

# ZHANG, Shu-yang (Shawn), PhD

CV | 2012-2025

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## RESEARCH INTERESTS

- Urban building energy model (UBEM)
- Urban microclimate
- Mobility and heat risk
- Inequity in heat exposure
- Resilient urban design under extreme weather

## SKILLS

- Coding: Python (Machine learning, Deep learning)
- Geography: ArcGIS, QGIS (UMEP), ENVI, SAGA
- Simulation: DesignBuilder, Ecotect, Radiance, Daysim, Dpethmap, Ladybug, Honeybee, Dragonfly, Eddy3D
- 3D Modeling: Rhino + Grasshopper, SketchUp
- 2D Graphic: AutoCAD, Photoshop, InDesign, Illustrator, PowerPoint
- Statistics: Excel, SPSS, Minitab, Origin
- Rendering: Enscape, V-ray
- Video Editing: Premiere, Audition

## EDUCATION

- 2020.08 – 2025.09 **School of Architecture, Tsinghua University** Beijing, China  
*Ph.D. in Engineering (Supervisor: Prof. Nian-xiong Liu)*  
*Dissertation: Design Optimization of Outdoor Thermal Environment and Building Form Layout under Extreme Climate Risks*
- 2023.10 – 2024.10 **Department of Architecture, National University of Singapore** Singapore  
*Visiting Ph.D. student of Architecture (Supervisor: Associate Prof. Chao Yuan)*
- 2017.08 – 2020.06 **School of Architecture, South China University of Technology** Guangzhou, China  
*M.Arch of Architecture (Supervisor: Prof. Yang Wang)*  
*Dissertation: Research on Space and Morphology Design of Umbrella Structures Building*
- 2012.08 – 2017.06 **School of Architecture and Art, Hefei University of Technology** Hefei, China  
*B.arch of Architecture*

## LIST OF ACADEMIC PUBLICATIONS

(† co-first author; \* Corresponding Author)

ORCID: <https://orcid.org/0000-0002-3677-1363>

Web of Science Researcher ID: [OIR-4914-2025](#) (Total citations: 61, H-index: 5)

Google Scholar: [https://scholar.google.com/citations?user=GW\\_6fuUAAAAJ](https://scholar.google.com/citations?user=GW_6fuUAAAAJ) (Total citations: 77, H-index: 5)

Scopus: <https://www.scopus.com/authid/detail.uri?authorId=57349228300> (Total citations: 62, H-index: 4)

ResearchGate: <https://www.researchgate.net/profile/Shuyang-Zhang-17/research> (Total citations: 75, H-index: 5)

• **Publications in Refereed Journals** (published 11 papers, with 7 of them as the first author):

1. **Zhang S**, Yuan C, Chen T, Ma B, Liu N\*. (2024). A cross-scale indicator framework for the study of annual stability of land surface temperature in different land uses. *Sustainable Cities and Society*, 116, 105936. (SCI Q1, IF=12, 7 citations) <https://doi.org/10.1016/j.scs.2024.105936>
2. **Zhang S**, Yuan C, Ma B, Liu N\*, Li W. (2024). Coupling effects of building-vegetation-land on seasonal land surface temperature on street-level: A study from a campus in Beijing. *Building and Environment*, 262, 111790. (SCI Q1, IF=7.6, 13 citations) <https://doi.org/10.1016/j.buildenv.2024.111790>
3. **Zhang S**, Liu N\*, Li W, Yan S. (2022). Umbrella structure building design method via case-based design and statistical analysis of structural morphological parameters. *Journal of Building Engineering*, 45, 103542. (SCI Q1, IF=7.4, 9 citations, the article is cited in *Nature Structural & Molecular Biology*) <https://doi.org/10.1016/j.jobbe.2021.103542>
4. **Zhang S**, Liu N\*, Ma B, Yan S. (2024). The effects of street environment features on road running: An analysis using crowdsourced fitness tracker data and machine learning. *Environment and planning B: Urban analytics and city science*, 51(2), 529-545. (SSCI Q1, IF=3.1, 34 citations) <https://doi.org/10.1177/23998083231185589>
5. **Zhang S**, Wang Y\*. (2020). Balance of form and force: research on architectural design strategies based on application of eccentric umbrella structure. *The Architect*, 2020(03), 91-99 (in Chinese, Tier 2 Chinese National Core Journal in Building Science) <https://d.wanfangdata.com.cn/periodical/jzs202003013>
6. **Zhang S**, Wang Y\*. (2020). The historical evolution and contemporary value of umbrella structure: cases study based on the practice in Western Europe and Latin America since the 20th century. *South Architecture*, 2020(06), 22-29 (in Chinese, Tier 3 Chinese National Core Journal in Building Science, 4 citations) <https://d.wanfangdata.com.cn/periodical/nfjz202006004>
7. **Zhang S**, Wang Y\*. (2019). Dynamic exterior sunshade design and shading effect analysis of southeast and southwest facing buildings in Guangzhou. *Building Energy Efficiency*, 47(08), 91-95+100 (in Chinese, Tier 3 Chinese National Core Journal in Building Science, 10 citations) <https://d.wanfangdata.com.cn/periodical/fcyzy201908022>
8. Zhang X, Chen T\*, **Zhang S**, Yuan C, PY Tan. (2025). Toward healthy neighborhood thermal environments: Interpretation of thermal comfort and rapid identification of hotspot areas using image-based metrics and explainable machine learning. *Sustainable Cities and Society*, 106648 (SCI Q1, IF=12, 2 citations) <https://doi.org/10.1016/j.scs.2025.106648>
9. Chen T, Singh V K, **Zhang S**, Zhang L, Yuan C\*. (2025). A city-scale mapping tool for assessing effects of urban greenery and morphologies on thermal comfort: A case study in Singapore. *Building and Environment*, 113760. (SCI Q1, IF=7.6) <https://doi.org/10.1016/j.buildenv.2025.113760>
10. Li W, Zhou Z\*, **Zhang S**, Feng J. (2022). Study on relationship between shading and outdoor air temperature based on the comparison of two high-rise residential estates with field measurements. *Buildings*, 12(11), 1813. (SCI Q2, IF= 3.1, 5 citations) <https://doi.org/10.3390/buildings12111813>
11. Wang Y, Lin M, Xu K, **Zhang S**, Ma H\*. (2021). Energy consumption analysis of glass house using electrochromic window in the subtropical region. *Journal of Engineering, Design and Technology*, 19(1), 203-

218. (SCI Q1, IF= 2.7, 5 citations, the article is cited in *Cell Reports Physical Science*)  
<https://doi.org/10.1108/JEDT-12-2019-0348>

• **Publications Under Review** (Recent research works):

1. **Zhang S**, Liu N\*, Wu X, Han Y, Li W, Guo F, Song X, Yuan C\*. An empirical study on the compound effects of extreme weather and UHI on building energy consumption under urban microclimate. *Building and Environment*. (SCI Q1, IF=7.6, Second-round review, originally submitted in May 2025) [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=5552898](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5552898)
2. **Zhang S**, Chen T, Zhang X, Liu N\*, Yuan C\*. UDEM driven by localized weather data for addressing urban building energy risks under compound heatwaves and UHI: a Beijing campus case study. *Sustainable Cities and Society*. (SCI Q1, IF=12, First-round review, originally submitted in August 2025) [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=5555721](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5555721)
3. **Zhang S**, Wu X, Xu P, Liu N\*, Li N\*. Local UHI mitigation and utilization: Urban building energy modeling, simulation, and urban design responses based on localized weather data. *Building Simulation*. (SCI Q1, IF=5.9, First-round review, originally submitted in September 2025) [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=5555862](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5555862)
4. Xu P†, Zhao P†, Xia B, Zhao Z, **Zhang S\***, Du J\*. A free-form and structural-redundant timber reciprocal frame configuration: intelligent design, optimization and fabrication. *Nature communication*. (SCI Q1, IF=15.7, Third-round review, originally submitted in September 2024) <https://doi.org/10.21203/rs.3.rs-4799666/v1>

• **Manuscripts in Preparation:**

1. **Zhang S**, Chen T, Liu N, Li N, Yuan C. Planting evergreen and deciduous trees: A study on the balance between cooling effects and radiative heat gains in Beijing's summer and winter.
2. **Zhang S†**, Chen T†, Liu N, Li N, Yuan C. Spatial-temporal variations in mobility flow heat risks in China's megacities under heatwave.

• **Theses:**

1. **Zhang S**. (2025). Design Optimization of Outdoor Thermal Environment and Building Form Layout under Extreme Climate Risks. *Tsinghua University*, PhD thesis, (Excellent PhD Thesis Award, Supervisor: Prof. Nian-xiong Liu)
2. **Zhang S**. (2020). Research on Space and Morphology Design of Umbrella Structures Building. *South China University of Technology*, M.Arch thesis, (Supervisor: Prof. Yang Wang)

• **Book Chapters:**

1. Liu N et al. (2021). A data supported object and performance-based design method for green dwellings. *Beijing: Tsinghua University Press* (in Chinese, **Authored Chapter 2**)
2. Zhang Y, Liu N, Cheng X et al. (2025). Design Theories and Indicator Framework for High-Quality Green Building. *Beijing: China Architecture Publishing Press* (in Chinese, **Co-authored Chapter 6**)

**PATENTS**

• **Granted Patents:**

1. Hao C, **Zhang S**, Shi S, Liu S, Zhao S, Song Y, Chu Y. (2025). High airtight flush doors with replaceable thresholds and construction methods. China: CN113914746A. (Invention patents)

### • Patents Pending:

1. Liu N, **Zhang S**, Shi S, Lin B. A simulation method for urban building energy consumption based on localized weather data and photovoltaic systems. (Invention patents, originally submitted in July 2025)
2. Liu N, **Zhang S**, Wu X. A method for calculating heat exposure risk considering urban mobility flows and built environment dynamics. (Invention patents, originally submitted in July 2025)
3. Liu N, **Zhang S**. A method and device for calculating the height and canopy distribution of urban evergreen and deciduous trees based on GF-7 satellite imagery. (Invention patents, originally submitted in July 2025)

### AWARDS AND GRANTS

- 2025 **Excellent PhD Thesis Award**  
*Tsinghua University, School of Architecture*
- 2023 **National Postgraduate Scholarship-Joint PhD Training Program**  
*China Scholarship Council, Grant Amount: SGD 26,400, Grant No. 202306210331*
- 2017 **Graduate Freshman Scholarship**  
*South China University of Technology*
- 2017 **Outstanding Bachelor's Graduate**  
*Hefei University of Technology*

### RESEARCH PROJECTS

- 2022-2025 **The National Key R&D Program of China, Supervisor as Co-PI** (Subproject coordinator, Principal Researchers)  
*Funding amount: CNY 3,200,000, Grant No.2022YFC3803801*
- 2021-2025 **The National Natural Science Foundation of China (Key Program), Supervisor as Co-PI** (Participation)  
*Funding amount: CNY 3,000,000, Grant No.52130803*
- 2020-2025 **The National Natural Science Foundation of China (General Program), Supervisor as PI** (Participation)  
*Funding amount: CNY 580,000, Grant No.52078262*
- 2016-2020 **The National Key R&D Program of China, Supervisor as PI** (Participation)  
*Funding amount: CNY 2,690,000, Grant No.2016YFC0700206*

### ARCHITECTURE DESIGN

- 2021.02 - 2021.03 **Ceramic cultural and creative park** Zibo, Shandong, China  
*Plan drawing with CAD*
- 2019.06 - 2019.07 **Gymnasium, Yihua Experimental School** Yueyang, Hunan, China  
*Schematic design*
- 2019.05 - 2019.06 **New campus planning for the Vocational Institute of Ceramic Arts and Crafts (built)** Jingdezhen, Jiangxi, China  
*Campus planning, training and laboratory center design, dormitory design*
- 2019.03 - 2019.05 **Urban design competition for the Core Area of the High-speed Rail Business District (3rd Prize)** Jingdezhen, Jiangxi, China  
*Concept design and southern building cluster planning*
- 2018.11 - 2018.12 **Integrated practical training center, Vocational School of Health and Medicine (built)** Yantai, Shandong, China

*Schematic design*

- 2018.05 - 2019.07 **Foreign Languages Vocational College (Built)** Rizhao, Shandong, China  
*Detailed construction plan, sunlight analysis report*
- 2017.11 - 2018.01 **Jilin University - Zhuhai campus (built)** Zhuhai, Guangdong, China  
*Specialist apartments and national academy building design*

## DESIGN AWARDS

- 2017 **i.FUTURE 1st "Future Cities" International Concept Design Competition** 2nd Prize (2/2)  
*Award: CNY 5,000*  
*China Institute of Urbanization, Zhejiang University*
- 2016 **The 6th IDEA-KING International Landscape Planning & Design Competition** The Excellence Award (3/4)  
*International Landscape Design Industry Association*
- 2015 **Shekou Prince Bay Public Cultural Architecture Design Competition** Top 50 (1/2)  
*Young Bird Plan, China*
- 2014 **National Green Building Design Competition, Light Green Category** 3rd Prize (2/3)  
*China Green Building Association*

## PRESENTATIONS

### • Invited Talks

- 2024.02 **Earth observation and urban morphometrics for urban microclimate research**  
*Department of Architecture, National University of Singapore, Singapore*

## TEACHING EXPERIENCE

- 2022.02-2022.06 **Teaching Assistant, "Building Physics - Thermal Environment"** (junior undergraduate professional theory course), **Tsinghua University**  
*Assisted with teaching, supervised experiments, and graded assignments (TA stipend provided)*
- 2018.09-2018.12 **Teaching Assistant, "Expert Studio Design" and "Youth Apartment Design"** (second-year undergraduate professional design course), **South China University of Technology**  
*Assist in design guidance, calculate grades, and scan design drawings for archiving*

## REVIEWER ASSIGNMENTS

- Since 2025.07 **Sustainable Cities and Society, Cities**

## PROFESSIONAL AFFILIATIONS

- Since 2022 **The Architectural Society of China (Member)**

## WORKSHOP PARTICIPATION

- 2017.11 - 2017.12 **The Skycourt and Skygarden: Towards a Vertical City Theory**  
*School of Architecture, South China University of Technology*

*October 5, 2025*