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EDUCATION

2011.08-2017.07	Tsinghua University	*Ph.D. in Building Science*
2016.08-2017.07	Schwarzman College, Tsinghua University	*M. Sci. in Public Policy*
2013.10-2014.09	University of Cambridge	*M.Phil. in Energy Technology*
2008.09-2011.07	Tsinghua University	*B. Eng. in Economics*
2007.09-2011.07	Tsinghua University	*B. Sci. in Civil Engineering*

RESEARCH

2021.10 to present **Assistant Professor, The Hong Kong University of Science and Technology**

2018.07 – 2021.10 **Project Scientist, Lawrence Berkeley National Lab**
- ➢ Model Predictive Control
  - Develop and deploy Model Predictive Control to control the energy system at building and campus level
- ➢ Reinforcement Learning
  - Develop virtual environments of buildings for RL training
  - Develop DRL controller, and test it in Flexlab, a testing facility located in LBNL
- ➢ End-Use Load Profiles for the U.S. Building Stock
  - Occupant behavior modelling to produce realistic building load shape
  - Propose data-driven approach to generate building load, and validate it with real smart meter data
- ➢ Low-cost smart sensing
  - Infer building thermal dynamics of US residential buildings using connected smart thermostat (Ecobee DYD Database), and then estimate demand response potential and thermal resilience
  - Infer occupant counts using Wi-Fi data

2017.10-2018.06 **Postdoc Researcher, UC Berkeley**
- ➢ Human-building interaction
  - Explore the most efficient way to collect occupants' feedback about the built environment
  - Develop data-driven model to predict individual comfort demands, develop comfort standards
  - Develop and test energy efficient comfort wearable to address personal demand

2016.12-2018.06 **Energy Consultant, World Bank**
- ➢ Urban Scale Building Energy Efficiency and Renewable Energy Project
  - Oversee the technical progress, provide technical supports

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OPEN-SOURCE TOOL

MPCPy	Python-based open-source platform for model predictive control in buildings
	https://github.com/lbl-srg/MPCPy
Modelica Buildings Library	Dynamic simulation models for building energy and control systems
	https://github.com/lbl-srg/modelica-buildings

ACADEMIC SERVICE

2020 till now	Editor,
	Building Simulation, *Building Energy Conservation*
2020	Grant Proposal Reviewer
	The Dunhill Medical Trust, UK
2020, 2021	Member of Technical Program Committee,
	First International Workshop on Reinforcement Learning for Energy Management in Buildings & Cities (RLEM), https://rlem-workshop.net/
till now	Reviewer,
	Applied Energy, Energy, Building and Environment, Energy and Building, Journal of Building Engineering, Building Simulation, Environmental Science and Pollution Research, Science and Technology for the Built Environment, SoftwareX, Journal of Building Performance Simulation, Applied Thermal Engineering, Advanced Engineering Informatics, Frontiers in Built Environment, International Journal of Biometeorology, Journal of Asian Architecture and Building Engineering, Journal of the Taiwan Institute of Chemical Engineer, Sustainable Cities and Society

AWARDs & HONORs

1. Key Technology for the Environmental and Energy-Efficient Design of Green Building, Second Class Award of 2019 Chinese State Science and Technology Prize (2019 年国家科学技术进步奖二等奖), Award Number: 2019-J-22101-2-01-R09
2. Outstanding Graduate of Beijing, 2017
3. Boeing Scholarship, Boeing Company, 2010, 2015
4. Wing Yip Scholarship, University of Cambridge, 2013 (3 awardees per year)
5. China National Scholarship, Chinese Government, 2009, 2010, 2012 (award ratio: 0.2%)
6. Outstanding Undergraduate of Beijing, 2011
7. Outstanding Undergraduate of Tsinghua, 2011 (top 2% of Tsinghua Undergraduates)

PATENT

1. Lin, BR., Zhao, HT., and **Wang, Z.**, A Waste Heat Recovery System Designed for Dishwasher. Chinese Patent Number: ZL 201320328067.9

PUBLICATION

(#: contribute equally; *: corresponding author)

1. **Wang, Z.**, Chen, B., Li, H. and Hong, T., 2021. AlphaBuilding ResCommunity: A multi-agent virtual testbed for community-level load coordination. Advances in Applied Energy, 4, p.100061.
2. **Wang, Z.**, Hong, T. and Li, H., 2021. Informing the planning of rotating power outages in heat waves through data analytics of connected smart thermostats for residential buildings. Environmental Research Letters, 16(7), p.074003.
3. **Wang, Z.**, Hong, T., Li, H. and Piette, M.A., 2021. Predicting city-scale daily electricity consumption using data-driven models. Advances in Applied Energy, 2, p.100025.
4. **Wang, Z.** and Hong, T., 2020. Reinforcement Learning for Building Controls: The opportunities and challenges. Applied Energy, 269, p.115036.
5. **Wang, Z.**, Hong, T. and Piette, M.A., 2020. Building thermal load prediction through shallow machine learning and deep learning. Applied Energy, 263, p.114683.
6. **Wang, Z.** and Hong, T., 2020. Learning occupants' indoor comfort temperature through a Bayesian inference approach for office buildings in United States. Renewable and Sustainable Energy Reviews, 119, p.109593.
7. **Wang, Z.** and Hong, T., 2020. Generating realistic building electrical load profiles through the Generative Adversarial Network (GAN). Energy and Buildings, p.110299.
8. **Wang, Z.**, Hong, T., Piette, M.A. and Pritoni, M. 2019, Inferring occupant counts from Wi-Fi data in buildings through machine learning, Building and Environment, 158, pp. 281-294.

9. **Wang, Z.**, Parkinson, T., Li, P., Lin, B. and Hong, T., 2019. The Squeaky wheel: Machine learning for anomaly detection in subjective thermal comfort votes. Building and Environment, 151, pp.219-227.

10. **Wang, Z.**, Zhang, H., He, Y., Luo, M., Li, Z., Hong, T. and Lin, B., 2020. Revisiting individual and group differences in thermal comfort based on ASHRAE database. Energy and Buildings, 219, p.110017.Wang, Z., Wang, J., He, Y., Liu, Y., Lin, B. and Hong, T., 2020. Dimension analysis of subjective thermal comfort metrics based on ASHRAE Global Thermal Comfort Database using machine learning. Journal of Building Engineering, 29, p.101120.

11. **Wang, Z.**, Hong, T. and Piette, M.A., 2019. Predicting plug loads with occupant count data through a deep learning approach. Energy, 181, pp.29-42.

12. **Wang, Z.**, Warren, K., Luo, M., He, X., Zhang, H., Arens, E., Chen, W., He, Y., Hu, Y., Jin, L. and Liu, S., 2019. Evaluating the comfort of thermally dynamic wearable devices. Building and Environment, p.106443.

13. **Wang, Z.**, Hong, T. and Piette, M.A., 2019. Data fusion in predicting internal heat gains for office buildings through a deep learning approach. Applied Energy, 240, pp.386-398.

14. **Wang, Z.**, Hong, T. and Jia, R., 2018. Buildings. Occupants: a Modelica package for modelling occupant behaviour in buildings. Journal of Building Performance Simulation, pp.1-12.

15. **Wang, Z.**, Luo, M., Geng, Y., Lin, B. and Zhu, Y., 2018. A model to compare convective and radiant heating systems for intermittent space heating. Applied Energy, 215, pp.211-226.

16. **Wang, Z.**, de Dear, R., Luo, M., Lin, B., He, Y., Ghahramani, A. and Zhu, Y., 2018. Individual difference in thermal comfort: A literature review. Building and Environment, 138, pp. 181-193 (highly cited paper)

17. **Wang, Z.**, Zhao, Z., Lin, B., Zhu, Y. and Ouyang, Q., 2015. Residential heating energy consumption modeling through a bottom-up approach for China's Hot Summer–Cold Winter climatic region. Energy and Buildings, 109, pp.65-74.

18. **Wang, Z.**, Zhao, H., Lin, B., Zhu, Y., Ouyang, Q. and Yu, J., 2015. Investigation of indoor environment quality of Chinese large-hub airport terminal buildings through longitudinal field measurement and subjective survey. Building and Environment, 94, pp.593-605.

19. **Wang, Z.**, de Dear, R., Lin, B., Zhu, Y. and Ouyang, Q., 2015. Rational selection of heating temperature set points for China's hot summer–Cold winter climatic region. Building and Environment, 93, pp.63-70.

20. **Wang, Z.**, Lin, B. and Zhu, Y., 2015. Modeling and measurement study on an intermittent heating system of a residence in Cambridgeshire. Building and Environment, 92, pp.380-386.

21. Liu, S.*,#, **Wang, Z.***,#, Schiavon, S., He, Y., Luo, M., Zhang, H. and Arens, E., 2020. Predicted percentage dissatisfied with vertical temperature gradient. Energy and Buildings, p.110085.

22. Wang, J.#, **Wang, Z.**#, Zhou, D. and Sun, K., 2019. Key issues and novel optimization approaches of industrial waste heat recovery in district heating systems. Energy, p.116005.

23. Wang, J.#, **Wang, Z.***,#, de Dear, R., Luo, M., Ghahramani, A. and Lin, B., 2018. The uncertainty of subjective thermal comfort measurement. Energy and Buildings, 181, pp.38-49.

24. Liu, Y.#, **Wang, Z.**#, Lin, B., Hong, J. and Zhu, Y., 2018. Occupant satisfaction in Three-Star-certified office buildings based on comparative study using LEED and BREEAM. Building and Environment, 132, pp.1-10.

25. Touzani, S.#, Prakash, A.K.#, **Wang, Z.**#, Agarwal, S., Pritoni, M., Kiran, M., Brown, R. and Granderson, J., 2021. Controlling distributed energy resources via deep reinforcement learning for load flexibility and energy efficiency. Applied Energy, 304, p.117733.

26. Luo, M., **Wang, Z.***, Ke, K., Cao, B., Zhai, Y. and Zhou, X., 2018. Human metabolic rate and thermal comfort in buildings: The problem and challenge. Building and Environment, 131, pp. 44-52

27. Li, H., **Wang, Z.** and Hong, T., 2021. A synthetic building operation dataset. Scientific data, 8(1), pp.1-13.

28. Li, H., **Wang, Z.**, Hong, T. and Piette, M.A., 2021. Energy Flexibility of Residential Buildings: A Systematic Review of Characterization and Quantification Methods and Applications. Advances in Applied Energy, p.100054.

29. Li, H., **Wang, Z.**, Hong, T., Parker, A. and Neukomm, M., 2021. Characterizing patterns and variability of building electric load profiles in time and frequency domains. Applied Energy, 291, p.116721.

30. Li, H., **Wang, Z.** and Hong, T., 2021. Occupant-Centric key performance indicators to inform building design and operations. Journal of Building Performance Simulation, pp.1-29.

31. Hong, T., **Wang, Z.**, Luo, X. and Zhang, W., 2020. State-of-the-art on research and applications of machine learning in the building life cycle. Energy and Buildings, p.109831.

32. Jiang, Y., **Wang, Z.**, Lin, B. and Mumovic, D., 2020. Development of a health data-driven model for a thermal comfort study. Building and Environment, p.106874.

33. Liu, Y., **Wang, Z.**, Zhang, Z., Hong, J. and Lin, B., 2018. Investigation on the Indoor Environment Quality of health care facilities in China. Building and Environment, 141, pp. 273-287

34. Luo, M., **Wang, Z.**, Zhang, H., Arens, E., Filingeri, D., Jin, L., Ghahramani, A., Chen, W., He, Y. and Si, B., 2020. High-density thermal sensitivity maps of the human body. Building and Environment, 167, p.106435.

35. Luo, M., **Wang, Z.**, Brager, G., Cao, B. and Zhu, Y., 2018. Indoor climate experience, migration, and thermal comfort expectation in buildings. Building and Environment, 141, pp. 262-272

36. Lin, B., **Wang, Z.**, Sun, H., Zhu, Y. and Ouyang, Q., 2016. Evaluation and comparison of thermal comfort of convective and radiant heating terminals in office buildings. Building and Environment, 106, pp.91-102.

37. Lin, B., **Wang, Z.**, Liu, Y., Zhu, Y. and Ouyang, Q., 2016. Investigation of winter indoor thermal environment and heating demand of urban residential buildings in China's hot summer–Cold winter climate region. Building and Environment, 101, pp.9-18.

38. Guo, X., Lee, K., **Wang, Z.** and Liu, S., 2021. Occupants' satisfaction with LEED-and non-LEED-certified apartments using social media data. Building and Environment, p.108288.

39. He, Y., Zhou, Y., **Wang, Z.**, Liu, J., Liu, Z. and Zhang, G., 2021. Quantification on fuel cell degradation and techno-economic analysis of a hydrogen-based grid-interactive residential energy sharing network with fuel-cell-powered vehicles. Applied Energy, 303, p.117444.

40. Chen, B., Jin, M., **Wang, Z.**, Hong, T. and Bergés, M., 2020, November. Towards Off-policy Evaluation as a Prerequisite for Real-world Reinforcement Learning in Building Control. In Proceedings of the 1st International Workshop on Reinforcement Learning for Energy Management in Buildings & Cities (pp. 52-56).

41. Hong, T., Chen, C.F., **Wang, Z.** and Xu, X., 2020. Linking human-building interactions in shared offices with personality traits. Building and Environment, 170, p.106602.

42. Jiang, Y., Luo, Z., **Wang, Z.** and Lin, B., 2019. Review of thermal comfort infused with the latest big data and modeling progresses in public health. Building and Environment, 164, p.106336.

43. He, Y., Chen, W., **Wang, Z.** and Zhang, H., 2019. Review of fan-use rates in field studies and their effects on thermal comfort, energy conservation, and human productivity. Energy and Buildings, 194, pp. 140-162.

44. Geng, Y., Ji, W., **Wang, Z.**, Lin, B. and Zhu, Y., 2018. A review of operating performance in green buildings: Energy use, indoor environmental quality and occupant satisfaction. Energy and Buildings. 183, pp.500-514. (highly cited paper)

45. Lin, B., Liu, Y., **Wang, Z.**, Pei, Z. and Davies, M., 2016. Measured energy use and indoor environment quality in green office buildings in China. Energy and Buildings, 129, pp.9-18.

46. Cho, B., Dayrit, T., Gao, Y., **Wang, Z.**, Hong, T., Sim, A. and Wu, K., 2020, December. Effective Missing Value Imputation Methods for Building Monitoring Data. In 2020 IEEE International Conference on Big Data (Big Data) (pp. 2866-2875). IEEE.

47. He, Y., Arens, E., Li, N., **Wang, Z.**, Zhang, H., Yongga, A. and Yuan, C., 2020. Modeling solar radiation on a human body indoors by a novel mathematical model. Building and Environment, p.107421.

48. Wang, Z., Yu, H., Luo, M., **Wang, Z.**, Zhang, H. and Jiao, Y., 2019. Predicting older people's thermal sensation in building environment through a machine learning approach: Modelling, interpretation, and application. Building and Environment, 161, p.106231.

49. Wang, J., Hua, J., Fu, L., **Wang, Z.** and Zhang, S., 2019. A theoretical fundamental investigation on boilers equipped with vapor-pump system for Flue-Gas Heat and Moisture Recovery. Energy, 171, pp.956-970.

50. Luo, M., Ke, Z., Ji, W., **Wang, Z.**, Cao, B., Zhou, X. and Zhu, Y., 2019. The time-scale of thermal comfort adaptation in heated and unheated buildings. Building and Environment, 151, pp.175-186.

51. Geng, Y., Yu, J., Lin, B., **Wang, Z.** and Huang, Y., 2017. Impact of individual IEQ factors on passengers' overall satisfaction in Chinese airport terminals. Building and Environment, 112, pp.241-249.

52. Chen, C.F., De Simone, M., Yilmaz, S., Xu, X., **Wang, Z.**, Hong, T. and Pan, Y., 2021. Intersecting heuristic adaptive strategies, building design and energy saving intentions when facing discomfort environment: A cross-country analysis. Building and Environment, 204, p.108129.

53. Li, Z., Lin, B., Zheng, S., Liu, Y., **Wang, Z.** and Dai, J., 2020, August. A review of operational energy consumption

calculation method for urban buildings. Building Simulation, Vol. 13, No. 4, pp. 739-751

54. Hong, T., Macumber, D., Li, H., Fleming, K. and **Wang, Z.**, 2020, June. Generation and representation of synthetic smart meter data. Building Simulation, Vol. 13, No. 4, pp. 1205–1220

55. Ghahramani, A., Galicia, P., Lehrer, D., Varghese, Z., **Wang, Z.** and Pandit, Y., 2020. Artificial Intelligence for Efficient Thermal Comfort Systems: Requirements, Current Applications and Future Directions. Frontiers in Built Environment, 6.

56. Luo, M., Arens, E., Zhang, H., Ghahramani, A. and **Wang, Z.**, 2018. Thermal comfort evaluated for combinations of energy-efficient personal heating and cooling devices. Building and Environment, 143, pp.206-216.

57. Taylor, J., Liu, Y., Lin, B., Burman, E., Hong, S.M., Yu, J., **Wang, Z.**, Mumovic, D., Shrubsole, C., Vermeer, D. and Davies, M., 2018. Towards a framework to evaluate the 'total' performance of buildings. Building Services Engineering Research and Technology, p.0143624418762662.

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