ZHANG, Shu-yang (Shawn), PhD

CV | 2012-2025

Citizenship: Chinese
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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 and Remote Sensing: ArcGIS, QGIS (UMEP), ENVI, SNAP
• Building Simulation: DesignBuilder, Ecotect, Radiance, Daysim, Dpethmap
• 3D Modeling: Rhino + Grasshopper (Ladybug, Honeybee, Dragonfly, Eddy3D), 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 (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 12 papers, with 8 of them as the first author):

1. **Zhang S**, Liu N*, Wu X, Han Y, Li W, Guo F, Song X, Yuan C. (2025). An empirical study on the compound effects of extreme weather and UHI on building energy consumption under urban local climate. *Building and Environment*, 287, 113824. (SCI Q1, IF=7.6) https://doi.org/10.1016/j.buildenv.2025.113824

2. **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

3. **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, <u>13 citations</u>) https://doi.org/10.1016/j.buildenv.2024.111790

4. **Zhang S**, Liu N*, Ma B, Yan S. (2023). 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, <u>34 citations</u>) https://doi.org/10.1177/23998083231185589

5. **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, <u>9 citations, the article is cited in *Nature Structural & Molecular Biology*</u>) https://doi.org/10.1016/j.jobe.2021.103542

6. **Zhang S**, Wang Y*. (2020). Balancing 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

7. **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

8. **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/fcyyy201908022

9. 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

10. 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

11. 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

12. 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, <u>the article is cited in *Cell Reports Physical Science*</u>) https://doi.org/10.1108/JEDT-12-2019-0348

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

1. **Zhang S**, Chen T, Zhang X, Liu N*, Yuan C. UBEM 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, <u>First-round review</u>, originally submitted in August 2025) https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5555721

2. **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, <u>First-round review received (minor revision)</u>, originally submitted in September 2025) https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5555862

3. 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 communications*. (SCI Q1, IF=15.7, <u>Third-round review</u>, 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, (<u>Excellent PhD Thesis Award</u>, 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 10, 2025