Yefan Zhi

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https://yefan-zhi.github.io/

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

Research 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 & 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 Trousset, 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 Trousset, 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 Trousset, 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   Sep 2022 - Oct 2024
Yefan Zhi, Hua Chai, Teng Teng, Masoud Akbarzadeh

BibGallery, A light, simple literature management library on Python   Dec 2022 - Present
Yefan Zhi

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