayed readings could be checked against downstream records. Routed sensor data to participant-specific streams and tracked receipt, dashboard use, and message delivery separately.
- Analyzed 18 operational records and data from 14 pilot completers using reproducible sensor quality checks, time-series workflows, and mixed-effects models. Interpreted surveys and qualitative responses alongside the sensor data.

Controlled Multisensory Indoor Environment Pilot | 2021–2023

- Contributed to a controlled study with nine adults and 16 test conditions, linking thermal, acoustic, lighting, and olfactory conditions with physiological and reported measures of stress and comfort.
- Used Python to align indoor-environment readings with wearable heart-rate and electrodermal activity records and flag gaps in the data streams.

ADDITIONAL TECHNICAL PROJECTS

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

- Co-authored a technical study using Wells–Riley modeling to compare ventilation and portable air cleaning for an indoor sports-center scenario.
- Used clean air delivery rate (CADR) to put outdoor-air ventilation and portable filtration on a comparable basis for the modeled space.

Ventilation methods and report

Small-Office Envelope and HVAC Analysis, Drexel University | **2022**

- Modeled changes to envelope, infiltration, and HVAC in an EnergyPlus reference building. Examined zone and surface heat balances under three cooling scenarios, with separate PTAC and VAV sensitivity studies.

PROFESSIONAL EXPERIENCE

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

- Led writing and interdisciplinary workshop synthesis for a 17-author roadmap. Translated discussions on building sensors, controls, interoperability, and data governance into research and implementation priorities.
- Categorized barriers from sensing through occupant interfaces, including deployment, data sharing, and validation. Helped convert these findings into a layered technology framework and staged research roadmap.

Available as an SSRN preprint. DOI

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

- Supported engineering design, building systems, and HVAC instruction. Guided students in prototype development, interpretation of lab data, room-by-room load calculations, and technical reporting. Supported laboratory work in hydraulics and construction materials.

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

- Supported design reviews and workshops in climate analysis, passive strategies, and building energy simulation.

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

- Modeled mechanical, electrical, and plumbing systems in Revit and prepared interior models and Rhino drawings for two real estate offices.

EDUCATION

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

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

Final grade: 110/110

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

SELECTED PUBLICATION AND PRESENTATION

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

Presented the field study at the 7th Residential Building Design and Construction Conference, Pennsylvania State University, March 27, 2024.

Field deployment and analysis case study

RECOGNITION AND PROFESSIONAL INVOLVEMENT

Kling-Lindquist Endowed Grant, Drexel University College of Engineering, 2023.

Technical Lead, NSF I-Corps Hub Northeast Regional Program, Spring 2026; participated in customer-discovery and commercialization training.

IEEE Philadelphia Section member, including the Consumer Technology Society and Internet of Things community; ASHRAE Philadelphia Chapter student member.