# Fan Feng

Post-doc Researcher | PNNL

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- Currently, I work as a post-doc researcher at the Pacific Northwest National Laboratory.
- Ph.D. in Mechanical Engineering from Texas A&M University.
- My experience spans from building modeling to the design, control, and optimization of HVAC, mechanical and lighting systems, and my current work focuses on integrating AI-powered techniques to building modeling, control and performance evaluation.

## Work Experience

**Present** – **Aug. 2023**
**Post-doc Researcher, PNNL, WA,USA**
- Conduct large-scale performance analysis for energy systems in residential buildings using high-performance clusters.
- Develop automatic compliance checking tools using AI-powered techniques.

Building energy modeling | high-performance computing | AI-powered techniques

**Aug. 2020** – **Jun. 2020**
**Advanced Technology Intern, Lennox International, TX,USA**
- Develop simulation models for residential chillers using Kalman filter. .
- Contribute to the development of a RC-network model for single-family houses

Kalman fileter | R language | Matlab

## Education

**Ph.D.** | **Mechanical Engineering** [*GPA:3.5/4.0*] — Jan. 2020 – Aug. 2023
Texas A&M University — College Station, TX,USA

**Ph.D.** | **Mechanical Engineering** [*GPA:4.0/4.0*] — Aug. 2018 – Dec. 2019 [1]
The University of Alabama — Tuscaloosa, AL,USA

**M.S.** | **Mechanical Engineering** — Sep. 2015 – Mar. 2018
Tongji University — Shanghai, China

**Bachelor** | **Mechanical Engineering** — Sep. 2011 – Jun. 2015
Tongji University — Shanghai, China

## Project and Research

**Jul. 2025** – **Aug. 2023**
**Large Scale Simulation Helps States and Utilities Enhancing Building Energy Code Adoption, , PNNL**
- Contribute to the development of large scale simulations of residential buildings to conduct code-compliance check of energy codes .
- Develop AI-powered code-compliance checking tools using LLMs

high-performance computing | LLM(RAG) | Model Context Protocol | EnergyPlus | R

**Jul. 2025** – **Aug. 2024**
**Control Strainer (ConStrain): A Data-driven Control Verification Framework (formally known as ANIMATE), , PNNL**
- Contribute to the development of a data-driven knowledge-integrated framework that automatically verifies that controls function against energy codes and control guidelines

Python | EnergyPlus

**Aug. 2023 – Jan. 2020**

**The Construction of Texas A&M Smart and Connected Homes Testbed, TEXAS A&M UNIVERSITY, TX,USA**

- Contribute the design and construction of a smart and connected testbed. This testbed consists of two identical single family houses that are instrumented with a wide range of sensors, including $CO_2$, VOA, and particulate matter sensors for indoor air quality, thermocouple, heat flux sensor for thermal comfort, and lighting sensor for visual environment.
- The data acquisition is implemented through LabVIEW, and the data collected are also pushed to a cloud server to be accessed remotely.

Data acquisition | LabVIEW | sensor deployment | Cloud database management

**Aug. 2023 – Jan. 2020**

**Cost-effective Thermally Activated Building Systems to Support a Power Grid System With High Penetrations of As-available Renewable Energy Resources , TEXAS A&M UNIVERSITY, TX,USA**

- Design a multi-functional building envelope with both phase change materials(PCM) and a radiant heat/cooling system. .
- Develop and implement a simulation module for industrial-grade PCMs in EnergyPlus
- Develop control-oriented models for energy and thermal estimation of buildings using this multi-functional panel
- Develop a model-predictive control framework for this system to optimize the cost and thermal comfort
- Implement the proposed control framework using High-performance computers

Control-oriented model | Model-predictive control | E+ development | High-performance computer

**Jul. 2022 – Sep. 2018**

**Collaborative Research: Adaptive, Multi-Layered Fenestration Elements for Optimum Building Energy Performance and Occupant Comfort, TEXAS A&M UNIVERSITY, TX,USA**

- Develop simulation models for complex fenestration systems with Electrochromic glazing and shading devices using EnergyPlus and Radiance
- Develop control-oriented models for building with complex fenestration systems.
- Develop control framework to optimize the system cost and occupants' comfort(both thermal and visual)

Daylighting simulation | E+development | Model-predictive control

## PUBLICATIONS

1 Qiu, Shunian, Fan Feng, Xuanzhe Zhang, Siyuan Xu, and Qian Wu. "Coding-free virtual flowmeter for building chilled water using pump VFD data and LLM." Flow Measurement and Instrumentation (2025): 102943.

2 Wan, Hanlong, Jian Zhang, Yan Chen, Weili Xu, and Fan Feng. "Exploring Gen-AI applications in building research and industry: A review." Building Simulation (2025): 1–23.

3 Choi, Youngsik, and Zheng O'Neill. "Energy Saving Potential Analysis for Primary Schools with Optimal Dedicated Outdoor Air System Control in Different Climate Zones." ASHRAE Transactions 130 (2024): 186–194.

4 Choi, Youngsik, Xing Lu, Fan Feng, and Zheng O'Neill. "Large-scale energy cost optimization and performance analysis for dedicated outdoor air system: simulation results from ASHRAE RP-1865." Science and Technology for the Built Environment 30, no.10 (2024): 1217–1235.

5 Wan, Hanlong, Jian Zhang, Yan Chen, Weili Xu, and Fan Feng. "Generative AI Application for Building Industry." arXiv e-prints (2024): arXiv-2410.

6 Choi, Youngsik, Xing Lu, Zheng O'Neill, and Fan Feng. "Optimal supply air temperature control for dedicated outdoor air system under varying climate zones." In Building Simulation 2023 18 (2023): 3209–3216.

7 Feng,Fan, Yangyang Fu, Zhiyao Yang, and others. "Enhancement of Energyplus Phase Change Material Hysteresis Model to Simulate Grid-Interactive Efficient Buildings." ASHRAE Transactions 129 (2023).

8 Choi, Youngsik, Xing Lu, Zheng O'Neill, Fan Feng, and Tao Yang. "Optimization-informed rule extraction for HVAC system: A case study of dedicated outdoor air system control in a mixed-humid climate zone." Energy and Buildings 295 (2023): 113295.

9 Feng,Fan, Yangyang Fu, Zhiyao Yang, and Zheng O'Neill. "Enhancement of phase change material hysteresis model: A case study of modeling building envelope in EnergyPlus." Energy and Buildings 276 (2022): 112511.

10 Firsich, Thomas, Zhiyao Yang, Fan Feng, and Zheng O'Neill. "Texas A&M Smart and Connected Homes Testbed (TAM-SCHT): An Evaluation and Demonstration Platform for Smart & Grid-interactive Technologies." ASHRAE Transactions 128 (2022).

11 Chen, Zhe, Peng Xu, Fan Feng, Yifan Qiao, and Wei Luo. "Data mining algorithm and framework for identifying HVAC control strategies in large commercial buildings." Building Simulation 14, no.1 (2021): 63–74.

12 Lu, Xing, Fan Feng, Zhihong Pang, Tao Yang, and Zheng O'Neill. "Extracting typical occupancy schedules from social media (TOSSM) and its integration with building energy modeling." Building Simulation 14, no.1 (2021): 25–41.

13 Lu, Xing, Fan Feng, and Zheng O'Neill. "Occupancy sensing in buildings through social media from semantic analysis." ASHRAE Transactions (2020, published in 2021).

14 Lu, Xing, Fan Feng, and Zheng O'Neill. "Occupancy Sensing in Buildings through Social Media from Semantic Analysis (OR-20-C031)." In 2020 ASHRAE Winter Conference.

15 Pang, Zhihong, Fan Feng, and Zheng O'Neill. "Investigation of the impacts of COVID-19 on the electricity consumption of a university dormitory using weather normalization." arXiv preprint arXiv:2012.07748 (2020).

17 Qiu, Shunian, Fan Feng, Weijie Zhang, Zhengwei Li, and Zhenhai Li. "Stochastic optimized chiller operation strategy based on multi-objective optimization considering measurement uncertainty." Energy and Buildings 195 (2019): 149–160.

18 Qiu, Shunian, Fan Feng, Zhengwei Li, Guang Yang, Peng Xu, and Zhenhai Li. "Data mining based framework to identify rule based operation strategies for buildings with power metering system." Building Simulation 12, no.2 (2019): 195–205.

19 Dong, Bing, Vishnu Prakash, Fan Feng, and Zheng O'Neill. "A review of smart building sensing system for better indoor environment control." Energy and Buildings 199 (2019): 29–46.

20 Feng,Fan, and Zheng O'Neill. "Identifying models of HVAC systems using Arimax." In 2019 ASHRAE Annual Meeting. Kansas City, MO. Jun 22–26, 2019.

21 Feng,Fan, and Zheng O'Neill. "A Real-Time Platform for Assessment of Chiller-Side Demand Response Strategies." ASHRAE Transactions 125 (2019): 305–312.

22 Feng,Fan, Yangyang Fu, Jin Hou, and Peng Xu. "Optimizing the topologies of heating, ventilation, and air-conditioning water systems in supertall buildings: A pilot study." Science and Technology for the Built Environment 24, no.4 (2018): 371–381.

23 Feng,Fan, Zhengwei Li, and others. "Enhancement of Energyplus Phase Change Material Hysteresis Model to Simulate Grid-Interactive Efficient Buildings (AT-23-C088)." In 2023 ASHRAE Winter Conference. (Note: duplicate of earlier)

24 Feng,Fan, Zhengwei Li, and Peng Xu. "A methodology to identify multiple equipment coordinated control with power metering system." Energy Procedia 105 (2017): 2499–2505.

25 Feng,Fan, Zhengwei Li, Zhaoning Zhang, Guang Yang, and Weijie Zhang. "The status quo of operation of HVAC water-side systems in China: a perspective from BAS data." Energy Procedia 143 (2017): 67–72.

26 Ruan, Yingjun, Jiahui Cao, Fan Feng, and Zhengwei Li. "The role of occupant behavior in low carbon oriented residential community planning: A case study in Qingdao." Energy and Buildings 139 (2017): 385–394.

27 Feng,Fan, Yingjun Ruan, and Peng Xu. "An empirical study of influencing factors on residential building energy consumption in Qingdao City, China." Energy Procedia 104 (2016): 245–250.

28 Yuan, Li, Yingjun Ruan, Guang Yang, Fan Feng, and Zhengwei Li. "Analysis of factors influencing the energy consumption of government office buildings in Qingdao." Energy Procedia 104 (2016): 263–268.

29 Yang, Tianren, Haisu Chen, Yisha Zhang, Shihao Zhang, and Fan Feng. "Towards low-carbon urban forms: A comparative study on energy efficiencies of residential neighborhoods in Chongming eco-island." Energy Procedia 88 (2016): 321–324.

30 Fu, Yangyang, Zhengwei Li, Fan Feng, and Peng Xu. "Data-quality detection and recovery for building energy management and control systems: Case study on submetering." Science and Technology for the Built Environment 22, no.6 (2016): 798–809.

## Honors and Awards

2022 **Continuing student fellowship in Texas A&M University**

2021 **Graduate Summer Research Grant in Texas A&M University**

2018 **Graduate Council Fellowship in the University of Alabama**

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[1]Not completed, and transferred to Texas A&M Univ then