

# RANIA LABIB

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-Assistant Professor  
-Research Fellow  
-3rd Year Design Coordinator  
-Undergraduate 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

*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**

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

*Ongoing* **University of Michigan**  
Machine Learning using Python  
1-month certificate  
Completed 95%- Expected finish date (August 2020)

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

## Attended Workshops

*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

Advanced Building Performance Simulations  
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.  
Sustainable Building Design, with a focus on high performance daylighting systems.  
Incorporating computer programming into Architectural education and research

## Research Grants

- 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
- November 2020* **PENDING:** NSF CAREER grant.  
Title: Accelerating the Built Environment Performance Simulations through a Machine Learning-enabled cloud Platform. \$527,000
- March 2021* **PENDING:** Department of Education, Title III grant.  
Title: Building Assembly, Environmental and Artificial Intelligence Research through STEM-based Research and Education (BAE-AIR). \$132,000
- 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

- 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 – 3<sup>rd</sup> place winner at the 2017 Texas Energy Summit.
- Nov 2016* Scholarship: The Illuminating Engineering Society (IES) Emerging Professionals Scholarship. \$1000
- Sep 2016* Scholarship: Charles and Bonny Culp '06 Research award at Texas A&M University. \$1000
- Oct 2015* Scholarship: The Illuminating Engineering Society (IES) Young Professionals Scholarship. \$1000
- Sep 2015* Scholarship: Norman & Renee Zelman Endowed Scholarship at Texas A&M University. \$1000
- Sep 2014* Scholarship: Norman & Renee Zelman Endowed Scholarship at Texas A&M University. \$2000
- 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

Rania Labib: *Early investigation of the application of Machine Learning for Daylighting design*. Submitted to the 2021 IBPSA International conference, September 2020, Burges, Belgium (upcoming)

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

Rania Labib, Mark Clayton: *The Negative Impact of Solar Reflections in Dense Urban areas: Literature Review and the Case Study of the Nasher Museum in Dallas, Texas*. Preparing for submission to the Energy and Buildings journal

Rania Labib: *Using Python to Automate Both Complex Geometry Manipulation Tasks and Model Animation Paired with Daylight Simulations*. The 2020 World Sustainable Built Environment conference (WSB), Gothenburg, Sweden. (upcoming conference presentation)

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. **3<sup>rd</sup> place winner poster**.

Work on progress: Rania Labib, Juan Carlos Baltazar: *Analysis and quantification of visual glare caused by photovoltaic panels installations in urban canyons*. For submission to the Energy and Buildings Journal

## Scientific Committees

December 2019 **Nominated for serving as a member of the IBPSA board of directors**  
IBPSA's elections results will be announced in February 2020

December 2018 to **Peer-review for the IBPSA Conference, Rome, Italy**  
current

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")

## Peer-Reviewed Articles

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

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

## Invited Critique

*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 taught workshops

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

## Machine learning for Daylighting simulations

- Spring 2015* College of Architecture, Texas A&M University,  
Daylighting and glare simulations in Parametric Environments:  
A workshop for a graduate daylighting course
- Spring 2016* College of Architecture, Texas A&M University,  
Parametric Design Using Grasshopper  
A workshop for an undergraduate design communication course
- Spring 2018* College of Architecture, Texas A&M University,  
The architecture of ancient Egypt  
A lecture for a world architecture course

## Teaching experience

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

- Fall 2020* Assistant Professor at Prairie View A&M University  
Course: **ARCH 3266** Design Studio VI  
Course: **ARCH 4234** Net Zero Energy Design I
- Spring 2020* Assistant Professor at Prairie View A&M University  
Course: **ARCH 3266** Design Studio VI  
Course: **ARCH 4234** Net Zero Energy Design II
- Fall 2019* Assistant Professor at Prairie View A&M University  
Course: **ARCH 3256** Design Studio V  
Course: **ARCH 4233** Net Zero Energy Design
- Summer 2019* Assistant Professor at Prairie View A&M University  
Course: **ARCH 4986** Design Studio VII
- Spring 2019* Assistant Professor at Prairie View A&M University  
Course: **ARCH 3266** Design Studio VI  
Course: **ARCH 4333** Computational Design (Rhino and Grasshopper)  
Course: **ARCH 4347** Building Information Modeling
- Fall 2018* Assistant Professor at Prairie View A&M University  
Course: **ARCH 3256** Design Studio V

- Course: **ARCH 2223** Computer-Aided Design
- Course: **ARCH 4347** Building Information Modeling
- Fall 2017* Professor of Record at Texas A&M University
- Course: **ENDS 115** Design Communication Foundation I
- Adjunct assistant professor at Prairie View A&M University
- Course: **ARCH 4743** Building Information modeling
- Spring 2017* Professor of Record at Texas A&M University
- Course: **ENDS 115** Design Communication Foundation I
- Course: **ENDS 105** Foundation Design Studio
- Adjunct assistant professor at Prairie View A&M University
- Course: **ARCH 4733** Computational design
- Fall 2016* Professor of Record at Texas A&M University
- Course: **ENDS 115** Design Communication Foundation I
- Adjunct assistant professor at Prairie View A&M University
- Course: **ARCH 4737** Building Information modeling
- Summer 2016* Professor of Record at Texas A&M University
- Course: **ENDS 116** Design Communication Foundation II
- Spring 2016* Adjunct assistant professor at Prairie View A&M University
- Course: **ARCH 4733** Computational design
- Course: **ARCH 5737** Advanced Building Information modeling
- Fall 2015* Adjunct assistant professor at Prairie View A&M University
- Course: **ARCH 4737** Building Information modeling
- Spring 2015* Adjunct assistant professor at Prairie View A&M University
- Course: **ARCH 4733** Computational design
- Course: **ARCH 5737** Advanced Building Information modeling
- Fall 2014* Adjunct assistant professor at Prairie View A&M University
- Course: **ARCH 4737** Building Information modeling

## 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

- 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  
Revit Architecture, including energy and building performance plugins  
Rhino and algorithmic modeling using Grasshopper  
Energy Plus, eQuest, DOE 2.1E, Open Studio, and Design Builder  
Sketchup  
Daylight simulations software such as Diva for Rhino  
Energy simulations using Autodesk 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**  
Intermediate: **French**  
Beginner: **German**  
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 implemented under my supervision at ARCH 106 class in Texas A&M University. The students were instructed to design and prototype a simple pavilion that has dynamic shading devices, the devices are controlled by an Arduino that has 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 properties 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

**Senior Architectural Designer/ BIM associate**

Firm

**Farrell Partnership Architectural firm, New Jersey**

Duties:

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

**Architectural Designer/ BIM associate**

Firm

**Farrell Partnership Architectural firm, New Jersey**

Duties:

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 and the Raspberry Pi

Reading