

Yefan Zhi

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Yefan Zhi is a second-year Ph.D. student in *Architecture* at the *University of Pennsylvania*. His research optimizes the energy and material efficiency of architectural structures from design-for-manufacturing perspectives. His work extensively exploits computational geometry and graph algorithms for automating fabrication rationalization and enabling fabrication-oriented design. Yefan is a member of the *Polyhedral Structures Laboratory (PSL)* concentrating on advancing structural and architectural geometry and construction technologies.

Yefan is a certified forklift driver and run *marathons*.

Education

Doctor of Philosophy - PhD, Architecture, *University of Pennsylvania Philadelphia, PA, US* Jul 2023 - Present

Master of Science in Design - MSD, Architecture, *University of Pennsylvania Philadelphia, PA, US* Aug 2021 - Aug 2022

Bachelor of Architecture - BArch, Architecture, *Tsinghua University Beijing, China* Aug 2016 - Jun 2021

Bachelor of Arts - BA, Sociology, *Tsinghua University Beijing, China* Aug 2016 - Jun 2020

Experience

Polyhedral Structures Laboratory, University of Pennsylvania Philadelphia, PA, US

- PhD Fellow, Full-Time. National Science Foundation (NSF) Future Manufacturing Research Grant Jul 2023 - Present

- Research Assistant, Full-Time. Advanced Research Projects Agency-Energy (ARPA-E) Grant Sep 2022 - Jun 2023

People's Architecture Office Beijing, China

- Research Intern, Full-Time Jul 2019 - Sep 2019

Journal Papers (Peer-reviewed)

[J4] *Automated Toolpath Design of 3D Concrete Printing Structural Components*

Yefan Zhi, Hua Chai, Teng Teng, Masoud Akbarzadeh

Additive Manufacturing 2025

[J3] *Prototyping High-Fidelity Multifunctional Objects Using Single-Nozzle Multi-Filament Additive Manufacturing System with Active Mixing*

Teng Teng, Yefan Zhi, Masoud Akbarzadeh

Materials and Design 2025

[J2] *Designing 3D-Printed Concrete Structures with Scaled Fabrication Models*

Yefan Zhi, Teng Teng, Masoud Akbarzadeh

Architectural Intelligence 2024

[J1] *Research on the Villagers' Behavior Characteristics in Rural Area: Analysis Using Spatio-Temporal Data from Wi-Fi and Surveillance Video*

Yefan Zhi, Ziyu Huang, Weixin Huang

Urban, Environment, Design (UED) 2023 in Chinese, on Cover

Conference Papers (Peer-reviewed)

[C7] *Functionally Graded Architectural Materials: Integrated and Tailored Thermal Insulation through Gradient Multimaterial Additive Manufacturing for Masonry Architectural Components*

Teng Teng, Yefan Zhi, Masoud Akbarzadeh

Association for Computer Aided Design in Architecture (ACADIA) Annual Conference 2024 Banff, Canada

Best Paper Award (Runner-Up)

- [C6] **The Effect of Post-tensioning on the Behavior of Small-Scale 3D-Printed Concrete Beams**
Damon Bolhassani, Fahimeh Yavartanoo, Javier Tapia, Masoud Akbarzadeh, Maximilian E. Ororbia, Hua Chai, Yefan Zhi, Mylene Bernard, Leon Trouset, Karolina Pajak, Blaise Waligun, Paul Kassabian
International Association for Shell and Spatial Structures (IASS) Annual Symposia 2024 Zurich, Switzerland
- [C5] **Experimental Study of a Funicular Concrete Beam Prototype**
Maximilian Ororbia, Hua Chai, Yefan Zhi, Pouria Vakhshouri, Jorge Huisa Chacon, Joseph R. Yost, Mathias Bernhard, Fahimeh Yavartanoo, Javier Tapia, Damon Bolhassani, Mylene Bernard, Leon Trouset, Karolina Pajak, Blaise Waligun, Paul Kassabian, Masoud Akbarzadeh
International Association for Shell and Spatial Structures (IASS) Annual Symposia 2024 Zurich, Switzerland
- [C4] **Design Approach for a Post-tensioned Funicular Concrete Beam**
Hua Chai, Maximilian Ororbia, Yefan Zhi, Ryan Welch, Billie Faircloth, Fahimeh Yavartanoo, Damon Bolhassani, Masoud Akbarzadeh
International Association for Shell and Spatial Structures (IASS) Annual Symposia 2024 Zurich, Switzerland
- [C3] **Diamanti: 3D-Printed, Post-tensioned Concrete Canopy**
Masoud Akbarzadeh, Hua Chai, Yefan Zhi, Maximilian E. Ororbia, Teng Teng, Mathias Bernhard, Damon Bolhassani, Fahimeh Yavartanoo, Javier Tapia, Karolina Pajak, Mylene Bernard, Leon Trouset, Paul Kassabian, Blaise Waligun
FABRICATE 2024 Copenhagen, Denmark
- [C2] **Local Optimization of Self-Supporting Shell Structures in 3D Printing: a Skeleton Method**
Yefan Zhi, Hua Chai, Teng Teng, Masoud Akbarzadeh
International Association for Shell and Spatial Structures (IASS) Annual Symposia 2023 Melbourne, Australia
- [C1] **Continuous Multi-Filament 3D Printing for Tension-Compression Structure Components**
Teng Teng, Yefan Zhi, Kun-Hao Yu, Shu Yang, Masoud Akbarzadeh
International Association for Shell and Spatial Structures (IASS) Annual Symposia 2023 Melbourne, Australia

Theses

A Wi-Fi and Video Data-Based Study on Spatial-Temporal Characteristics of Rural Space Behavior

Yefan Zhi, Advised by Weixin Huang

Bachelor of Architecture thesis 2021, Tsinghua University Beijing, China, in Chinese

Forming Norms in a Small Community: a Sociological Study of Birdwatching

Yefan Zhi, Advised by Yue Du

Bachelor of Arts in Sociology thesis 2020, Tsinghua University Beijing, China, in Chinese

Software

Ovenbird, A cross-scale shell printing slicer and optimizer

Yefan Zhi, Hua Chai, Teng Teng, Masoud Akbarzadeh

Sep 2022 - Oct 2024

BibGallery, A light, simple literature management library on Python

Yefan Zhi

Dec 2022 - Present

Exhibitions

Advanced Research Projects Agency–Energy (ARPA-E) Energy Innovation Summit 2023 Washington, DC, US Apr 2023

- Technology showcase, part of University of Pennsylvania

Association for Computer Aided Design in Architecture (ACADIA) Conference 2022 Philadelphia, PA, US Oct 2022

- Faculty research exhibition, part of Polyhedral Structures Laboratory
- Student work exhibition, part of Master of Science in Design program

Weitzman School Year End Show 2022, University of Pennsylvania Philadelphia, PA, US May 2022

- Student work exhibition, part of Master of Science in Design program