

Kevin J. Kircher

Assistant Professor, Mechanical Engineering (2022–)
Assistant Professor (by courtesy), Electrical and Computer Engineering (2023–)
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Research interests: Energy and algorithms

I work on modeling, control, optimization, and data science methods for energy systems, focusing on buildings and power grids. I'm particularly interested in new technologies for efficient electric heating.

Education

2019–22	Postdoctoral Associate in Electrical Engineering and Computer Science, Massachusetts Institute of Technology
2019	PhD in Mechanical Engineering, Cornell University
2016	MS in Mechanical Engineering, Cornell University
2009	MEng in Engineering Physics, Cornell University
2008	BS in Applied Mathematics and Physics, University of Wisconsin–Milwaukee

Publications

For papers with multiple professor co-authors, the last author position indicates the primary research advisor.

Journal articles

23. A.H.P. Farha, J.P. Ore, E.N. Pergantis, D. Ziviani, E.A. Groll, and **K.J. Kircher**. Laboratory and field testing of a residential heat pump retrofit for a DC solar nanogrid. *Applied Energy* (2026).
22. L.D. Reyes Premer, E.N. Pergantis, L. Semmelmann, D. Ziviani and **K.J. Kircher**. Model predictive control lowers barriers to heat-pump water heater adoption: A field study. *Energy Conversion and Management* (2026).
21. Priyadarshan, C. Crozier, K. Baker and **K.J. Kircher**. Distribution grids may be a barrier to residential electrification. *Cell Reports Sustainability* (2025).
20. A.J. Khabbazi, E.N. Pergantis, L.D. Reyes Premer, P. Papageorgiou, A.H. Lee, J.E. Braun, G.P. Henze and **K.J. Kircher**. Lessons learned from field demonstrations of model predictive control and reinforcement learning for residential and commercial HVAC: A review. *Applied Energy* (2025).
19. **K.J. Kircher**. Accounting for methane from natural gas infrastructure in United States emissions estimates. *Energy Policy* (2025).
18. F. Wu, H. Lee, P. Karava, H. Devarapalli, J.E. Braun, **K.J. Kircher**, D. Ziviani and W. Travis Horton. Occupant thermostat-adjustment behavioral patterns for different heat pump types and operation modes. *Building and Environment* (2025).
17. E.N. Pergantis, L.D. Reyes Premer, A.H. Lee, Priyadarshan, H. Liu, D. Ziviani, E.A. Groll and **K.J. Kircher**. Protecting residential electrical panels and service through model predictive control: A field study. *Applied Energy* (2025).

16. G.P. Henze, **K.J. Kircher** and J.E. Braun. Why has advanced commercial HVAC control not yet achieved its promise? *Journal of Building Performance Simulation* (2024).
15. E.N. Pergantis, P. Dillhon, L.D. Reyes Premer, A.H. Lee, D. Ziviani, E.A. Groll and **K.J. Kircher**. Humidity-aware model predictive control for residential air conditioning: A field study. *Building and Environment* (2024).
14. L. Semmelmann, M. Hertel, **K.J. Kircher**, R. Mikut, V. Hagenmeyer and C. Weinhardt. The impact of heat pumps on day-ahead energy community load forecasting. *Applied Energy* 368 (2024).
13. E.N. Pergantis, Priyadarshan, N. Al Theeb, P. Dillhon, J.P. Ore, D. Ziviani, E.A. Groll and **K.J. Kircher**. Field demonstration of predictive heating control for an all-electric house in a cold climate. *Applied Energy* 360 (2024).
12. A.O. Aderibole, **K.J. Kircher**, E.K. Saathoff, S.B. Leeb and L.K. Norford. Adaptive power line communication for low-data-rate control and sensing. *IEEE Transactions on Power Delivery* 38 (2023): 2213–2223.
11. A.O. Aderibole, E.K. Saathoff, **K.J. Kircher**, A.W. Langham, L.K. Norford and S.B. Leeb. Characterizing low-data-rate power line communication channels. *IEEE Transactions on Instrumentation and Measurement* 72 (2022): 1–12.
10. Z. Zhang, **K.J. Kircher**, Y. Cai, J.G. Brearly, D. Birge and L.K. Norford. Mitigating peak load and heat stress under heat waves by optimizing thermostat setpoint and fan speed schedules. *Journal of Building Performance Simulation* 16.4 (2022): 493–506.
9. A.O. Aderibole, **K.J. Kircher**, S.B. Leeb and L.K. Norford. Distributed load control using reliable low-bandwidth power line communication. *IEEE Access* 10 (2022): 50242–50253.
8. **K.J. Kircher**, A.O. Aderibole, L.K. Norford and S.B. Leeb. Distributed peak shaving for small aggregations of cyclic loads. *IEEE Transactions on Power Delivery* 37 (2022): 4315–4325.
7. A.O. Aderibole, E.K. Saathoff, **K.J. Kircher**, S.B. Leeb and L.K. Norford. Power line communication for low-bandwidth control and sensing. *IEEE Transactions on Power Delivery* 37 (2021): 2172–2181.
6. **K.J. Kircher** and K.M. Zhang. Heat purchase agreements could lower barriers to heat pump adoption. *Applied Energy* 286 (2021): 116489.
5. **K.J. Kircher**, W. Schaefer and K.M. Zhang. A computationally efficient, high-fidelity testbed for building climate control. *ASME Journal of Engineering for Sustainable Buildings and Cities* 2 (2020): 1–22.
4. Z. Lee, K. Gupta, **K.J. Kircher** and K.M. Zhang. Mixed-integer model predictive control of variable-speed heat pumps. *Energy and Buildings* 198 (2019): 75–83.
3. **K.J. Kircher** and K.M. Zhang. On the lumped capacitance approximation accuracy in RC network building models. *Energy and Buildings* 104 (2015): 454–462.
2. S.N. Palacio, **K.J. Kircher** and K.M. Zhang. On the feasibility of providing power system spinning reserves from thermal storage. *Energy and Buildings* 104 (2015): 131–138.
1. **K.J. Kircher**, X. Shi, S. Patil and K.M. Zhang. Cleanroom energy efficiency strategies: Modeling and simulation. *Energy and Buildings* 42 (2010): 282–289.

Conference papers

26. E.N. Pergantis, L.D. Reyes Premer, A.J. Khabbazi, Priyadarshan, F. Wu, D. Ziviani and **K.J. Kircher**. Active current limiting control of residential appliances for breaker panel protection across the US: a preliminary study. *CISBAT*, 2025.
25. L.D. Reyes Premer, L. Semmelmann, E.A. Groll, D. Ziviani and **K.J. Kircher**. A minimal-sensing predictive control strategy for heat pump water heaters: Field insights from cold climate operation. *ASHRAE Annual Conference*, 2025.

24. O.B. Mulayim, G. Qu, **K.J. Kircher** and M.E. Bergés. Physics-informed RL for HVAC controls: Imitation to online fine-tuning. *International Conference on Machine Learning*, 2025.
23. A.H.P. Farha, P. Papageorgiou, **K.J. Kircher**, E.A. Groll and R. Ciez. A technoeconomic decision making framework for thermal energy storage in net-zero energy systems across the United States. *ASHRAE Annual Conference*, 2025.
22. E.N. Pergantis, C. Liang, A.A.M. Bani Issa, J. Cai, D. Ziviani and **K.J. Kircher**. Frost accumulation reduction in air-source heat pumps using load regulation. *REHVA HVAC World Congress CLIMA*, 2025.
21. L. Semmelmann, K. Kaiser, A. Heider, **K.J. Kircher**, G. Hug and C. Weinhardt. Analyzing the impact of dynamic tariff adoption and regulatory options on distribution grids with an open-source framework. *E-Energy: ACM International Conference on Future and Sustainable Energy Systems*, 2025.
20. N. Al Theeb, A.A.M. Bani Issa and **K.J. Kircher**. Using small amounts of resistance heat to improve thermal comfort in residential air-source heat pumps. *ASHRAE Winter Conference*, 2025.
19. E.N. Pergantis, L.D. Reyes Premer, A.H. Lee, H. Liu, D. Ziviani, E.A. Groll and **K.J. Kircher**. Protecting residential electrical infrastructure through advanced control: The first field results. *International High Performance Buildings Conference*, 2024.
18. A.J. Khabbazi, E.N. Pergantis, L.D. Reyes Premer, A.H. Lee, J. Ma, G.P. Henze and **K.J. Kircher**. What have we learned from field demonstrations of advanced commercial HVAC control? *International High Performance Buildings Conference*, 2024.
17. L.D. Reyes Premer, L. Semmelmann, E.N. Pergantis, D. Ziviani, E.A. Groll and **K.J. Kircher**. A predictive heat pump water heater controller in a residential building: A field study. *International High Performance Buildings Conference*, 2024.
16. F. Wu, H. Devarapalli, H. Lee, J. Go, H. Kim, P. Karava, J.E. Braun, D. Ziviani, W.T. Horton, **K.J. Kircher** and E.A. Groll. Investigating occupant thermostat adjustment behavioral patterns in different heat pump operation modes: A field experiment. *International High Performance Buildings Conference*, 2024.
15. D. Mah, H. Cai, **K.J. Kircher** and A. Tzempelikos. Real-time estimation of heat gains for demand-driven building control using deep learning. *International High Performance Buildings Conference*, 2024.
14. A. Farha, D. Ziviani, **K.J. Kircher** and E.A. Groll. Performance comparison of a residential split-system heat pump powered on AC versus DC power. *International High Performance Buildings Conference*, 2024.
13. E.N. Pergantis, J. Park, Priyadarshan, T.J. Bird, D. Ziviani and **K.J. Kircher**. Learning the thermal dynamics of a residential building from limited data. *International High Performance Buildings Conference*, 2024.
12. L. Sriram, A. Farha, A. Hoess, D. Ziviani, E.A. Groll, E.N. Pergantis and **K.J. Kircher**. Development and comparative analysis of a power-over-ethernet (PoE) DC lighting system for residential buildings. *International High Performance Buildings Conference*, 2024.
11. D. Mah, A. Tzempelikos and **K.J. Kircher**. Real-time detection of internal and solar gains toward demand-driven building control using deep learning. *ASHRAE Winter Conference*, 2024.
10. E.N. Pergantis, L.D. Reyes Premer, Priyadarshan, A.H. Lee, P. Dillhon, D. Ziviani, E.A. Groll and **K.J. Kircher**. Latent and sensible model predictive controller demonstration in a house during cooling operation. *ASHRAE Winter Conference*, 2024.
9. Priyadarshan, E.N. Pergantis, C. Crozier, K. Baker and **K.J. Kircher**. EDGIE: A simulation test-bed for investigating the impacts of building and vehicle electrification on distribution grids. *Hawai'i International Conference on System Sciences (HICSS)*, 2024.
8. E.N. Pergantis, A.S. Sangamnerkar, Priyadarshan, J.P. Ore, P. Dillhon, D. Ziviani, E.A. Groll and **K.J. Kircher**. Sensors, storage and algorithms for practical optimal controls in residential buildings. *ASHRAE Annual Conference*, 2023.

7. **K.J. Kircher**, Y. Cai, L.K. Norford and S.B. Leeb. Controlling big, diverse, nonlinear load aggregations for grid services by adjusting device setpoints. *IEEE Conference on Decision and Control (CDC)*, 2021.
6. Y. Cai, J. Burek, S. Das, J.R. Gregory, L.K. Norford, J. Wang and **K.J. Kircher**. Reducing greenhouse gas emissions by optimizing room temperature set-points. *International Conference on Machine Learning (ICML): Workshop on Tackling Climate Change with Machine Learning*, 2021.
5. **K.J. Kircher** and K.M. Zhang. Sample-average model predictive control of uncertain linear systems. *IEEE Conference on Decision and Control (CDC)*, 2016.
4. **K.J. Kircher** and K.M. Zhang. Testing building controls with the BLDG toolbox. *American Control Conference (ACC)*, 2016. Invited paper.
3. **K.J. Kircher** and K.M. Zhang. Model predictive control of thermal storage for demand response. *American Control Conference (ACC)*, 2015. Invited paper.
2. **K.J. Kircher**, G. Ghatikar, S. Greenberg, D. Watson, R. Diamond, D. Sartor, C. Federspiel, A. McEachern and T. Owen. Toward the holy grail of perfect information: Lessons learned from implementing an energy information system in a commercial building. *ACEEE Summer Study on Energy Efficiency in Buildings*, 2010.
1. P.A. Mathew, R. Clear, **K.J. Kircher**, T. Webster, K.H. Lee and T. Hoyt. Advanced benchmarking for complex building types: Laboratories as an exemplar. *ACEEE Summer Study on Energy Efficiency in Buildings*, 2010.

Book chapter

G.P. Henze and **K.J. Kircher**. Modelling and simulation in building automation systems. *Building Performance Simulation for Design and Operation*, 3rd edition (2026).

PhD thesis

K.J. Kircher. Heat pump aggregation, optimization and control. Cornell University (2019).

This thesis develops an economic model that could accelerate adoption of efficient electric heat pumps for low-carbon heating and cooling. It also develops optimization and control methods that let heat pumps provide reliability services to the power grid, unlocking new revenues and facilitating renewable integration.

Course notes

6. **K.J. Kircher**. “Distributed energy resources,” created for Purdue ME 597.
5. **K.J. Kircher** and E.Y. Bitar. “Robust and stochastic optimization,” based on Cornell ECE 6990.
4. **K.J. Kircher** and A.S. Lewis. “Convex analysis,” based on Cornell ORIE 6328.
3. **K.J. Kircher** and D.P. Williamson. “Linear programming,” based on Cornell ORIE 6300.
2. **K.J. Kircher** and S.G. Henderson. “Monte Carlo simulation,” based on Cornell ORIE 6580.
1. **K.J. Kircher** and M.L. Psiaki. “Model-based estimation,” based on Cornell MAE 6760.

Patents

4. Y. Lin, L.K. Norford, A. Botterud, J.R. Gregory, J. Higgins, D.H. Green, **K.J. Kircher** and F. Selvaggio. “Multi-space learning building control.” US Patent [App. 63/665,248](#) (2024).
3. **K.J. Kircher**, E.N. Pergantis, L.D.R. Premer and D. Ziviani. “Smart controls for electrical distribution protection in homes.” US Patent [App. 63/566,019](#) (2024).
2. **K.J. Kircher**, N. Al Theeb, A.A.M Bani Issa and E.N. Pergantis. “Comfort control system and method.” US Patent [App. 63/627,421](#) (2024).

1. S.B. Leeb, L.K. Norford, E.K. Saathoff, A.O. Aderibole and **K.J. Kircher**. “Power line communication for low-bandwidth control and sensing.” US Patent 11,888,548 (2024).

Teaching

S24, S25, S26	Distributed Energy Resources course creator & instructor, Purdue University
F22, S23, F23, F24, F25	Thermodynamics I instructor, Purdue University
S14, F15, S15	Teaching assistant trainer, Cornell University College of Engineering <i>Trained hundreds of graduate student teaching assistants from 14 departments.</i>
F13	Multivariable Calculus teaching assistant, Cornell University
S13	Dynamics teaching assistant, Cornell University
S07, S08	Physics in Everyday Life teaching assistant, University of Wisconsin–Milwaukee
F05–Sp07	Mathematics tutor, University of Wisconsin–Milwaukee

Funding

14. Comprehensive Evaluation of a Residential DC Nanogrid: Safety and Economic Potential (PI). Co-authored with Eckhard Groll and Davide Ziviani. *Center for High Performance Buildings*. KJK share: **One student-year** (1/2026–1/2027).
13. Smart electrification for rural co-operatives (PI; \$6M federal plus \$3M match). Co-authored with Jie Cai, Panagiota Karava, Vassilis Kekatos, Xiaonan Lu, and Davide Ziviani. *DOE Connected Communities 2.0*. KJK share: TBD.
12. Midwest Agrivoltaics Incubator to Transform the Prosperity and Resilience to Extreme Weather of Midwest Farmers and Rural Communities. Co-authored with Dan Chavas (PI), Juan Sesmero, Xiaonan Lu, Aaron Thompson, Kara Salazar. *NSF Regional Resilience Innovation Incubator*.
11. Pioneering DC-enabled equipment and predictive controls for home energy management systems (PI). Co-authored with Eckhard Groll and Davide Ziviani. *Center for High Performance Buildings*. KJK share: **One student-year** (1/2025–1/2026).
10. Building a low-cost residential thermal energy storage system for both heating and cooling. Co-authored with Eckhard Groll (PI) and Davide Ziviani. *Center for High Performance Buildings* (1/2025–1/2026).
9. Assessing and improving the performance of air-source heat pumps using laboratory and community testbeds. Co-authored with Panagiota Karava (PI), James Braun, Travis Horton, and Davide Ziviani. *Center for High Performance Buildings* (1/2025–1/2026).
8. Development of an artificial intelligence solution for residential heating and cooling equipment sizing to reduce equipment oversizing. Co-authored with Mark Ladd of RookStack (PI). *DOE Small Business Technology Transfer*. KJK share: **One student-year** (8/2024–8/2025).
7. Optimization of low-cost predictive controls in residential buildings and the DC House. Co-authored with Eckhard Groll (PI) and Davide Ziviani. *Center for High Performance Buildings* (1/2024–1/2025).
6. Comparisons of occupant satisfaction and energy efficiency of comfort delivery approaches and heating equipment using the Human-Building Interactions Laboratory. Co-authored with Panagiota Karava (PI), James Braun, Travis Horton, and Davide Ziviani. *Center for High Performance Buildings* (1/2024–1/2025).
5. Technoeconomic decision-making framework for thermal and electric energy storage in net zero energy systems. Co-authored with Rebecca Ciez (PI), Eckhard Groll, and Davide Ziviani. *Center for High Performance Buildings* (1/2024–1/2025).

4. Unlocking the potential of Ray W. Herrick Laboratories as a testbed for advanced whole-building HVAC control (PI). Co-authored with Thanos Tzempelikos, Jie Ma, and James Braun. *Center for High Performance Buildings*. KJK share: **One-half student-year** (1/2024–6/2024).
3. Improving air-source heat pump thermal comfort by modifying equipment and controls (PI). Co-authored with Davide Ziviani. *Carrier Global Corporation*. KJK share: **One student-year** (1/2023–1/2024).
2. Characterizing and mitigating the impacts of home and vehicle electrification on distribution grids (PI). Co-authored with James Braun. *Center for High Performance Buildings*. KJK share: **Two student-years** (1/2023–1/2025).
1. Smart heat: Aggregating renewable-electric-heating-thermal-storage systems for grid services. Co-authored with K. Max Zhang (PI) and Justin Dobbs. *NSF Energy, Power, Controls and Networks*. (8/2017–8/2020).

Invited talks

39. Indiana Electric Cooperatives fall section meeting, Carmel, IN. *Heat pumps: Environmental benefits and household economics*. September, 2026.
38. Heartland Democracy Project forum on Affordable & Sustainable Energy, Lafayette, IN. *United States energy affordability trends*. May, 2026.
37. Purdue University LightsUp Conference keynote address, West Lafayette, IN. *Stories of United States energy*. February, 2026.
36. University of Rhode Island Metcalf Institute/Solutions Journalism Network, Kingston, RI. *Causes and responses to extreme winter weather*. February, 2026.
35. University of British Columbia Faculty of Forestry guest lecture in ‘Sustainable Futures,’ Vancouver, BC. *Modeling and optimizing the world system*. September, 2025.
34. Georgia Tech Department of Industrial and Systems Engineering guest lecture in ‘Power Systems for Optimizers,’ Atlanta, GA. *Modeling and optimizing the world system*. September, 2025.
33. RWTH Aachen University Center for Flexible Electricity Networks, Aachen, Germany. *The DC Nanogrid House*. March, 2025.
32. University of Massachusetts Lowell Mechanical & Industrial Engineering Seminar, Lowell, MA. *Control opportunities in electrified housing*. March, 2025.
31. University of Michigan College of Engineering Control Seminar, Ann Arbor, MI. *Control opportunities in electrified housing*. November, 2024.
30. IEEE Energy Conversion Conference and Expo Tutorial on DC Distribution Systems and Microgrids, Phoenix, AZ. *The DC Nanogrid House*. October, 2024.
29. MIT Electrical Engineering and Computer Science Academic Job Search Seminar, Cambridge, MA. *My prof. job search*. October, 2024.
28. Herrick International Conferences Short Course, West Lafayette, IN. *Climate change and heat pumps*. July, 2024.
27. Purdue University Institute for a Sustainable Future, West Lafayette, IN. *Decarbonizing Purdue*. February, 2024.
26. Hawai’i International Conference on System Sciences, Honolulu, HI. *EDGIE: A Matlab toolbox for emulating the distribution grid impacts of electrification*. January, 2024.
25. INFORMS Annual Meeting, Phoenix, AZ. *Equity benefits of strategic home electrification*. October, 2023.
24. Purdue University Herrick Energy Seminar, West Lafayette, IN. *Thermal comfort and air-source heat pump controls*. September, 2023.

23. Purdue University Institute for Control, Optimization, and Networks, West Lafayette, IN. *Learning, optimization, and control for distributed energy resources*. August, 2023.
22. Duke Energy and Itron, West Lafayette, IN. *Data and decisions for distributed energy resources*. August, 2023.
21. Purdue University School of Electrical and Computer Engineering, West Lafayette, IN. *Reducing electricity demand peaks from populations of on/off loads*. November, 2022.
20. Herrick Laboratories Industrial Advisory Committee, West Lafayette, IN. *Toward smart electrification*. October, 2022.
19. MIT Electrical Engineering and Computer Science Academic Job Search Seminar, Cambridge, MA. *My prof. job search*. September, 2022.
18. U.S. Department of Energy Loan Programs Office, Washington, D.C. *Third-party ownership models for financing and aggregating electric heat pumps*. March, 2022.
17. Carnegie Mellon University Department of Electrical and Computer Engineering, Pittsburgh, PA. *Smart electrification: How control systems in buildings can accelerate decarbonization*. March, 2022.
16. University of Vermont Department of Electrical and Biomedical Engineering, Burlington, VT. *Smart electrification: How control systems in buildings can accelerate decarbonization*. March, 2022.
15. Purdue University Department of Mechanical Engineering, West Lafayette, IN. *Smart electrification: How control systems in buildings can accelerate decarbonization*. February, 2022.
14. MIT Department of Mechanical Engineering and Schwarzman College of Computing, Cambridge, MA. *Planet Earth has a fever. . . but better building control software can help*. January, 2022.
13. IEEE Conference on Decision and Control, Austin, TX. *A general, scalable grid-service control framework for aggregated electrical devices*. December, 2021.
12. Tune-In on MIT's Climate Action Plan for the Decade, Cambridge, MA. *How artificial intelligence can reduce campus carbon emissions*. November, 2021.
11. MIT Department of Facilities, Cambridge, MA. *Shifting electrical load by perturbing zone air temperature setpoints*. February, 2020.
10. Schneider Electric, Cambridge, MA. *Shifting load by perturbing temperature setpoints*. January, 2020.
9. Cornell University Department of Mechanical and Aerospace Engineering, Ithaca, NY. *Heat purchase agreements could lower barriers to heat pump adoption*. July, 2019.
8. IEEE Conference on Decision and Control, Las Vegas, NV. *Sample-average approximation in stochastic model predictive control*. December, 2016.
7. HydroVision International, Minneapolis, MN. *Operating a Hawai'ian microgrid without fuel*. July, 2016.
6. American Control Conference, Boston, MA. *Testing building controls in MATLAB with the BLDG toolbox*. July, 2016.
5. Cornell University Economics and Engineering of Electricity Research Group, Ithaca, NY. *Flexible demand from the building operator's perspective*. October, 2015.
4. Cornell University Energy Seminar, Ithaca, NY. *How can buildings help the grid?* September, 2015.
3. HydroVision International, Portland, OR. *Pumped hydro controls for a Hawai'ian microgrid*. July, 2015.
2. American Control Conference, Chicago, IL. *Economic MPC of thermal storage for demand response*. July, 2015.
1. University of Hawaii at Hilo. *A little island on the Big Island: UH-Hilo microgrid design*. May, 2013.

Media

October 2026	Renovating energy systems for the future. Planet Philadelphia
August 2026	The clean energy transition has a grid problem. Here's how to fix it. Atmos
July 2026	The overlooked wiring problem in the clean-energy transition. Anthropocene
July 2026	How to retrofit residential air-source heat pumps to run on DC. PV Magazine
April 2026	Invisible plumes and 'terrible pollution': the reality of the US gas sites rated 'grade A'. The Guardian
April 2026	The trouble with voluntary methane schemes. Drilled Media
April 2026	A climate activist and a gas executive walk into a bar. New Hampshire Public Radio Outside/In podcast
March 2026	Texas seizes the solar crown from California, and other key points from the latest electricity data. Inside Climate News
February 2026	LightsUp Conference educates attendees on sustainability. The Exponent
September 2025	The costs (and savings) of electrifying homes, cars. WEHT Evansville, WLFI Lafayette, KION-DT2 Monterey-Salinas, KICU San Francisco, KTVU San Francisco
September 2025	Purdue offers solutions to blackouts, high energy bills as people electrify their homes and cars. Indiana Public Broadcasting
September 2025	What the effects of electrification could mean for home and car owners. Star City News Lafayette
September 2025	Purdue study: Move to electric homes, vehicles could cost households thousands. WISH TV Indianapolis
September 2025	If every home and personal vehicle went electric in the U.S., power outages could spike — unless key measures are taken. Purdue Today
July 2025	Two-thirds of U.S. GHG cuts since 2005 wiped out by higher methane – study. Gas Outlook
July 2025	Want a battery for your home? Your hot water tank is a great start. The Reengineer
June 2025	Long- and short-term solutions to keep yourself and your home cool in a heat wave. NPR
May 2025	Why killing home-energy tax credits would be bad for the economy. Canary Media
February 2025	Purdue rural electrification project to help upgrade home utilities. CBS 4 Indianapolis, Fox 59 Indianapolis
January 2025	Is Purdue hiding its emissions data? Students and faculty say reports are limited, unclear. The Exponent
November 2024	UK heating experts win a long-running battle on boiler efficiency. The Reengineer
November 2024	Electrifying your home can limit greenhouse effect. WDVM Washington, D.C., WTTK Indianapolis, KDVR Denver, WRIC Richmond, WLFI Lafayette, WTHI Terre Haute
September 2024	Cold climate heat pumps in the US: Updates from the refrigerant to the electrical grid. IEA Heat Pumping Technologies Magazine
July 2024	The hunt for the most efficient heat pump in the world. Wired
June 2024	Predictive heat pump thermostat could reduce energy bills. ACHR News
March 2024	Where heat pumps win – and where they lose. Heatmap News
February 2024	A market for 24/7 clean power might look something like this. Heatmap News
January 2024	Can this city's microgrid plan skirt the traditional utility model? Latitude Media
November 2023	Heat pumps – the future of home heating and cooling. Her House, Her Home podcast

July 2023	Europe struggles to heat homes without cooking the planet. Clean Energy Wire
April 2023	6 things to know about heat pumps, a climate solution in a box. NPR
March 2023	The new incentive for Americans to get heat pumps as a key climate solution. All Things Considered
February 2023	Talking devices could reduce odds of electrical grid breakdowns. The American Society of Mechanical Engineers
November 2022	Orchestrating chatter between appliances could save a surprising amount of energy. Anthropocene
August 2022	Experts: Cash incentives in climate bill could revolutionize U.S. homes, 1 HVAC at a time. USA Today
May 2022	The U.S. is addicted to gas heating. A new bill may make going electric the easy choice. HuffPost
April 2022	How does a heat pump work? Carbon Switch
April 2021	Unlocking home electrification with heat pumps. The Energy Gang podcast

Mentoring

As a Purdue professor

PhD:	2025–	Grant Dierking (co-chair with Davide Ziviani), Mechanical Engineering
	2023–	Aaron Farha (co-chair with Eckhard Groll), Mechanical Engineering
	2023–	Arash Khabbazi (chair), Mechanical Engineering
	2023–	Levi Reyes Premer (co-chair with Davide Ziviani), Mechanical Engineering
	2023–	Nadah Al Theeb (chair), Mechanical Engineering
	2022–	Priyadarshan (chair), Mechanical Engineering
	2022–24	Elias Pergantis, PhD (co-chair with Davide Ziviani), Mechanical Engineering <i>Next position: Lead residential R&D engineer at Trane</i>
MS:	2025–	Liam Johnson (chair), Mechanical Engineering
	2024–26	Jose Sandoval Hernandez (chair), Mechanical Engineering <i>Next position: TBD</i>
	2024–26	Panagiotis Papageorgiou (co-chair with Jie Cai), Mechanical Engineering <i>Next position: Industrial Engineering PhD student at UT Austin</i>
	2024–26	Alex Lee (chair), Mechanical Engineering <i>Next position: Data scientist at Switchbox</i>
BS:	2026–	Joyce Li, Mechanical Engineering
	2024–26	Andrew Beck, Mechanical Engineering <i>Next position: Mechanical Engineering MS student at Purdue</i>
	2025–26	Serena Wei, Civil Engineering <i>Next position: TBD</i>
	2024–26	Shubha Vijayaraj, Mechanical Engineering <i>Next position: Propulsion engineer at Honeywell Aerospace</i>

2025	Pranav Vijayanand, Nuclear Engineering <i>Next position: Propulsion engineer at Space Lab</i>
2024–25	Zachary Tan, Mechanical Engineering <i>Next position: Mechanical engineer at SpaceX</i>
2023–25	Liam Johnson, Mechanical Engineering <i>Next position: Mechanical Engineering MS student at Purdue</i>
2023–25	Lokesh Sriram, Mechanical Engineering <i>Next position: Mechanical Engineering MS student at Carnegie Mellon</i>
2024	Jose Sandoval Hernandez, Mechanical Engineering <i>Next position: Mechanical Engineering MS student at Purdue</i>
2023–24	Sophia Evers, Nuclear Engineering <i>Next position: Nuclear Fuels Engineer at Constellation</i>
2023–24	Jude Lin, Mechanical Engineering <i>Next position: Mechanical engineer at Atkore</i>
2023–24	Jacob Aldridge, Computer Science <i>Next position: Building controls software engineer at Automated Logic</i>
2023–24	Justin Chang, Mechanical Engineering <i>Next position: Mechanical Engineering PhD student at Purdue</i>
2023–24	Aadit Kumar, Mechanical Engineering <i>Next position: Mechanical Engineering MS student at Purdue</i>
2023–24	Alex Lee, Civil Engineering and Computer Science <i>Next position: Mechanical Engineering MS student at Purdue</i>
2023–24	Brendan Corban, Mechanical Engineering <i>Next position: Building automation engineer at Siemens</i>

Committee memberships: Zicheng Wang (CCE PhD 2026–), Hyeongseok Lee (CCE PhD 2025–), Hongzhen Dan (ME PhD 2025–), Cyra Chronister (ME MS 2025–), Isha Bayad (ME PhD 2023–), Dongyang Xi (ME PhD 2025–), Hanwen Qin (EEE PhD 2025–), Jennifer Patterson (EEE PhD 2024–), Yash Mathur (ME MS 2024–), Yuanzhi Yang (ME PhD 2024–), Tchato Vidal (ME PhD 2024–), Ranadip Saha (ME PhD 2023–), Feng Wu (ArchE PhD 2023–24), Dongjun Mah (CE PhD 2023–24), Aditya Nur (ME PhD 2022–), Ara Bolanger (ME MS 2022–24), Ting-Chun Kuo (ArchE PhD 2022–25)

As an MIT postdoc

2021–22	Morgan Santoni-Colvin, SM, Technology and Policy Program <i>Next position: Associate consultant at Energy and Environmental Economics</i>
2021–22	Stella Zhujing Zhang, SM, Building Technology <i>Next position: Civil Engineering PhD student at EPFL</i>
2021–22	Julia Wang, SB/SM, Computer Science <i>Next position: Machine learning engineer at Meta</i>
2019–22	Yuan Cai, SM, Computer Science and Building Technology <i>Next position: Associate consultant at Bain & Company</i>
2019–22	Adedayo Aderibole, PhD, Electrical Engineering and Computer Science <i>Next position: Systems engineer at Google</i>

As a Cornell PhD student

2017–18	Kartikay Gupta, MS, Mechanical Engineering <i>Next position: Flight dynamics engineer at SES Satellites</i>
2016	Kevin Leong-Tiwanak, MEng, Systems Engineering <i>Next position: Design engineer at SepiSolar</i>
2015–16	Sean Hidaka, MEng, Mechanical Engineering <i>Next position: Mechanical engineer at Elara Engineering</i>
2015	Walter Schaefer, MEng, Mechanical Engineering <i>Next position: Project engineer at Energy and Resource Solutions</i>
2015	Eric Hui Fat Tse, BS, Mechanical Engineering and Economics <i>Next position: Business analyst at Indus Valley Partners</i>
2015	Stefan Rauscher, BS, RWTH Aachen Mechanical Engineering <i>Next position: Project engineer at TLK Energy</i>
2014–15	Julius Scheuber, BS, RWTH Aachen Mechanical Engineering <i>Next position: Co-founder of ENLYZE</i>
2014–15	Siddharth Deshpande, MEng, Mechanical Engineering <i>Next position: Energy analyst at EnerNOC</i>

Academic service

Conference and workshop organizing:

July 2026	International High-Performance Buildings Conference co-chair, West Lafayette, IN
July 2026	Intelligent Building Operations Workshop chair, West Lafayette, IN
July 2024	Intelligent Building Operations Workshop co-chair, West Lafayette, IN
September 2023	Intelligent Building Operations Workshop co-chair, Boulder, CO

Purdue seminar organizing: Herrick Graduate Seminar creator (2023) and faculty advisor (2023–)

Society memberships: IEEE (Power & Energy Society, Control Systems Society), ASHRAE

Club advising: Faculty advisor, Sustainable Energy Club of Purdue (West Lafayette 2024–, Indianapolis 2026–)

Purdue faculty senate: Sustainability Committee member, 2024–

Reviewing: Natural Sciences and Engineering Research Council of Canada; Nature Communications; Joule; Applied Energy; Energy Conversion and Management; Energy Policy; Energy Reports; Cell Reports Sustainability; IEEE Transactions on Power Systems; IEEE Transactions on Automatic Control; IEEE Transactions on Smart Grid; IEEE Transactions on Power Delivery; IEEE Transactions on Control Systems Technology; Annual Reviews in Control; Environmental Science & Technology; Electric Power Systems Research; Journal of Environmental Management; Energy and Buildings; Building and Environment; Journal of Building Engineering; Renewable Energy; The Innovation Energy; Sustainable Energy, Grids and Networks; Journal of Building Performance Simulation; Journal of Cleaner Production; Control Engineering Practice; Science and Technology for the Built Environment; Earth's Future; IEEE Conference on Decision and Control; American Control Conference; Hawai'i International Conference on System Sciences

Select awards and recognition

2026	Third Place, Student Paper Competition, International Conference on Refrigeration and Air Conditioning (to advisee Levi Premier)
2026	Senior Member, IEEE
2024	Second Place, Student Paper Competition, International Conference on High Performance Buildings (to advisee Elias Pergantis)
2014–16	Hydro Research Foundation Fellowship
2014	Honorable mention, Link Foundation Energy Fellowship
2012–13	Sibley Graduate Fellowship

Select employment and volunteering

2009–10	Building Technologies research associate, Lawrence Berkeley National Laboratory
2009	Volunteer, Amanecer solar oven project, Totogalpa, Nicaragua
2008	Volunteer, AguaClara water supply project, Cuatro Comunidades, Honduras