Yao Lu

Ph.D., M.S., M.Arch, B.Eng

Last updated: January 20, 2025

4201 Henry Avenue
Smith House Room 107
Thomas Jefferson University
Philadelphia, PA 19144
Email: Yao.Lu@jefferson.edu
Tel: +1 (607) 262-4344

Short Bio

Yao Lu is an Assistant Professor of Architecture at Thomas Jefferson University. He is a researcher and designer with specialization in combining emerging computational technologies with structures as a generative design tool. As a researcher, he was awarded the Hangai Prize medal at the International Association for Shell and Spatial Structures (IASS) Annual Symposium in 2022 and received the YoungCAADRIA Award at the 2020 International Conference of the Association for Computer-Aided Architectural Design Research in Asia (CAADRIA) for his research on efficient structures and computational methodologies. As a designer and builder, his projects have received several awards including the R & D Award of 2022 and the DigitalFUTURES Project Award of 2022. As a software developer, the computational tools he developed have been downloaded thousands of times by worldwide users.

Education

- **University of Pennsylvania** — Philadelphia, PA, US
  ***Ph.D.** in Architecture* — *Aug 2020 - Aug 2024*
- **Cornell University** — Ithaca, NY, US
  ***M.S.** in Matter Design Computation* — *Aug 2018 - May 2020*
- **Tongji University** — Shanghai, China
  M.Arch — *Sep 2014 - June 2017*
- **Tongji University** — Shanghai, China
  ***B.Eng** in Architecture* — *Sep 2010 - May 2014*

Publications

Peer-Reviewed Journal Papers

- Joseph Robert Yost, Matthew Cregan, Damon Bolhassani, Philipp Amir Chhadeh, Jens Schneider, **Yao Lu**, and Masoud Akbarzadeh. Experimental investigation of the bearing capacity between short hollow glass columns and a transparent thermoplastic interface material. *Engineering Structures*, 325:119407, February 2025. ISSN 0141-0296. doi: 10.1016/j.engstruct.2024.119407
- **Yao Lu**, Márton Hablicsek, and Masoud Akbarzadeh. Algebraic 3D graphic statics with edge and vertex constraints: A comprehensive approach to extend the solution space for polyhedral form-finding. *Computer-Aided Design*, 166:103620, Jan 2024. doi: 10.1016/j.cad.2023.103620
- **Yao Lu**, Thamer Alsalem, and Masoud Akbarzadeh. A method for designing multi-layer sheet-based lightweight funicular structures. *Journal of the International Association for Shell and Spatial Structures*, 63(4):252–262, Dec 2022a. doi: 10.20898/j.iass.2022.018
- **Yao Lu**, Alireza Seyedahmadian, Philipp Amir Chhadeh, Matthew Cregan, Mohammad Bolhassani, Jens Schneider, Joseph Robert Yost, Gareth Brennan, and Masoud Akbarzadeh. Funicular glass bridge prototype: design optimization, fabrication, and assembly challenges. *Glass Structures & Engineering*, 7(2):319–330, Aug 2022c. ISSN 2363-5150. doi: 10.1007/s40940-022-00177-x

Peer-Reviewed Conference Papers

- Damon Bolhassani, Delaram Hassanlou, Fahimeh Yavartanoo, Masoud Akbarzadeh, **Yao Lu**, Joseph R. Yost, Jorge H. Chacon, Jens Schneider, and Philipp A. Chhadehd. Numerical analysis with experimental verification of a multi-layer sheet-based funicular glass bridge. In Philippe Block, Giulia Boller, Catherine DeWolf, Jacqueline Pauli, and Walter Kaufmann, editors, *Proceedings of the IASS 2024 Symposium: Redefining the Art of Structural Design*, Zurich, Switzerland, Aug 26-30 2024
- Joseph Robert Yost, Jorge Huisa Chacon, **Yao Lu**, Masoud Akbarzadeh, Damon Bolhassani, Fahimeh Yavartanoo, Phillipp Amir Chhadeh, and Jens Schneider. Experimental behavior of a prototype 3m-span modular glass pedestrian bridge. In *Challenging Glass Conference Proceedings*, volume 9. Stichting OpenAccess Foundation, June 2024. doi: 10.47982/cgc.9.620. URL http://dx.doi.org/10.47982/cgc.9.620
- Hua Chai, **Yao Lu**, Márton Hablicsek, and Masoud Akbarzadeh. Generation of a compression-tension combined funicular polyhedral beam structure. In *Proceedings of IASS 2023 symposium Integration of Design and Fabrication*, Melbourne, Australia, July 10-14 2023

- **Yao Lu**, Hua Chai, and Masoud Akbarzadeh. Towards a novel form-finding approach using matrix analysis: exploiting nodal displacements of pin-jointed frameworks. In *Proceedings of IASS Symposium and Spatial Structures Conference 2023, Integration of Design and Fabrication*, Melbourne, Australia, July 2023a
- **Yao Lu**, Márton Hablicsek, and Masoud Akbarzadeh, Abdolhamid Akbarzadeh. 3D auxetic materials designed with algebraic polyhedral graphic statics. In *Proceedings of IASS Symposium and Spatial Structures Conference 2023, Integration of Design and Fabrication*, Melbourne, Australia, July 2023b
- **Yao Lu**, Alireza Seyedahmadian, Philipp Amir Chhadeh, Matthew Cregan, Mohammad Bolhassani, Jens Schneider, Joseph Robert Yost, Gareth Brennan, and Masoud Akbarzadeh. Tortuca: An ultra-thin funicular hollow glass bridge. In *The Projects Catalog of the 42nd Annual Conference for the Association for Computer Aided Design in Architecture (ACADIA)*, pages 166–171, Philadelphia, PA, October 27-29 2022b
- Joseph Robert Yost, Matthew Cregan, Mohammad Bolhassani, Masoud Akbarzadeh, **Yao Lu**, Philipp Amir Chhadeh, and Jens Schneider. Experimental investigation of a transparent interface material for glass compression members. In *Proceedings of Challenging Glass Conference 8*, volume 8, Ghent, Belgium, Jun 2022. doi: 10.47982/cgc.8.395
- Mostafa Akbari, **Yao Lu**, and Masoud Akbarzadeh. From design to the fabrication of shellular funicular structures. In *Proceedings of the 41st Annual Conference of the Association for Computer Aided Design in Architecture (ACADIA)*, Virtual, Online, Nov 2021. URL https://papers.cumincad.org/cgi-bin/works/paper/acadia21_328
- Yulun Liu, **Yao Lu**, and Masoud Akbarzadeh. Kerf bending and zipper in spatial timber tectonics: A polyhedral timber space frame system manufacturable by 3-axis cnc milling machine. In *Proceedings of the 41st Annual Conference of the Association for Computer Aided Design in Architecture (ACADIA)*, Virtual, Online, Nov 2021. URL https://papers.cumincad.org/cgi-bin/works/paper/acadia21_354
- **Yao Lu**, Matthew Cregan, Philipp Chhadeh, Alireza Seyedahmadian, Mohammad Bolhassani, Jens Schneider, Joseph Yost, and Masoud Akbarzadeh. All glass, compression-dominant polyhedral bridge prototype: form-finding and fabrication. In *Proceedings of the 7th International Conference on Spatial Structures and the Annual Symposium of the IASS*, pages 326–336, Surrey, UK, Aug 2021
- **Yao Lu**, Eda Begum Birol, Colby Johnson, Christopher Hernandez, and Jenny Sabin. A method for load-responsive inhomogeneity and anisotropy in 3D lattice generation based on ellipsoid packing. In *Proceedings of the 25th Annual Conference of The Association for Computer-Aided Architectural Design Research in Asia (CAADRIA)*, pages 395–404, Bangkok, Thailand, Aug 2020. URL http://papers.cumincad.org/cgi-bin/works/paper/caadria2020_257
- Eda Begum Birol, **Yao Lu**, Ege Sekkin, Colby Johnson, David Moy, Yaseen Islam, and Jenny Sabin. POLYBRICK 2.0: Bio-integrative load bearing structures. In *Proceedings of the 39th Annual Conference of the Association for Computer Aided Design in Architecture (ACADIA)*, pages 222–233, Austin, USA, October 2019. URL http://papers.cumincad.org/cgi-bin/works/paper/acadia19_222

Book Chapters

- (Copy-editing) Masoud Akbarzadeh, Márton Hablicsek, and **Yao Lu**. Chapter 7: Algebraic Formulations of Polyhedral Graphic Statics. In Masoud Akbarzadeh (Ed.) *Polyhedral Graphic Statics: A Design Guide For Funicular Structural Form-Finding*. Cambridge University Press

Theses & Dissertation

- **Yao Lu**. *Lightweight, Efficient Sheet-Based Spatial Structures Designed With Polyhedral Graphic Statics*. Ph.d., University of Pennsylvania, United States – Pennsylvania, 2024
- **Yao Lu**. POLYBRICK 2.0: Bio-Integrative Load-Bearing Lattice Structures. Master of Science in Matter Design Computation, Cornell University, United States – New York, 2020
- **Yao Lu**. Inspiration of Concrete Shells: Investigating the Structural Legacy of Félix Candela. Master of Architecture, Tongji University, China – Shanghai, 2017

Articles by Others – Featuring Lu's Work

- Tecture Mag editorial department. CNCによるデジファブ建築特集. *TECTURE MAG (テクチャーマガジン)*, August 2023. URL https://mag.tecture.jp/feature/20230830-cnc-architecture/
- Tecture Mag editorial department. ガラスが構造材の透明な橋!? *TECTURE MAG (テクチャーマガジン)*, September 2022. URL https://mag.tecture.jp/culture/20220915-tortuca/
- Edward Keegan. R+D Award: Tortuca. *Architect*, pages 70–71, Aug 2022. URL https://www.architectmagazine.com/awards/r-d-awards/r-d-award-tortuca_o
- Jenny Sabin. Sabin Design Lab: PolyBrick Series. *A+U Magazine*, 595:162–173, March 2020

Exhibitions

- **December 2024 - April 2025** Corning Museum of Glass
  The Ten-Meter Glass Bridge: A Clear Path to Sustainability
- **May 2022** Eventscape, NY
  An NYC×Design Festival activity: A three-meter glass bridge prototype

Research Grants and Funding

- **2024, PI** JeffSmart Seed Grant, $10,000
  Title: *Reducing Structural Carbon Emissions: Using Fabric Formwork for Lightweight, Carbon-Absorbing Concrete Thin Shell Structures*

Honors and Awards

- **2022** IASS Hangai medal
  Webpage: www.design.upenn.edu/architecture/graduate/post/phd-researcher-wins-hangai-prize-iass-2022
- **2022** R&D Award
  Webpage: www.architectmagazine.com/awards/r-d-awards/r-d-award-tortuca_o
- **2022** DigitalFUTURES Project Award
  Webpage: digitalfutures.international/project-award/
- **2022** Dezeen Award longlisted
  Webpage: www.dezeen.com/awards/2022/longlists/tortuca/
- **2020** Young CAADRIA Award
- **2017** 1st Prize of Youth Design Competition for Suqian City
- **2016** 3rd Prize of International Student Urban Design Competition for Shanghai Railway Station (Group Work)
- **2015** 2nd prize of Shanghai College Students' Modern Drama Festival (Group Work)
- **2014** 1st Prize of Vertical City Asia International Competition (Group Work)
- **2014** 1st Prize of Architecture Competition of Taiwan and Mainland Students (Group Work)
- **2013** 2nd Prize of East Asia Architecture and Urban Planning Competition

Software Products

- **PolyFrame 2** A polyhedral funicular form-finding plug-in for Rhino® and Grasshopper®
  Download: www.food4rhino.com/en/app/polyframe-2
- **Earthworms** A Python scripting environment for Rhino® with enhanced interactivity and flexibility
  Download: www.food4rhino.com/app/earthworms
- **PolyBrick** A load-responsive lattice generation plug-in for Grasshopper® (available upon request)
  Demo: yaolu.page/polybrick_plugin

Teaching

Courses

- **2025 Spring Coordinator and Instructor** of the design studio *ARCH 412 Design 8 for Architecture: Comprehensive Studio* at Thomas Jefferson University
- **2025 Spring Coordinator** of the seminar *ARCH 416 Tech 5: Documentation and Detailing* at Thomas Jefferson University
- **2024 Fall Instructor** of the design studio *ARCH 412/615 Design 8 for Architecture: Comprehensive Studio* at Thomas Jefferson University
- **2024 Fall Instructor** of the seminar *ARCH 416/645 Tech 5: Documentation and Detailing* at Thomas Jefferson University
- **2023 Fall Instructor** of the seminar *ARCH 7326 Tech Designated Elective: Developing Computational Solutions for Design Problems* at University of Pennsylvania, co-teach with Mostafa Akbari
- **2023 Spring Teaching Fellow** of the design studio *ARCH 602 Generative Prefabrication: A Design Research In Building Prefabrication and Assembly*, Instructor: Prof. Masoud Akbarzadeh
- **2021 Spring Teaching Fellow** of the design studio *ARCH 705 Innovative Mid-rise Timber: Timber Tectonics Meets Spatial Force Flow*, Instructor: Prof. Masoud Akbarzadeh
- **2020 Spring TA** of the design studio *Cinecitta to Thin Cities*, Instructor: Prof. John Zissovici
- **2019 Fall TA** of the design studio *The Anthropocene Style*, Instructor: Prof. Sarosh Anklesaria
- **2019 Spring TA** of the design studio *ARCH 5116 Matter Design Computation: Human-centered Adaptive Architecture in the UAE*, Instructor: Prof. Jenny Sabin
- **2018 Fall TA** of the lecture *ARCH 2614/5614 Building Technology*, Instructor: Prof. Jonathan Ochshorn

Workshops

- **2023 August Instructor** of the *IASS 2023 Masterclass on PolyFrame 2*, co-teach with Prof. Masoud Akbarzadeh
- **2023 April Instructor** of the *Workshop for Summum Engineering on PolyFrame 2*

Guest Lectures & Talks

- **2023 May Guest lecture** *Introduction to Polyhedral Graphic Statics* and *Algebraic Formulations of Polyhedral Graphic Statics* for the course *Performance-based Design in Architecture* at Tongji University
- **2022 May Guest talk** *Computational design of Tortuca the glass bridge* for the *Glass Bridge Exhibition & Presentation* at the NYC×Design festival.

Consulting

- **SOM - Skidmore, Owings & Merrill** — Chicago, IL
  Software Developing Consultant — *Dec 2024 - Aug 2025*

Scholarly Service

- **2025** Peer reviewer, ARCC 2025 International Conference
- **Since 2024** Peer reviewer, Architectural Intelligence
- **Since 2022** Peer reviewer, Annual Conference of the Association for Computer Aided Design in Architecture (ACADIA)
- **Since 2021** Peer reviewer, Annual Conference of The Association for Computer-Aided Architectural Design Research in Asia (CAADRIA)

Employment

- **Thomas Jefferson University** — Philadelphia, PA
  Assistant Professor — *Aug 2024 - Present*
- **University of Pennsylvania** — Philadelphia, PA
  Doctoral Teaching Fellow — *Aug 2020 - August 2024*
- **JSLab, Cornell University** — Ithaca, NY
  Research Assistant — *Aug 2018 - May 2020*
- **Cornell University** — Ithaca, NY
  Teaching Assistant — *Aug 2018 - May 2020*
- **Tongji Architectural Design Co. (TJAD)** — Shanghai, China
  Part-time Junior Architect — *Oct 2014 - May 2017*