Mostafa **Akbari**

Architect · Computationl Designer

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Summary

Architect and designer, Mostafa Akbari, is a Ph.D. researcher at Polyhedral Structures Laboratory at the University of Pennsylvania, Weitzman School of Design. He conducts research at the intersection of computational design, digital fabrication, materials science and structural design, and applies that knowledge to design across disciplines, media and scales—from the micro to macro scale. Mostafa's goal is to augment the relationship between design and science by employing design principles inspired and engineered by Nature, and implementing them in the invention of novel design technologies.

Education

University of Pennsylvania — *PA, USA*
Doctor of Philosophy in Architectural Technology (Focused on Advanced Structural Design) — *2019-2023*
- Certificate of Advanced Scientific Computing
- Advisor: Dr. Masoud Akbarzadeh (Penn- Architecture), co-advisor: Dr. Andrej Kosmrlj (Princeton- Mechanical Engineering), Committee members: Dr. Tomohiro Tachi (Tokyo-Architecture/ Graphic Science), Dr. Shu Yang (Penn-Material Science), Dr. Franca Trubiano (Penn-Architecture)

University of Pennsylvania — *PA, USA*
Master of Science in Design, Advanced Architectural Design — *2017-2018*
- Concentrating on Computational Design and Robotic Manufacturing
- Winner of the highest merit-based scholarship based on excellent qualifications

Shahid Beheshti University (SBU) — *Tehran, Iran*
Master of Architecture — *2013-2016*
- Graduated with honors
- Thesis: Marine Passenger Terminal Design Based on Optimizations of Qualitative Aspects of Circulation Utilizing Pedestrian Simulation

University of Tehran — *Tehran, Iran*
Bachelor of Architecture — *2008-2013*
- Graduated with honors

Academic Experience

Polyhedral Structures Lab (PSL), University of Pennsylvania — *PA, USA*
Research Associate — *2018 - PRESENT*
- Computational form-finding and structural design in the context of graphic statics
- Developing novel algorithmic tools for designing cellular structures with complex morphology

Contemproray Theory (Digitalization), University of Pennsylvania — *PA, USA*
Teaching Fellow — *2021*
- Teaching around 40 students in two different recitation sessions

Penn Design Summer Institute, Digiblast workshop, University of Pennsylvania — *PA, USA*
Teaching Assistant — *2021*
- Enhancing students' abilities to use digital tools

Material Formation, University of Pennsylvania — *PA, USA*
Part-time Lecturer — *2018 - 2020*
- Robotic clay-printing and shell topology optimization based on structural analysis

Advanced Robotic Fabrication In Architecture, University of Pennsylvania — *PA, USA*
Part-time Lecturer — *2018 - 2019*
- Designing shell-based micro-structures using robotic wire-cutting.

Advanced Structural Design Studio, University of Pennsylvania *PA, USA*

PART-TIME LECTURER *2018 - 2019*

- Designing an airport using a geometric structural form-finding technique

Professional Practice 2, University of Pennsylvania *PA, USA*

TEACHING ASSISTANT *2018*

- A series of workshops that introduce students to a diverse range of practices

Laboratory Assistant, University of Pennsylvania *PA, USA*

GRADUATE ASSISTANT *2018 - 2019*

- Maker Bot 3D printers hardware and software specialist

Architectural Design studios 3 and 4, Shahid Beheshti University (SBU) *Tehran, Iran*

TEACHING ASSISTANT *2014, 2015*

- Bechelor's program, Structural Design Studio

Invited Book Chapters

2022   M. Akbarzadeh, M. Akbari, Compression-only Form Finding, Shellular Funicular Structures. In *Cambridge University Press, in progress*, Cambridge, 2022.

Peer-Reviewed Papers

2023   Z. Hsain, M. Akbari, M. Akbarzadeh, J Pikul, Electrochemical Healing as an Alternative to Welding: A Framework for Full Strength Recovery in Fractured Metals. *Advanced Materials*, 2023.

2022   M. Akbari, M. Akbarzadeh, Continuous Approximation of Shellular Funicular Structures. In *proceedings of the IASS Anual Symposium*, Beijing, China 2022.

2022   M. Akbari, M. Akbarzadeh, On the Design of Shellular Funicular Structures.*Structures, in progress*, 2022.

2022   M. Akbari, Anvitha Sudhakar, Andrej Kusmrlj, M. Akbarzadeh, Simulating the Self-folding Behavior of Shell Structures. *Science, in progress*, 2022.

2022   M. Akbari, M. Mirabolghasemi, A. Akbarzadeh, M. Akbarzadeh, Strut-based Cellular to Shellular Funicular Polyhedral Materials. *Advanced Functional Material*, 2022.

2021   M. Akbari, Y. Lu, and M. Akbarzadeh, From design to the fabrication of shellular funicular structures. *Proceedings of the Association for Computer-Aided Design in Architecture (ACADIA)*, 2021.

2020   M. Akbarzadeh et al., Saltatur: Node-based Assembly of Funicular Spatial Structures *Proceedings of the Association for Computer-Aided Design in Architecture (ACADIA)*, 2020.

2020   M. Akbari, M. Mirabolghasemi, A. Akbarzadeh, M. Akbarzadeh, Geometry-based Structural Form-finding to Design Architected Cellular Solids *ACM Symposium on Computational Fabrication (ACM-SCF)*, Virtual Conference, 2020.

2019   M. Akbari, M. Bolhasani, M. Akbarzadeh, From Polyhedral to Anticlastic Funicular Spatial Structures In *proceedings of the IASS Anual Symposium*, Barcelona, Spain, 2019.

2018   M. Akbari, W. Huang, Montreal, Sensate and Augmented In *Pressing Matter 8, University of Pennsylvania, School of Design*, 2018.

2016   M. Akbari, K. Safamanesh, L. Bahrami, Optimization of Qualitative and Motional Aspects Marine Passenger Terminal Based on an Innovative Approach for Pedestrian Simulation In *International Conference on Civil Engineering, Architecture, and Cityscape (ICCACS)*, Istanbul, Turkey, 2016.

Software Products

2022   M. Akbari et al., PolyFrame, Grasshopper Plugin, https://www.food4rhino.com/app, , 2022.

Honors and Awards

2022   Shellular Funicular Structures research - featured on the cover page of Advanced Functional Material Journal.

2020   Winner of the silver A' Design award for Saltatur structure - Polyhedral Structures Lab.

2019   Winner of the full merit-based scholarship for Ph.D. in Architectural Technology at the University of Pennsylvania based on excellent qualifications.

2019	Fusong project - listed as the top 50 best drawings in the Architizer's one drawing challenge.
2018	Homuncular Heterotopía - the project featured on the Notas CPAU Magazine.
2017	Winner of the highest merit-based scholarship based on excellent qualifications at the University of Pennsylvania.
2017	Third place - Digital Design competition, Master of Advanced Architectural Design, University of Pennsylvania.
2013	National full scholarship for graduate studies at Shahid Beheshti University (SBU), Tehran, Iran.
2013	Ranked 21 among more than 50 thousands applicants on the national univesity entrance exam for graduate study in Architecture, Iran.
2008	National full scholarships for undergraduate studies, Tehran, Iran.

Synergistic Activities

2022	Peer Reviewer, Association of Computer Aided Design in Architecture (ACADIA).
2022	Peer Reviewer, University of Pennsulvania, Ph.D. Conference (Precarity).
2022	Conference Organizer, University of Pennsulvania, Ph.D. Conference (Precarity).

Invited Lectures/ workshops

2022	University of Pennsulvania, Weitzman School of Design Philadelphia, U.S., invited by Dr.Masoud Akbarzadeh. Title: *Designing Shellular Funicular Structures (workshop).*
2022	University of Tehran Tehran, Iran, (virtual talk), invited by Dr. Katayoon Taghizadeh. Title: *Shell-based cellular funicular structures.*
2021	World CAAD Ph.D workshop virtual talk, invited by SIGraDi. Title: *Ph.D. thesis, Shellular Funicular Structures.*
2019	City Collage of NewYork New York, U.S., invited by Dr. Mohamad Bolhassani. Title: *3D Graphic Statics (workshop).*

Professional Experience

Gensler *CA, USA*
Professional Architecture Summer Intern *2018*
- Architectural designing, digital rendering, advanced 3D modeling, and building information modeling.
- Attending Evolo competition as a part of the internship program.

Intelligent Design Studio *Tehran, Iran*
Chief Architect, Computational Designer *2015 - 2017*
- Designing and supervising the execution of interior design projects.

Diargah Consultant *Tehran, Iran*
Junior Architect *2013 - 2014*
- Architectural designing, digital rendering, and 3D modeling.

U.N. Agencies *Tehran, Iran*
Young Registered Member *2002 - 2003*
- Working with UNESCO and WHO as a young registered member.

Design Competitions

2018	Evolo Idea Competition
2018	HOK Future Design Challenge
2015	Kish Parkway and International Square Design
2015	Mirmiran Bionic Conceptual Design
2014	The Gugenheim Helsinki Museum Design

Skills

Programming Languages	Python, Java, C++, Processing, Arduino.
Digital Fabrication	ABB Robot Arm 3D printing and Wire-cutting.
3D Modeling	Maya, Rhino, Grasshopper, Blender, Revit, 3DMax, AutoCad, Sketch up.
Presentation	Latex, Adobe Suite, Keyshot, Vray.
Others	Ansys, VR HTC Vive, Pedestrian Dynamics.
Languages	English, Persian, French (Intermediate), Arabic (Intermediate).