ZHOUPENG WANG

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EDUCATION

Tianjin University **Tianjin, China**
M.Eng. - Smart Building Sep. 2021 - Jun. 2024
• Overall GPA: 3.69/4.0 Rank: **1st/30**
• Course: Engineering Mathematics, Data Mining, Thermodynamics, Electricity/Electronics, Architecture Design, Building Information Modeling in Architecture, Building Thermal Environment and Intelligentization

Hefei University of Technology **Hefei, Anhui, China**
B.Eng. - Civil Engineering Sep. 2017 - Jun. 2021
• Overall GPA: 3.51/4.0 Rank: **26th/257**
• Courses: Advanced Mathematics, Linear Algebra, Probability Theory and Mathematical Statistics, C Programming, MATLAB Programming, Structural Mechanics, University Physics, Material Mechanics, Theoretical Mechanics, Elasticity and Finite Element Method, Fluid Mechanics, Principle of Concrete Structure, Principles of Steel Structures

HONORS

- **Academic Scholarship, First-Class (Top 10%)** 2023, 2022, 2021
- **Merit Student (Top 6%)** 2023, 2022, 2021
- **Third Prize in 2022 International Solar Building Design Competition** 2023
- **Second Prize in The 20th China Post-graduate Mathematical Contest in Modeling (Top 4%)** 2023
- **Second Prize in The 19th China Post-graduate Mathematical Contest in Modeling (Top 8%)** 2022
- **Outstanding Graduate** 2021

RESEARCH INTERESTS

AI Applications in Built Environment; High-performance Building Envelopes; Building Performance Simulation; Finite Element Simulation; Machine Learning; Deep Learning

PUBLICATIONS

[1] Predicting and extracting thermal behavior rules of hydronic thermal barrier with interpretable ensemble learning in the heating season
Guo, J., **Wang, Z.**, Jin, Y., Li, M., and Chen, Q.
Energy and Buildings, 2023 (Co-first Author)

[2] Effects of joint tolerances on thermal bridging in precast concrete shear walls: Field tests and numerical simulations
Guo, J., **Wang, Z.**, Jin, Y., Zhao, W., Li, M., Feng, H., and Chen, Q.
Journal of Building Engineering, 2024 (First Author in Students)

[3] Uncertainty quantification and sensitivity analysis of energy consumption in substation buildings at the planning stage
Guo, J., **Wang, Z.**, Li, M., and Jin, Y
Journal of Building Performance Simulation, 2022 (First Author in Students)

[4] Experimental and numerical study on thermal performance of energy storage interior wall with phase change materials
Guo, J., Tan, C., Zhang, Z., Zhao, W., Li, M., Zhang, K. and **Wang, Z.**
Energy and Buildings, 2025

[5] A novel multi-objective generative design approach for sustainable building using multi-task learning (ANN) integration
Li, M., Wang, Z., Chang, H., **Wang, Z.**, and Guo, J
Applied Energy, 2024

[6] Research on energy efficiency evaluation model of substation building based on AHP and fuzzy comprehensive theory
Xue, B., Lu, F., Guo, J., **Wang, Z.**, Zhang, Z. and Lu, Y.
Sustainability, 2023

[7] Energy Prediction and Optimization Based on Sequential Global Sensitivity Analysis: The Case Study of Courtyard-Style Dwellings in Cold Regions of China
Guo, J., Li, M., Jin, J., Shi, C. and **Wang, Z.**
Buildings, 2022

[8] Optimized design of floor plan and components of prefabricated building with energy-cost effect
Guo, J., Li, M., Jiang, Z., **Wang, Z.** and Zhou, Y.

Applied Sciences, 2022

[9] Enhancing sustainability and resilience of hydronic thermal barrier in the heating season: A multi-objective optimization framework based on machine learning

Wang, Z., Lu, Y., Jin, Y., and Guo, J.

Energy and Buildings (Under Review)

[10] Measurement of Light and Heat Environment in the Atrium Space of Underground Transportation Hubs in Hot Summer and Warm Winter Regions

Guo, J., Chang, H., **Wang, Z.** and Xu, Z.

Building Science (Under Review)

PATENTS

[1] A hydronic Thermo-active building system thermal performance prediction and mechanism extraction method and device

Guo, J., **Wang, Z.**, Jin, Y. and Wang, J.

China National Intellectual Property Administration, Chinese Patent Application Number: 202310813950.5.

[2] Evaluation Model for Typical Prefabricated Shear Wall Thermal Bridges

Guo, J., Zhao, W., Jin, Y., Shu, Z. and **Wang, Z.**

China National Intellectual Property Administration, Chinese Patent Application Number: 202410227749.3.

RESEARCH EXPERIENCE

Key technologies of village prefabricated house envelope system and passive house Sep. 2021 - Mar. 2023

Funding agency: National Key R & D Program of China Sub-project

Advisors: **Prof. Juanli Guo** (School of Architecture, Tianjin University)

- Design the overall route to energy efficiency in buildings.
- Design the HVAC system.
- Participate in the design of demonstration projects (Application of building technology).
- Conduct building performance simulations based on DesignBuilder and EnergyPlus.
- Calibrate EnergyPlus model based on deep learning.

Digital design of prefabricated houses based on energy consumption and cost Sep. 2021 - Mar. 2022

Funding agency: Tianjin Natural Science Foundation

Advisors: **Prof. Juanli Guo** (School of Architecture, Tianjin University)

- Field research.
- Conduct building performance simulations based on Grasshopper (Ladybug & Honeybee).
- Implement multi-objective optimization based on Grasshopper (Octopus).
- Analyze the impact of thermal bridges generated by joint tolerances in prefabricated buildings on the indoor environment based on COMSOL.
- Implement linear thermal transmittance sensitivity analysis and develop linear thermal transmittance prediction models based on machine learning (Python).

Study on Evaluable Indicators of Green Technology for Substation Buildings Dec. 2021 - Dec. 2023

Funding agency: National Grid Corporation Science and Technology Project

Advisors: **Prof. Juanli Guo, Gang Liu** (School of Architecture, Tianjin University)

- Field research.
- Conduct building performance simulations based on Grasshopper (Ladybug & Honeybee).
- Implement sensitivity analysis of critical design parameters for substation buildings based on R.
- Implement thermal performance simulation of hydronic thermal activated envelopes based on COMSOL.
- Implement thermal performance prediction and rule extraction for hydronic thermal activated envelopes based on machine learning and eXplainable AI (Python).
- Develop thermal performance prediction software for hydronic thermal activated envelopes based on Python.
- Develop green design evaluation system for substation based on AHP and FCE (MATLAB).

Shenzhen Gangxia North Comprehensive Transportation Hub Physical Environment Study Dec. 2021 - Dec. 2022

Funding agency: China Railway Design Corporation

Advisors: **Prof. Juanli Guo, Zhen Xu** (School of Architecture, Tianjin University)

- Field research. Test Physical Environment.
- Analyze the impact of the atrium on the indoor physical environment (Temperature, Humidity, Illumination).
- Conduct building performance simulations based on Grasshopper (Ladybug & Honeybee) to compare with measured results.
- Propose design improvements based on measurements and simulation analysis results.

Shun'an Yuanda Ultra-low Energy Building Demonstration Sep. 2021 - Dec. 2023

Funding agency: Hebei Shun'an Yuanda Environmental Protection Technology Co., Ltd.
Advisors: **Prof. Juanli Guo, Ting Zhou** (School of Architecture, Tianjin University)

- Field research.
- Participate in the design of demonstration project.
- Conduct building performance simulations based on Grasshopper (Ladybug & Honeybee) and calculate project costs.

EXTRACURRICULAR ACTIVITIES

• State Grid Shandong Electric Power Company, Intern — Dec. 2022 - Jun.2023
  • Engaged in substation field studies.
  • Led the writing of research reports.
• China Railway Design Corporation, Intern — Jul. 2022 - Sep.2022
  • Engaged in physical environment testing.
  • Led the writing of research reports.
• Longfor Group Holdings Limited, Intern — Jun. 2021 - Aug.2021
  • Engaged in land site surveys.
  • Engaged in land site surveys.
• Member of the Student Union — Sep. 2021 - Sep.2022
  • Engaged in interviews with outstanding students..
  • Engaged in volunteer activities.

SKILLS & INTERESTS

Tools: EnergyPlus, DesignBuilder, Rhino & Grasshopper, Python, MATLAB, R, COMSOL Multiphysics, SketchUp,

Languages: Mandarin (Native), English (Fluent, IELTS: 6.5, GRE: 321+3.5)

Interests: Programming, Mathematical Modeling, Calligraphy, Photography, Basketball