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RANIA LABIB

-Assistant Professor
-AI for High Performance Buildings Lab Director
-IBPSA, Houston Chapter President
-3rd Year Design Coordinator
-Undergrad Curriculum Committee Member
-Student Advisor for Tau Sigma Delta

Education and Certificates

Sep 2014 – 2019 **Texas A&M University**
PhD, Architecture (Completed, July 2019, graduation: December 2019)
United States

Dissertation title: *Façade Internet of Things (FIoT): A Human-sensing Two-Facade communication approach to Achieve Glare reduction, Optimized Daylighting, and solar energy collection*

Sep 1992 – Jul 1997 **Minia University**
5-year professional BSc, Architectural Engineering
Egypt

Post Graduate Certificates

Feb 2021 – May 2021 **Cornell University**
Online post-graduate certificate on eCornell
Machine Learning

Other notable certificates and workshops

(Completed virtually unless noted otherwise)

July 2020 **Machine Learning**
Stanford University
3-month certificate
Completed on Coursera

July 2018 **Institute for Advanced Architecture of Catalonia, Spain**
Summer School **Summer school in NYC (in person)**
Course: Digitize, Smart Architecture, Environmental sensing, Augmented Reality, and 3D scanning.

May 2016 **The University of Michigan, School of Information Technology**
6-month Certificate: Programming in Python

Completed on Coursera
Final project: Creating an SQL database and interactive map to visualize the location of top 500 universities across the world

Oct 2016 **The University of California, Irvine (UC Irvine)**
6-month Certificate: Programming for the Internet of Things, Completed on Coursera
Final project: Building a device to collect temperature, humidity, and air pressure and stream the collected data to the internet for easy access

Nov 2017 **ETH Zurich, Switzerland**
Course: Smart Cities, Completed on edx
Final project: Improving the urban layout of Empower Shack project in Cape Town, South Africa

June 2017 **IE School of Architecture and Design, Madrid, Spain**
Course: Making Architecture, Completed on Coursera

Jan 2017 **IBM**
1-month Course: A Developer's Guide to the Internet of Things (IoT), Completed on Coursera

February 2017 (workshop) **Illuminating Engineering Society** (IES)
Course: Fundamentals of Lighting
4-month Workshop (in person at a local IES chapter)

Attended Workshops

March 2021 (enrolled) **Drone Lidar surveying**
Aerial Lidar scanning
Three-day in person workshop

March 2021 (enrolled) **Drone mapping, modeling and surveying**
Mapping, modeling, and photogrammetry
4-week Virtual workshop

March 2021 (enrolled) **Drone thermal inspection**
Aerial thermal inspection
4-week Virtual workshop

August 2019 **Data Science and Machine Learning BootCamp**
Texas A&M University
Intensive two-day workshop
Topics include:

Advanced data analytics and visualization
Machine Learning

Oct 2019 **Robotic Fabrication using VR**
ACADIA conference at University of Texas at Austin
Intensive three-day workshop
Topics include:
Parametric Design enhancement for Robotic fabrication
Controlling Kuka's Robotic
Using VR technology to control the robot arm
Full-scale fabrication

Research Interests

Building performance simulations (BPS) and BPS tools development
Advanced energy modeling
Artificial Intelligence integration in the built environment
High performance building design
Utilizing high performance computing for BPS
Utilizing Artificial Intelligence with focus on ML and DL for BPS
Adaptive Facades
Connected smart facades
Smart cities
Human-centered design
Daylighting
Grasshopper custom component development in Python
Performance-based design, especially in parametric design environments.
Embedded devices, aka IoT devices, to achieve human-centered design.
Incorporating computer programing into Architectural education and research

Research Grants

July 2022 Pending NSF RUI proposal
Title: "Advancing the Energy Efficiency Analysis of the Built Environment Through Artificial Intelligence and High-Performance Computing", $285,000

January 2021 PRISE grant funded by Texas A&M University and Prairie View A&M University. Rania Labib, Co-PI: Mark Clayton and Robert Brown; Title: "An Interdisciplinary Team for Investigating a Machine Learning Framework for Predicting Outdoor Thermal Comfort to Reduce Energy Needs of Future Urban Development.". $30,000.

March 2021 Department of Education, Title III grant.

Title: Building Assembly, Environmental and Artificial Intelligence Research through STEM-based Research and Education (BAE-AIR). $500,000

September 2020 Graduate RISE grant funded by Prairie View A&M University.
Title: Cloud-enabled Building Performance Simulations. $10,000

September 2020 Undergraduate RISE grant funded by Prairie View A&M University.
Title: Machine learning for Daylighting Simulations. $5,000

Sep 2016 **National Science Foundation (NFS) Graduate Fellowship; Honor mention, $150,000.00** (Please note: Honor mention recipients don't obtain funds)

Sep 2014 Fellowship: Selected to receive the merit based McKnight Fellowship from Florida Educational Funds (declined award to attend Texas A&M). $15,000 a year for 5 years and full tuition at any University in Florida.

Awards, Scholarships, and Competitions

September 2022 The 2022 IBPSA-USA Outstanding Chapter award. The award is given to the local IBPSA Houston Chapter which I currently chair (Jan-2021 to Jan 2023).

October 2019 Travel support to attend the Advanced Manufacturing Workshop for faculty of HBCUs/MIs on November 6-8, 2019 in Alexandria, Virginia is acknowledged under NSF Grant number 1855871 and NIST Grant number 60NANB19D092. $1100

September 2019 Faculty Innovation and Enhancement travel award to attend the IBPSA conference in Rome, Italy $2600

May 2019 Faculty Innovation and Enhancement travel award to attend the Sustainable Built Environment Conference in Helsinki, Finland $3500

Nov 2017 Malcolm Verdict Memorial Poster Competition – 3rd place winner at the 2017 Texas Energy Summit.

Sep 2014 Fellowship: Selected to receive the merit based McKnight Fellowship from Florida Educational Funds (declined award to attend Texas A&M). $15,000 a year for 5 years and full tuition at any University in Florida.

Journal Publications & Conference Proceedings

Dalia Abdelfattah, Mohammed Mayhoub, Sahar Abdelwahab, Rania Labib: Facts and Myths about The Non-Visual effects of lighting on the Elderly (sleep, Mood, and Alertness). The 2023 ARCH+DESN International Conference (upcoming).

Rania Labib: *"Integrating Machine Learning with Parametric modeling Environments to Predict Buildings Daylighting Performance".* Upcoming, The 2022 Sustainable Built Environments International Conference, October 2022, Delft, Netherlands.

Rania Labib: *Machine Learning-Based Framework to Predict Single and Multiple Daylighting Simulation Outputs Using Neural Networks.* The 2021 IBPSA International conference, September 2020, Burges, Belgium.

Rania Labib: *Utilizing High Performance Computing to Improve the Application of Machine Learning for Time-Efficient Prediction of Buildings' Energy and Daylighting Performance.* The 2021 IBPC International conference, September 2021, Copenhagen, Denmark.

Rania Labib, Mark Clayton: *Automated Computer Vision Recognition Based Method to Determine Glare Causing Patches on Reflective Façades.* The 2020 PLEA Conference, September 2020, Courna, Spain

Rania Labib, Juan Carlos Baltazar: *Using Python to Automate the Preparation and Execution of Thousands of Daylighting and Glare Simulations on a Cloud Parallel Computing environment for Time-efficient Processing.* The 2019 IBPSA International Conference, September 2019, Rome, Italy.

Sahar Abdelwahab, Mariam Elhussinay, Rania Labib: *The Negative Impact of Solar Reflections Caused by Reflective Buildings' Facades in Urban Settings: Simulation-Based Case Study of the Nasher Museum in Texas,* the 2019 Sustainable Built Environment (SBE) International Conference, May 2019, Helsinki, Finland.

Rania Labib: Is computer programming beneficial to architects and architecture students for complex modeling and informed performative design decisions? 12th Advanced Building Skins, Bern, Switzerland; 10/2017

Rania Labib, Juan Carlos Baltazar: *Analysis and quantification of visual glare caused by photovoltaic panels installations in urban canyons*. 11th conference on Advanced Building Skins, Bern, Switzerland; 10/2016

Rania Labib, *Trade-off method to assess the interaction between light shelves and complex ceiling forms for optimized daylighting performance.* Advances in Building Energy Research 03/2015; 9(2). DOI:10.1080/17512549.2015.1014838

Mohammed Mayhoub, Rania Labib: *Towards A Solution for the Inevitable Use of Glazed Facades in the Arid Regions via a Parametric Design Approach*. The 29th CIE, Manchester, UK; 06/2015

Rania Labib, Liliana Beltran: *Optimized Street Design to Balance Outdoor Thermal Comfort and Indoor Daylighting Performance Within Large Scale Urban Settings in Hot Arid Climates.* 31st International PLEA; 09/2015

Rania Labib: *Trade-off Method to Assess the Interaction Between Light Shelves and Complex Ceiling Forms for Optimized Daylighting Performance*. 9th Energy Forum Advanced Building Skins, Bressenone, Italy; 10/2014 **(chosen among top 10 papers to get published in the Advances in Building Energy Research Journal)**

Rania Labib: *Improving daylighting in existing classrooms using laser cut panels*. Lighting Research and Technology 10/2013; 45(5). DOI:10.1177/1477153512471366

Rania Labib, Juan-Carlos Baltazar: *What if Buildings' Facades Could Talk to Each Other? Façade Internet of Things (F-IoT)*, 14th Annual CATEE 2017, Nov 2017. **3rd place winner poster**.

Scientific Committees and Public service

January 2021 **President of IBPSA's Houston chapter**

As of September 2019, I have been serving on the board of The Houston chapter of the International Building Performance Simulation Association (IBPSA) and, in January 2021, I was elected as president of the chapter for two years. My responsibilities include leading the effort to organize the yearly Performance Huddle conference which was held this year on Oct. 21th, 2022. Under my leadership, our chapter was awarded the 2022 IBPSA-USA Outstanding Chapter award, which was given to the chapter at the ASHRAE 2022 SimBuild conference in Chicago last September.

December 2018 to current **Peer-review for the IBPSA Conferences, 2019 BS in Rome, Italy and the 2021 BS in Burgs, Belgium**

Reviewed papers for inclusion in the International Building Performance Simulation Conference

2015 to current **Daylighting Committee, Illuminating Engineering Society (IES):**

Activities as of Nov 2018:

Currently (since 3/2018), on a special IES sub-committee to revise the RP-5-13, (a recommended practice guide published by the IES titled "Recommended Practice for Daylighting Buildings")

Journal Articles that I reviewed

December 2019 Journal**: Journal of Building Engineering**

Paper Title: A User Detective Adaptive facade towards Improving Visual and Thermal Comfort

Invited NSF Panelist

Fall 2018 Participated in a NSF's Division of Information and Intelligent Systems (IIS) review panel.

Fall 2021 Participated in a NSF's Graduate Fellowship review panel.

Invited Critique

Fall 2020 Texas A&M University

The fundamentals of Product design

Instructor: Dr. Mark Clayton

Fall 2019 School of Architecture, Prairie View A&M University,

ARCH 3256 mid-term project: Theater/performance arts center

Fall 2019 School of Architecture, Prairie View A&M University,

ARCH 3256 end-of-term project: Assisted-living housing/community center

Spring 2018 School of Architecture, Texas A&M University,

ENDS 105 mid-term project: The future of the past, Expanding Siena, Italy

Fall 2017 School of Architecture, Texas A&M University,

ENDS 105 mid-term project: A tower and skin

Summer 2016 School of Architecture, Texas A&M University,

ENDS 106 final project: A Pavilion

Summer 2016 College of Architecture, Texas A&M University,

ENDS 106 mid-term project: A public space

Spring 2015 School of Architecture, Prairie View A&M University,

ARCH 2415 final project: A house for an artist

Invited lecturer and workshops

Fall 2022 Speaker in a Podcast by the ASHRAE Journal

Title: The Impact of AI on High-Performance Buildings

Fall 2022 Speaker at the University of Houston.

Title: Machine Learning 101 for Daylighting Design

Fall 2020 Speaker at The IBPSA Houston conference (upcoming, Nov. 2020)

Title: Machine Learning for Daylighting Simulations

Spring 2015 College of Architecture, Texas A&M University,

Title: Daylighting and Glare Simulations in Parametric Environments:

A workshop for a graduate daylighting course

Spring 2016 College of Architecture, Texas A&M University,

Title: Parametric Design Using Grasshopper

A workshop for an undergraduate design communication course

Spring 2018 College of Architecture, Texas A&M University,

Title: The architecture of ancient Egypt

A lecture for a world architecture course

Artificial Intelligence for High Performance Buildings Lab, Budget $500,000

Fall 2021 to Current Established the Artificial Intelligence for High Performance Buildings Lab at the Prairie View School of Architecture to advance AI research and education for disadvantaged and minority students. Managed a team of researchers within the lab. Wrote quarterly and annual reports. Executed high-level collaborative research

Teaching experience

Both Universities: **Texas A&M and Prairie View A&M**

Fall 2014 to Current Assistant Professor at Prairie View A&M University

Course: **ARCH 3256** Design Studio V

Course: **ARCH 3266** Design Studio VI

Course: **ARCH 4234** Net Zero Energy Design I

Course: **ARCH 4234** Net Zero Energy Design II

Course: **ARCH 4347** Building Information Modeling

Course: **ARCH 2223** Computer-Aided Design

Course: **ARCH 4733** Computational design

Summer 2016 to Fall 2018 Assistant Professor at Texas A&M University

Course: **ENDS 115** Design Communication Foundation I

Course: **ENDS 105** Foundation Design Studio

Non-Teaching Graduate Assistantship (GANT) experience

Spring 2018 Graduate Assistant (non-teaching)

Duties: Preparing Energy, Daylighting, Glare, and Thermal comfort simulations and teaching material for use in a newly created course.

Certifications

In progress	Part 107 certification for drone operation (Pilot certificate)
Since 2016	Academy for Future Faculty Certificate from Texas A&M University
Since 2008	LEED AP (Leadership in Energy & Environmental Design Accredited professional) Accredited by the US Green Building Council.
Since 2000	Registered Architect in Egypt.
Since 2008	Associate AIA (American institute of Architects.)
Since 1998	A member of The Egyptian Syndicate of Engineers.

Skills and computer programming Languages

Computer Skills

AutoCAD
Bently's ContextCapture (LiDar, drone and, flood risk simulations)
Revit Architecture, including energy and building performance plugins
Rhino and algorithmic modeling using Grasshopper
EnergyPlus, eQuest, DOE 2.1E, Open Studio, and Design Builder
Sketchup
Daylight simulations software such as Diva for Rhino
Energy simulations using Autodeask Vasari, and Ecotect
Grasshopper building performance plug-ins such as Honeybee and Ladybug
Grasshopper climate analysis plug-ins such as Ladybug
Envi-met, OTC Model, and UMI for urban scale simulations
Dynamo
Microsoft office applications
Adobe Applications: Including Photoshop, Illustrator, InDesign.
Autodesk impression for presentation.

Computer Programming

Machine learning in Python
Python (experienced in writing custom Grasshopper components using Python)
HTML
JavaScript
Internet of Things (IoT)
Robotics (Arduino and Raspberry Pi)
Node Red
SQL (experienced in streaming building performance simulation results to SQL database)
Linux operating system
MQTT
Node.js

Languages	Native:	**Arabic**
	Fluent:	**English**
	Beginner:	**French**
	Beginner:	**Italian** (Currently working on improving my Italian language skills)

Citizenship Dual Citizen (Egyptian/American)

Computer Programming, Virtual reality, and Internet of Things Projects for Architectural Purposes:

2016 **Dynamic IoT-powered pavilion design**
The pavilion design project was implement under my supervision at ARCH 106 class in Texas A&M University. The students were instructed to design and prototype a simple pavilion that have dynamic shading devices, the devices are controlled by an Arduino that have light sensors connected to it. The devices rotate to block sunlight in the summer based on the information collected by the light sensors.

2016 **Online-connected weather data logger**
A data-logger that I designed, programmed, and prototyped using a Raspberry Pi and a set of sensors that collect data from the surrounding environment such as temperature, lighting level, air pressure, humidity…..etc. I programmed the raspberry pi to save the collected data in an SQL database. For the purpose of accessing the data online, , I created a dedicated webpage with an easy to read interface to display live data from the logger. The logger was used to test the indoor environment of multiple around The College of Architecture at Texas A&M University.

2017 **Custom Grasshopper component to visualize annual glare data**
A custom Grasshopper component to parse and visualize daylight glare probability (DGP) values on dynamic graphs. A combination of Python, JavaScript, and HTML were used to create the component

2018 **Silicon Wearable with embedded sensing capabilities that can connect the real world with the virtual world**
This is a group project that was completed during a summer school at the Institute for advanced architecture at Catalonia (the NY location). The smart wearable has embedded sensors that collect data of the human interaction with the surrounding environment and use this data to control the architectural proprieties of space in the virtual environment.

2018 **Custom Grasshopper component for shading and reflection analysis**

A Grasshopper component developed using Python. It is used to assess glare caused by reflective facades in urban environments in the early design phase. **The component is currently under consideration for inclusion in the next Honeybee and Ladybug's release.**

Professional Practice Experience

2012-2013
Firm
Duties:

Senior Architectural Designer/ BIM associate
Farrell Partnership Architectural firm, New Jersey

BIM using Revit Architecture on a daily basis to develop design ideas and construction documents.
Worked on commercial projects, an example project is a 22,000 sf two-story office/ warehouse building.
Coordinated with electrical, mechanical, structural, and plumbing; engineers to produce and solve issues with construction documents.

2008-2009
Firm
Duties:

Architectural Designer/ BIM associate
Farrell Partnership Architectural firm, New Jersey

Helped the firm members to convert to BIM software via Group and Individual Training sessions and continuous support.
BIM using Revit Architecture on a daily basis to develop design ideas and construction documents.
Establishing Design Ideas, and presenting them a graphic way.
Preparing construction documents (CD).
Construction field Observation.
Making sure projects are code compliant.
Preparing Bidding and contract forms.
Managing Junior Architects and intern
Attending Coordination meeting with Engineers.
Worked on pharmaceutical, commercial and offices layouts
Researched equipment, Materials and furniture to be used in different projects
Put together presentations for Worldwide Makeup and Perfume companies like L'Oreal, Symrise, and Sanofi Avantis.

Hobbies

Spending time with my family, learning foreign languages, and making things with Arduino, Raspberry Pi, and Jetson, and reading.