

HANIN OTHMAN

Architect, Researcher, & Designer

Assistant Professor
School of Architecture
College of Architecture, Planning and
Landscape Architecture (CAPLA)
The University of Arizona
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Research Areas

Indoor Environmental Quality Monitoring & Sensor Technologies.
Smart Building Systems & IoT-Driven Environmental Optimization.
Robotics and Computational Design for Built Environment Research.
Climate-Responsive & Health-Equitable Design.

Education

Ph.D. Candidate in Architecture (Sustainability)
Pennsylvania State University, USA | 2022 – Summer 2026 (Expected).
Master of Science in Architectural Engineering (M.Sc)
University of Jordan, Amman, Jordan | Aug 2019.
Bachelor of Science in Architectural Engineering
The Hashemite University, Az Zarqa, Jordan | May 2014.

Academic Appointments

Graduate Teaching Assistant | Penn State University · Full-time
ARCH 130A | Basic Design and Research (Fall 2025)
ARCH 170N | Sustainable Architecture 1 (Summer 2025)
ARCH 270N | Introduction to Sustainable Architecture2 (2024-2025)
Department of Architecture, Penn State University, USA | Aug 2024 – May 2025
Artist and Maker in Residence at Learning Factory
Learning Factory, College of Engineering, Penn State University, USA | Aug 2024 – May 2025
Designed and led workshops on low-cost IAQ sensing, mobile systems, and Arduino-based environmental monitoring.
Assistant Mentor Coordinator - The Learning Edge Academic Program (LEAP)
Learning Edge Academic Program (LEAP), Penn State University, USA | Summer 2023, 2024, 2025 Supported incoming first-year students through mentorship training, orientation coordination, and academic readiness workshops.
Graduate Research Assistant
Department of Architecture, Penn State University, USA | Aug 2022 – May 2024
Research on IoT-based indoor air quality monitoring, low-cost sensor calibration, and robotic sensing platforms.
Instructor for Architectural Design Studio & Teacher Assistant - The Hashemite university
Department of Architectural Engineering, Hashemite University, Jordan | Oct 2016 – Aug 2022
Architect and Designer - Ruba Hosuah for Engineering
Ruba Hosuah for Engineering, Amman, Jordan | May 2016 – Oct 2016
Design Studio Supervisor - The Hashemite University. Sep 2014 - May 2016
Intern Architect - Bitar Consultants, Architects, Engineers & Project | May 2013- Aug 2013.

Teaching Experience

Penn State University

ARCH130A: Basic Design and Research

Co-taught first-year design studio introducing foundational design principles, analog and digital representation, and the iterative design process. Guided students in developing visual communication skills through drawing, modeling, and mixed-media presentation techniques. Integrated precedent analysis, site studies, and basic research methods into design proposals. Facilitated desk critiques, peer reviews, and pin-ups to promote constructive feedback, collaborative learning, and critical reflection. Emphasized ABET outcomes in communication, problem-solving, and evidence-based design decision-making.

ARCH 270N & ARCH 170N: Introduction to Sustainable Architecture I & II

Fall 2024 – Spring 2025 (ARCH 270N/497), Summers 2024–2025 (ARCH 170N)

Supported large-enrollment, interdisciplinary sustainability courses by leading breakout discussions, grading assignments, and co-developing lecture materials on environmental systems (energy, water, materials) and their cultural impact. Helped students articulate connections between building design and human/environmental health. Contributed to the integration of design critique methods and sustainability certification systems (e.g., Phius, LEED, WELL) into class discourse.

Workshop Instructor – Learning Factory Artist & Maker in Residence

Fall 2024 – Spring 2025

Designed and led four original workshops on indoor air quality (IAQ) sensing using low-cost hardware and Arduino platforms. Topics included:

Workshop 1: Temperature-based alarm system (DHT22 + LEDs)

Workshop 2: VOC and eCO2 sensing with SGP30 + LCD display

Workshop 3: IAQ monitor with real-time feedback

Workshop 4: Multi-sensor IAQ monitor with real-time feedback

Mentored students through full system assembly, programming, troubleshooting, and basic data interpretation.

Encouraged interdisciplinary engagement by linking environmental sensing with creative technology and spatial design.

Learning Edge Academic Program (LEAP) - Coordinator

Summers 2023, 2024, 2025

Supervised and managed students and led orientation programming for incoming first-year students in the Learning Edge Academic Program. Facilitated training on mentorship skills, campus navigation, and academic success strategies. Coordinated architecture-specific sessions introducing design thinking, sustainability in architecture, and creative exploration. Provided one-on-one mentorship to at-risk students, building confidence and academic readiness through scaffolded support.

Hashemite University

Department of Architectural Engineering, 2014–2021

1.Design Studios

Basic Design I & II, Design 1–4 (All Levels), Graduation Project (Parts I & II)

Served as studio instructor and design critic across multiple levels, from first-year foundations to advanced thesis projects.

Mentored students through the full design process - from concept development and spatial organization to environmental integration and technical detailing.

Emphasized sustainability, bioclimatic strategies, and vernacular adaptation. Provided regular desk crits, organized pin-ups, and led final reviews.

ARCH 121 – 122 | Basic Design I & II: Introduced students to form, space, and composition using abstract exercises and small-scale site interventions.

ARCH 221 – 222 | Design 1–2: Focused on spatial programming, circulation, and early contextual response in small buildings.

ARCH 321 – 322 | Design 3–4: Addressed more complex typologies (e.g., civic, institutional buildings) with an emphasis on sustainability, structure, and user experience.

ARCH 521 – 542 | Graduation Project I & II: Supported thesis students in defining architectural problems, site and user research, and delivering comprehensive design proposals through drawings, models, and presentations. Supervised mid- and upper-level design studios with an emphasis on integrative and performance-based design. Students were guided to apply accumulated knowledge through the courses and address real-world architectural problems through:

- Integration of structural systems, environmental strategies, life-safety codes, construction assemblies, and material selection within cohesive design proposals.
- Demonstration of sustainable design principles including passive strategies, daylighting, site response, climate adaptation, and regulatory compliance.

- Production of comprehensive architectural packages: site analysis, concept development, schematic and detailed drawings, 3D models, and graphic presentations.
- Oral and visual communication of design intent using appropriate terminology, narrative structure, and aesthetic sensibility.
- Emphasis on critical thinking, individual expression, and the articulation of a personal design identity.
- Reinforcement of universal design principles, ensuring accessibility for people with disabilities and the elderly.
- Development of professional skills such as time management, teamwork, resilience under pressure, and effective studio collaboration.
- These studios assessed architectural design skills and emphasized interdisciplinary thinking, decoding design at architecture and urban levels, and real-world readiness, preparing students for both practice and further academic pursuit.

2. Visual Communication Skills

ARCH 112 – 213 | Communication and Presentation in Architecture, Architectural Drawing, Working Drawing

Guided students in developing architectural representation techniques including hand-drawing, digital drafting (AutoCAD), perspective drawing, rendering, and working drawing documentation. Taught conventions of architectural annotation, dimensioning, materials specification, and sheet composition. Provided one-on-one drawing critiques and software tutorials.

3. Theory & History

ARCH 341| History and Theory of Architecture

ARCH 342| Theory of Modern Architecture

ARCH 343| Islamic Architecture

ARCH 344| Local and Contemporary Architecture

Co-taught & TA Course projects, workshop and seminars focused on architectural historiography and theory. Helped students connect historical precedents with current design challenges. Led classroom discussions, prepared visual lecture materials, and assessed student essays and presentations.

- Islamic Architecture: Focused on regional examples from Jordan, Syria, and North Africa, integrating architectural analysis with cultural heritage.

- Local and Contemporary Architecture: Bridged traditional building practices with contemporary Jordanian architecture, encouraging critical reflection on identity and modernization.

4. Conservation & Building Techniques

ARCH 381| Conservation of the Architectural Heritage

ARCH 382| Restoration and Rehabilitation of Historic Buildings

ARCH 383| Photogrammetry, Surveying and Documentation

- Collaborated with a departmental initiative and faculty at the Hashemite University to document Jordan's architectural heritage, focusing on both urban and vernacular contexts. The project involved field documentation of historic buildings and sites in downtown Amman and Jabal Lweibdeh, as well as traditional villages such as Gharissah, Al-Qastal, Um Al-Rasas, and Zarqa. These case studies were incorporated into the Architectural Conservation course as core studio components during the academic years 2013, 2014, and 2015.
- The documentation includes using image processing, photogrammetry (Agisoft), AutoCAD, and GIS.
- Instructed students in field surveying techniques and historic building documentation methods.
- Emphasized adaptive reuse and heritage preservation as tools for sustainable development.
- Led hands-on workshops to train students in advanced digital documentation tools and workflows.
- Taught photogrammetry techniques using Agisoft Metashape, 3DF Zephyr, RealityCapture, and Meshroom, enabling students to generate accurate 3D models and digital archives of heritage structures.
- Emphasized precision, ethical heritage representation, and the integration of these tools into conservation planning and design proposals.

5. Landscape & Environment

ARCH 362| Landscape Architecture

Assisted students in understanding ecological site design, vegetation strategies, and spatial composition in outdoor environments. Helped students develop planting plans and integrate environmental systems into their architectural proposals.

6. Lectures & Workshops

Technical Workshops – Hashemite University (2016–2022)

Developed and delivered hands-on training sessions for architecture students on digital fabrication tools, including:

- 01 | 3D printing techniques
- 02 | Laser cutting workflows
- 03 | Safe machine operation and maintenance
- 04 | Agisoft Metashape, RealityCapture, Meshroom, and MDMET

Integrated these workshops into design studios and courses, emphasizing digital heritage documentation, rapid prototyping, and architectural visualization.

Research Experience

My research lies at the intersection of architecture, environmental sensing, digital technologies, and sustainable design. It spans multiple spatial and disciplinary scales, from building-level indoor air quality (IAQ) monitoring to urban-scale analyses of microclimate and morphology. I employ a diverse range of methodologies, including design-based experimentation, sensor integration and calibration, advanced statistical analysis, and optimization. My work integrates microclimate simulation (ENVI-met), energy (Design Builder), and thermal comfort modeling (Rayman & Leonardo), computational fluid dynamics (CFD) using (Solid Works), and parametric design workflows to assess and enhance environmental performance (Grasshopper).

At the architectural scale, I focus on developing and validating low-cost IoT-based sensing systems for real-time IAQ monitoring, incorporating mobile platforms, calibration chambers construction (aligned with Phius principles), and sensor network optimization. This research is grounded in hands-on experimentation and statistical validation against reference-grade monitors. On the urban scale, I explore the influence of urban morphology, vegetation, and spatial configuration on outdoor thermal comfort, using GIS mapping, environmental simulation, and spatial analysis techniques.

My work also extends into computational fabrication, exploring the integration of industrial robotic arms with Rhino and Grasshopper for digital carving of traditional materials. This research bridges computational design and craft, proposing new workflows for material innovation in architectural detailing. Across all research strands, I maintain a strong commitment to human and environmental health, climate-responsive design, and socially equitable technologies, often aligned with the Sustainable Development Goals (SDGs).

2022-Present| Low-Cost IoT-Based Indoor Air Quality Monitoring

This ongoing research focuses on the design, calibration, and spatial deployment of low-cost sensor systems for indoor environmental monitoring. It involves the development of real-time sensing devices, mobile and stationary platforms, and calibration methodologies to validate performance against high-quality reference monitors. Key research questions include: How accurate and scalable are these systems? How can they support architectural decision-making?

2023-Present| Internet of Things (IoT) and Environmental Sensing in Architecture

This line of research evaluates the broader application of IoT and sensing technologies in built environments. It critically examines sensor-based approaches to indoor environmental quality (IEQ), identifies challenges, and proposes strategies for more equitable and adaptive environmental sensing.

2022-Present| Robotic Fabrication & Architectural Craft

This project bridges digital design, computation, and traditional materials. It explores how robotic subtractive methods can be applied to fine detailing of plaster surfaces, blending craft and automation in new construction methods.

2018–2021| Urban Morphology, Vegetation, and Thermal Comfort

This research investigates how urban form, green infrastructure, and environmental design affect outdoor and indoor thermal comfort, particularly in arid and semi-arid climates. Using simulation tools like ENVI-met, Rayman, and Design Builder, it explores the climate change and microclimate, thermal comfort, and energy performance and livability of traditional and contemporary urban spaces.

2018–2019| The Role of Urban Morphology on Outdoor Thermal Comfort: Al-Sharq City – Az Zarqa Urban Morphology Impact over Indoor Thermal Comfort and Energy Consumption

Investigated the influence of urban form and outdoor microclimates on indoor comfort and energy use.

The Influence of Green Spaces on Outdoor Thermal Comfort in a Hot-Arid Environment

Demonstrated the cooling effect of vegetation using ENVI-met simulations.

Vegetation Effects on Courtyard Building Performance in a Hot-Arid Climate

Assessed the thermal benefits of planted courtyards in traditional housing.

Al-Sharq City Urban Mapping Project (2018)

Conducted GIS-based analysis of urban expansion patterns in semi-arid conditions.

Honors & Awards

2026| IAQVEC Scholarship Award, in recognition of academic excellence and research potential at the IAQVEC 2026 Conference.

2026| Kalisperis Mentorship Award, College of Arts and Architecture, Penn State (2025&2026)

Recognized for outstanding mentorship and contributions to student development.

2026 | A&A Graduate Student Research Support Program, Penn State

Selected for competitive college-wide research funding in 2026 in recognition of the strength and merit of the proposed research project. Awarded \$3,333 to support research development and implementation.

2026| Sustainability Graduate Student Award, College of Arts and Architecture, Penn State

Winner of the college-wide award in 2026 in recognition of sustainability-focused research and academic leadership.

2025-2026| ICDS Rising Researcher Award - Penn State University

Selected to support the “TwinSight: A Data-Driven Digital Twin Framework for Human-Centric Health Monitoring” project for Summer 2026. Competitive, interdisciplinary funding from the Institute for Computational and Data Sciences.

2025| Fox Scholar, Penn State University – Awarded in recognition of outstanding academic achievement and research potential in architecture and environmental design.

2024-2025| Artists and Makers in Residence - Learning Factory, Penn State

Selected for a competitive residency program within the College of Engineering. Designed and led interdisciplinary workshops on IoT and environmental monitoring using Arduino-based systems.

2023- 2024| AT&T Graduate Fellowship - Penn State University

Nominated by the Department of Architecture for the AT&T Graduate Fellowship. | Nominee

2022| Graduate Assistantship for Ph.D. Studies - Penn State University

Awarded full assistantship support for doctoral research.

2023-2025| Graduate Student Instructor, LEAP Program Mentor -Penn State University

Selected to mentor incoming undergraduate students as part of the Learning Edge Academic Program.

2019| Best Master Thesis Published Paper Award - University of Jordan

Recognized for publication excellence based on master’s thesis research.

2014| Best Graduation Project Award - Hashemite University

Received top prize for undergraduate thesis project, including financial support of \$1,200.

Ranked Top 4 in Architecture Department - Hashemite University

Consistently ranked among the top students at both undergraduate (4th overall, 2014) and graduate (top-tier ranking, 2019) levels.

2009-2014| Dean’s Honor List, & 1st Place Graduation Project - Hashemite University

Ranked first among architecture students for final graduation design project.

Fellowships & Grants

2025-2026| ICDS Collaboration Award. Penn State Institute for Computational and Data Sciences (2025).

Competitively selected to assist TwinSight: A Data-Driven Digital Twin Framework for Human-Centric Health Monitoring. Summer Stipend.

2025| J. Jeffery and Ann Marie Fox Graduate School Fox Summer Research Grant, Penn State

University -Awarded \$5,000 to support critical summer research advancing academic progress and scholarly contributions.

2025| Coccozziello Institute of Real Estate awards - SEED Grant for DECODE: Digital twin Environments for Comprehensive Decarbonization Evaluation of the urban and rural real estate

Penn State University. Amount: \$60,000

2024| Stuckeman Center for Design Computing (SCDC) Summer Student Support

Integrating IoT-Based Sensor Networks and Robotic Systems for Real-Time Indoor Air Quality Monitoring

Penn State University

2024| Alma Heinz and August Louis Pohland Graduate Student Fellowship

Development of a Mobile Robotic Platform for Indoor Air Quality Sensing and Environmental Justice Applications

Penn State University. Amount: \$2,300

2024| College of Arts and Architecture Travel Grant - Penn State University. Amount: \$500

2024| Department of Architecture Grant - Penn State University. Amount: \$600

2025| 2025 Conference Travel Grant - Funding for presenting research at the ARCC 2025 Conference

Penn State University | Amount: \$1,800

2024| SIGraDi 2024 Conference Travel- Funding for presenting research at the SIGraDi 2024 Conference in Barcelona. Penn State University. Amount: \$3,000

2023| Stuckeman Center for Design Computing (SCDC) Travel Grant - Penn State University.

Amount: \$1,100

2009-2014| Arab Bank Education Scholarship – B.Sc. degree (Merit-Based)

Awarded a full undergraduate scholarship in recognition of academic excellence and outstanding academic performance.

Technology Disclosures & Intellectual Property

Technology Disclosure Submitted to Penn State Office of Technology Management (OTM)

Title: Integrating IoT with Mobile Systems for Indoor Air Quality Sensing, Monitoring, and Optimization

Inventors: Hanin Othman (Lead Contributor), Rahman Azari, Tamy Guimaraes, Katie Fitzsimons

Institution: Penn State University | Status: Submitted – Under Review | Date: 2025

Summary: Nominated by OTM for potential patent consideration. Collaborative innovation on a mobile IAQ sensing system integrating IoT technologies for real-time environmental monitoring.

Publications

Peer-Reviewed Journals

1. **Othman, Hanin**, and Rahman Azari. 2026. "Enhancing Spatial Indoor Air Quality Sensing Using a Hybrid Low-Cost Fixed Mobile IoT Network." *Energy and Buildings* 365 (August): 117670.
<https://doi.org/10.1016/j.enbuild.2026.117670>.
2. **Othman, Hanin**, Guilherme Sieves, Tamy Guimarães, and Rahman Azari. 2025. "A Calibration Chamber Framework for Low-Cost Indoor Air Quality Sensor Validation." *Building and Environment* 260: 113856.
<https://doi.org/10.1016/j.buildenv.2025.113856>.
3. **Othman, Hanin**, Rahman Azari, and Tamy Guimarães. 2024. "Low-Cost IoT-Based Indoor Air Quality Monitoring." *Technology | Architecture + Design* 8 (2): 250–70.
<https://doi.org/10.1080/24751448.2024.2405403>.
4. **Othman, Hanin**, Alshboul A.A. The role of urban morphology on outdoor thermal comfort: The case of Al-Sharq City – Az Zarqa. (2020) *Urban Climate*, 34, no.100706. <https://doi.org/10.1016/j.uclim.2020.100706>.

Peer-Reviewed Conference Papers

5. **Othman, Hanin**, and Rahman Azari. 2026. "Enhancing the Granularity of Spatial Sensing Using a Low-Cost IoT-Based Sensing Network." *E3S Web of Conferences*, 716: 01002. IAQVEC 2026. EDP Sciences.
<https://doi.org/10.1051/e3sconf/202671601002>
6. **Othman, Hanin**, Guilherme Sieves, Tamy Guimaraes, and Rahman Azari. 2024. "Development of a Calibration Chamber to Evaluate the Performance of a Low-Cost IAQ Sensing Device." In *SiGraDi 2024 - Biodigital Intelligent Systems Conference, 2024, Volume1*:1493–1504. Barcelona (Spain).
<https://sigradi.org/sigradi2024/#publications>.
7. **Othman, Hanin**, and Rahman Azari. 2023. "Internet of Things (IoT) Sensing of Indoor Environmental Quality (IEQ): A Review of Possibilities, Challenges, and Open Problems." In *Amps Proceedings Series, 34.1*:146–60. *Amps Proceedings Series 34.1*. New York. https://amps-research.com/wp-content/uploads/2024/04/Amps_Proceedings-Series_34.1.pdf.
8. **Othman, Hanin**, and Rahman Azari. 2023. "Exploring Low-Cost Sensors for Indoor Air Quality (IAQ) Monitoring: A Review of Stationary and Mobile Sensing Systems." In *Computation, Culture, and Context*, 224–42. Amman Jordan.
<https://ascaad.org/conference/2023/docs/ASCAAD2023Proceedings.pdf>.
9. Imam, Chowdhury, **Othman, Hanin**, and Çapunaman, Özgüç. "Robotic Plaster Carving: Formalizing Subtractive Detailing of Plaster Surfaces for Construction and Crafts." *Digital Design Reconsidered, 2023*,
https://papers.cumincad.org/data/works/att/ecaade2023_318.pdf.

Ongoing Research and Manuscripts

10. **Book Chapter**: The Applications of Internet-of-Things (IoT) and Mobile Systems for Indoor Environmental Quality (IEQ) Sensing: A Review of Possibilities, Challenges, and Knowledge. || **Othman, Hanin**, Rahman Azari
11. **Manuscript in Preparation**: Hybrid Fixed-Mobile Indoor Air Quality Monitoring for Spatial Field Reconstruction. || **Othman, Hanin**, Rahman Azari.
12. **Ongoing Research Project**: DECODE: Digital Twin Environments for Comprehensive Decarbonization Evaluation of Urban and Rural Real Estate. || Lead Researcher: **Hanin Othman** (PI: Rahman Azari; Co-PIs: Katie Fitzsimons, Tamy Guimaraes, Julian Wang; Co-I: Lisa Iulo).

Peer Review & Editorial Contributions

2023 – Present | Journal Reviewer – *Urban Climate*

2026| Journal Reviewer – Academia Green Energy
2026| Design Research Society Conference (DRS)
2026| The Ibero-American Society of Digital Graphics (SIGraDi)
2024| Arab Society for Computation in Architecture, Art and Design (ASCAAD)

Conferences & Presentations

2026| **Othman, Hanin.** 2026. Coccoziello Institute Built Environment Showcase. (Oral + poster presentation)
2026| **Othman, Hanin.** 2026. University of Pittsburgh at the Department of Civil and Environmental Engineering. (Oral presentation)
2026| **Othman, Hanin.** 2026. Sustainability Council Showcase Exhibit. College of Arts and Architecture, Penn State. (Oral presentation)
2026| **Othman, Hanin.** 2026. 2nd Annual Living Materials Day (LiMDay) at Penn State. (Poster presentation)
2025| **Othman, Hanin.** 2025. ICDS Fall 2025 Symposium. PSU Institute for Computational and Data Sciences, Penn State. (poster presentation)
2024| **Othman, Hanin.** MIT Senseable City Lab (Global Seminar). Massachusetts Institute of Technology. (invited)
2024| **Othman, Hanin.** 2024. Thermal Architecture Lab. University of Pennsylvania. (research presentation)
2024-2025| **Othman, Hanin.** 2024. Sustainability Council, Penn State. (research presentation)
2024-2025| **Othman, Hanin.** ARCH 412: Integrative Energy and Environmental Design Penn State. (Lecture presentation)
2024| **Othman, Hanin.** Sustainability Council Showcase Exhibit. College of Arts and Architecture, Penn State. (poster presentation)
2023-2024 | **Othman, Hanin.** University-wide Research Showcase. (poster presentation)
2024| **Othman, Hanin.** A Framework for Integrating IoT with a Mobile System for Indoor Air Quality (IAQ) Sensing in Built Environments. Sustainability Research Get-Together. College of Arts and Architecture Sustainability Round Table, Penn State. (invited)
203-2024| **Othman, Hanin.** LiMC² Poster Exhibition, Penn State University. (poster presentation)
2024| **Othman, Hanin.** Development of a Calibration Chamber to Evaluate the Performance of a Low-Cost IAQ Sensing Device. SIGraDi - Biodigital Intelligent Systems Conference, Barcelona, Spain. (conference presentation)
2023| **Othman, Hanin.** Exploring Low-Cost Sensors for Indoor Air Quality (IAQ) Monitoring: A Review of Stationary and Mobile Sensing Systems. ASCAAD Conference Amman, Jordan. (conference presentation)
2023| **Othman, Hanin.** A Review of Using IoT and mobile sensing for monitoring Indoor Environmental Quality (IEQ) Perspective: Possibilities, issues, challenges, and open problems. Livable Cities Conference New York. (conference presentation)
2023| **Othman, Hanin.** Robotic Plaster Carving: Formalizing Subtractive Detailing of Plaster Surfaces for Construction and Crafts. The 41st eCAADe Conference, Graz University of Technology, Austria, 2023. (conference presentation)

Competitions

Design Research & Community-Based Practice

These design investigations reflect my commitment to integrating speculative design, environmental performance, and community-driven solutions into architectural research. Each competition engages real-world problems - ranging from climate-adapted infrastructure and net-zero retrofitting to affordable housing and food equity - and translates them into design strategies rooted in equity, sustainability, and interdisciplinary collaboration. Whether developed independently or as part of a team, these projects demonstrate how design can serve as both a research methodology and a tool for engaged practice.

2025 | LAGI- Land Art Generator Initiative: Marou Village, Fiji

Role: Lead Designer | Status: Submitted

Project Title: *DRUA – A Resilient Energy-Water Infrastructure Rooted in Local Knowledge*. 2025. Recognized as a 4th-place finalist and selected for international exhibition & publication. Competition organized by LAGI 2025 – Land Art Generator Initiative: Marou Village, Fiji. Team Submission.

2025| U.S. Department of Energy Solar Decathlon– Design Challenge

Role: Indoor Environmental Quality & Designer Lead

Team: Penn State – Morgan State | Status: Submitted

Project Title: *Retrofitting a Single-Family Building for Net-Zero Urban Farming – Park Heights, Baltimore*. 2025. Competition organized by the U.S. Department of Energy Solar Decathlon 2025 – Design Challenge. Team submission.

2024| SCCLT South Garner Street Design Competition – State College, PA

Role: Team Designer | *Status:* Submitted

Project Title: *Affordable High-Performance Housing for Community Land Trust Residents.* 2024. State College Community Land Trust (SCCLT) South Garner Street Design Competition – State College, PA.

2017-2019| Architectural Contribution – Hashemite University Presidency Building

Role: Design Collaborator | *Status:* Completed

Collaborated on the architectural design and planning of the Hashemite University's Presidency Building, delivering solutions that reflected the university's institutional identity while incorporating sustainable and climatically responsive strategies. Contributed to spatial planning, façade articulation, and site integration.

2016| Royal Monument Design Competition

Hashemite Royal Palace Campus (2015–2016)

Role: Design Team Member | *Status:* Awarded – First Place

Supported the first place-winning team in a national design competition for the Al Rayah Monument, located at the Hashemite Royal Palace. Contributed to schematic design development, presentation graphics, and cultural research under the leadership of Dr. Shaher Rababa, Dr. Rama Al-Rabady, and Dr. Ahmad Al-Husban.

Academic Service & Outreach

Mentorship, Leadership & Student Development

Mentor Coordinator, *The Learning Edge Academic Program (LEAP)*

Penn State University (Summers 2023–2025)

- Coordinated mentor teams supporting incoming first-year students across disciplines.
- Led mentor training sessions on peer engagement, communication, and academic success strategies.
- Developed and facilitated architecture-specific programming introducing design thinking, sustainability, and creative exploration.
- Provided individualized support and mentoring to students transitioning into university life.

Workshop Instructor – Artists and Makers in Residence

Learning Factory – Penn State University (Fall 2024–Spring 2025)

- Designed and delivered three hands-on workshops focused on IoT-based environmental monitoring and Arduino-based systems.
- Workshop topics included: temperature-based alarm systems, VOC and CO₂ monitoring, and real-time multi-sensor IAQ feedback.
- Mentored students in assembling electronic circuits, programming microcontrollers, and interpreting sensor data.
- Created interdisciplinary learning environments that bridged engineering, design, and sustainability education.

Capstone Studio Mentor, Hashemite University

Department of Architecture (2015–2022)

- Supervised and evaluated graduation project students, ensuring alignment with program learning outcomes and NAAB standards.
- Supported student work through critiques, technical guidance, and portfolio development.
- Co-led final year thesis exhibitions.

Academic Community Participation

Sustainability Fellow - **A&A Sustainability Council** – Penn State University

Member, **Muslim Graduate Student Organization (MGSO)** – Penn State University

Member, **Graduate Research and Innovative Design Organization (GRID)** – Penn State University

Participant, **Tuning Middle East and North Africa (T-MEDA) Program** – University of Deusto & Hashemite University (2016)

Represented Hashemite University in a European Union-funded initiative with 16 participating countries to enhance curriculum harmonization and accreditation across the MENA region.

Attended academic workshops and contributed to cross-cultural curriculum assessment and alignment strategies.

Guest Critiques & Studio Reviews

Architectural Design Studios

Stuckeman School of Architecture, Penn State University (Fall 2022–Fall 2025)

Invited to multiple undergraduate and graduate studio reviews for mid-term and final critiques across various levels.

ARCH 412: Integrative Energy and Environmental Design - Penn State University, (Spring & Fall 2024 & Fall 2025)- Reviewed final presentations for ARCH 412: Integrative Energy and Environmental Design, focused on team-based retrofitting proposals for Mifflin Hall (a 1960s Penn State residence building).

Architectural Engineering Studios – Penn State University (Spring & Fall 2023)

Participated in reviews for architectural engineering design studios focused on performance-driven building design.

Jordanian Engineers Association (2017, 2018, 2019)

Served as guest critic for graduate-level design projects and licensure review juries.

Hashemite University (2015–2022)

Critiqued second, third, and fourth year, and graduation project studios, providing design guidance and final assessment.

Accreditation & Curriculum Development**NAAB Accreditation Support**, *Department of Architecture – Hashemite University (2016–2022)*

- Key contributor in preparing and documenting materials for three successful NAAB accreditation visits.
- Co-authored and aligned syllabi with NAAB Student Performance Criteria (SPC) and Intended Learning Outcomes (ILOs).
- Developed supporting materials, organized a 4-year archive of student work, and co-designed a hybrid digital/physical team room to facilitate visiting team evaluations.
- Co-led the production of an accreditation exhibition displaying student work from foundation to graduation level.

ABET Accreditation Committee Member, *College of Engineering – Hashemite University (2017–2019)*

- Served on the Environmental and Logistic Committee supporting ABET compliance and program improvement.
- Designed and implemented an institution-wide signage system to enhance accessibility and wayfinding.
- Conducted environmental evaluations of labs, studios, and academic spaces.

Digital Media, Publications & Outreach Design**Department Website Development & Publication Design**, *Hashemite University – Architecture Department (2016–2022)*

- Designed and launched the department's official website, featuring program highlights, course archives, and student portfolios.
- Created the Department Projects Magazine, publishing exemplary student design work across all academic years.
- Elevated the department's visibility through digital storytelling and curated project showcases.
- University Achievements Documentation, *Office of the President – Hashemite University*
- Authored and designed three editions of Al Hassad Book, the university's official achievements publication (2018, 2019, 2020).
- Collaborated with the university presidency to design and produce the "Hashemite University Achievements Report"
- Collaborated across departments to consolidate major academic, research, and outreach accomplishments into a cohesive institutional narrative.

Exhibitions, Events & Visual Identity Contributions**Exhibition & Event Organizer**, *Hashemite University (2015–2021)*

- Organized annual Science Days, thematic exhibitions, student showcases, and graduation galleries for the Architecture Department and Engineering College.
- Lead and organize university and region level Conference & Exhibitions.
- Contributed to national and institutional events including:
 - Royal Visit 2018
 - Jordan's Centennial Conference and Exhibition
 - AIDTSEC Dead Sea Conference Booth Design and Coordination
- Led planning and curation for university-wide conferences and national celebrations.

Entrepreneurship Exhibition & Conference Organization

- Supervised and led preparations for the Entrepreneurship Exhibition at Hashemite University, showcasing

student innovation and interdisciplinary projects.

- Played a key role in organizing the Entrepreneurship and Innovation Conference, contributing to planning, exhibition setup, content coordination, and visual identity design for the event.

Logo & Branding Designer, Hashemite University (2015–2021)

Designed official logos and branding for more than a dozen high-profile university events and institutional bodies, including:

- Engineering School & its 7 Departments
- HU Creative Center
- Faculty of Graduate Studies & Faculty of Applied Medical Sciences
- Jordan's Centennial Celebration & Scientific Week for Jordanian Universities
- AIDTSEC Conference & Exhibition

Curriculum and Studio Support

Hashemite University, 2015–2022

- Contributed to the development and continuous updating of architectural studio materials, technical detailing content, and course documentation.
- Coordinated student design field visits, integrating experiential learning with course objectives.
- Supported faculty in material exploration, construction documentation, and integration of environmental design concepts.
- Library, The Craft and Computation Lab & other Architecture Laboratory Development
Hashemite University, 2016–2022
- Prepared detailed procurement plans and layout proposals for architectural library facilities, including shelving systems, digital equipment, and key academic texts.
- Led the setup and operation of new lab infrastructure, including 3D printers, laser cutters, and CNC equipment.
- Designed and delivered student workshops on digital fabrication tools, and drafted Safety Guidelines and Lab Access Policies for the Craft and Computation Labs.
- Oversaw operations across three research labs supporting woodworking, digital fabrication, CAD/CAM, and rapid prototyping under the Digital Design Shop (DDS) framework.

Procurement & Tender Committees

- Served on multiple **university procurement and tender review committees**, including projects for library acquisitions, fabrication lab installation, and spatial renovation efforts.
- Contributed to planning, budgeting, and technical review of architectural equipment and layout requirements.

Hashemite University Campus Design & Renovation Projects

Architectural Contributor, 2015–2022

- Collaborated on multiple design and renovation projects across the Hashemite University campus, contributing to spatial planning, material detailing, and institutional identity.
- Focus areas included enhancing circulation clarity, creating intuitive wayfinding systems, and improving environmental integration of public spaces.

East and North Gate Projects

Co-designed the East and North campus entrances, reinforcing campus branding and navigability while addressing site-specific circulation patterns and symbolic architectural gestures.

Technical Skills & Knowledge

Design & Visualization Tools

AutoCAD (2D/3D) – Architectural drafting, code-compliant documentation, and detailing

SketchUp & V-Ray – Massing studies, spatial diagramming, and visualization

Autodesk Revit Architecture – BIM modeling with parametric components and system analysis

3ds Max – Advanced architectural modeling and photorealistic rendering

Adobe Creative Suite (Photoshop, Illustrator, InDesign) – Diagrams, portfolios, presentations, and visual branding

Rhinoceros 3D & Grasshopper – Parametric design, environmental optimization workflows, and robotic toolpath generation (intermediate)

Environmental Simulation & Analytical Tools

DesignBuilder – Whole-building energy performance simulation

ENVI-met – Microclimate simulation for outdoor thermal comfort
RayMan & Leonardo – Solar radiation and thermal comfort modeling
Agisoft Metashape, RealityCapture, Meshroom – Photogrammetry workflows for 3D heritage documentation
SolidWorks (CFD tools) – Simulation of airflow, heat transfer, and mechanical systems
ArcGIS/QGIS – Environmental and urban morphology mapping and analysis
The City Energy Analyst (CEA): an urban building energy modeling (UBEM) platform for Urban Decarbonisation Planning & Design.
COVE Tool – Building Performance Analysis.

Embedded Systems, IoT & Robotics

Raspberry Pi (Single and Networked Systems) – IAQ monitoring, SLAM implementation, sensor-host communication
Arduino & Arduino IDE – Embedded programming, circuit prototyping, and low-cost sensor integration
Low-Cost Sensors – BME680, MH-Z19B, DHT22, PM sensors, SGP30, TSL2591
Ubuntu/Linux Systems – ROS configuration, Python environment setup, multi-board coordination
ROS (Robot Operating System) – ROS1 & ROS2, including SLAM, wall-following, services/actions, and multi-node networks
IoT Hardware & Systems Design – Design and deployment of sensor-based environmental systems for IAQ monitoring, mobile sensing, and real-time feedback
Socket.IO & Flask – Live data visualization with web dashboards for IoT systems
Altium Designer – PCB layout and electronic hardware prototyping

Data Analysis & Research Tools

Jupyter Notebook – Data processing, visualization, and calibration scripts
Statistical Tools – Regression analysis, ANOVA, t-tests, MAE/MSE/RMSE calculations for sensor performance
Excel & Google Sheets – Experimental logging, charting, and structured tabulation
LaTeX, Microsoft Word, PowerPoint – Research writing, presentations, and academic formatting

Digital Fabrication & Lab Operations

Digital Fabrication Tools – 3D printing (FDM), laser cutting, CNC (introductory)
Lab Safety & Access Policy Development – Authored and enforced policies for student use of Craft & Computation Labs
Workshop Design & Delivery – Led student trainings in digital fabrication tools, photogrammetry, and fabrication software
Lab Management – Oversaw materials lab and Digital Design Shop operations for rapid prototyping and CAD/CAM experimentation

Certificates

Pedagogy, Inclusion & Communication – Penn State University **Arts and Architecture Graduate Certificate in Teaching – Pedagogy in Arts and Design**

Center for Pedagogy in Arts and Design, Fall 2024

BUILD @ Penn State Track 1 – Recognizing the Importance of Inclusion in the Workplace (Feb 2022)

BUILD @ Penn State Track 2 – Adopting an Inclusion Mindset at Work (Nov 2024)

BUILD @ Penn State Track 3 – Skills for Building a Culture of Inclusion (Jan 2025)

Foundations of Diversity, Equity, Inclusion, and Belonging (Nov 2023)

The Art and Science of Communication (Feb 2025)

Values, Ethics, and Compliance at Penn State (Mar 2025)

Robotics, Programming & Embedded Systems

Code Foundation for ROS – The Construct Robotics Institute, Feb 2025 Modules:

Linux for Robotics

Python 3 for Robotics

Mastering with ROS: TurtleBot3 – The Construct Robotics Institute, May 2025

ROS1 Basics (Python) – The Construct Robotics Institute, April 2025

ROS2 Basics (Python) – The Construct Robotics Institute, April 2025

ROS2 Navigation – The Construct Robotics Institute, May 2025

Raspberry Pi Essential Training – LinkedIn Learning Certificate, Jan 2022

Programming Foundations: Fundamentals – LinkedIn Learning Certificate, Oct 2022

Computational Design & Parametric Modeling

Rhino & Grasshopper Workshop – How to Rhino Platform, Instructor: Dušan Cvetković

Covered parametric modeling, environmental plugins, and digital workflows for architecture.

Coursera Specializations & Technical Courses

ME 456: Introduction to Robotics – Prof. Xiaogang Hu, Penn State

ME 348: Circuit Analysis, Instrumentation & Statistics – Prof. Linxiao Zhu, Penn State

Introduction to Electronics – Georgia Institute of Technology

Instructors: Dr. Bonnie H. Ferri, Dr. Robert A. Robinson, Jr.

An Introduction to Programming the Internet of Things (IoT) Specialization – University of California, Irvine

Instructor: Ian Harris

Python Basics (Part of Python 3 Programming Specialization) – University of Michigan

Instructors: Paul Resnick, Steve Oney

Penn State University – The School of Engineering Design and Innovation (EDI)

Learning Factory Skills Training | 2024–2025

The Learning Factory provides access and hands-on training for digital fabrication, prototyping, electronics, and manufacturing tools. The following certifications were completed as part of technical training for interdisciplinary design and research:

Additive – Basic I

- Operation of Prusa 3D Printers (PLA & PETG)
- Set up for long-duration 3D prints without continuous supervision

Additive – Basic II

- Use of advanced Prusa printers (MK4, XL) with dual toolheads
- Proficiency in printing with multiple materials, including PLA, PETG, TPU, and ABS

Additive – Advanced Manufacturing

- Training in high-performance fabrication using metal, carbon fiber, and poly jet resin printing
- Operation of Bambu Lab X1-Carbon Combo 3D Printer

EE and IoT Training

- Hands-on training in electronic prototyping and diagnostics
- Proficient use of soldering equipment, multimeters, and other electronics tools.

Immersive Environments Lab

- Hands-on training in immersive experience with 3D platform integrating sketching and generative AI for scenic design prototyping, enabling rapid exploration of visual ideas.
- Training to use Hyve-3D which is an immersive design and visualization system.