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BIO

Dr. Jin Dong is a member of ORNL's Building Envelope & Urban Systems Research Group in the Energy and Transportation Science Division. He received his PhD degree in Electrical Engineering from the University of Tennessee, Knoxville in 2016. During his PhD study, he was involved in several projects about power system frequency monitoring, occupancy prediction, occupancy-based control and distributed robust control for improving energy efficiency while meeting probabilistic building constraints.
Since joining ORNL in 2016, his work has focused mainly on control-oriented building energy modelling and new optimal control algorithms for improving the energy efficiency of buildings as well as actively engaging them in response to grid needs. This is especially important in power systems with high penetrations of wind and solar. He has been involved in the development of transactive building load control, adaptive building modelling and virtual storage devices projects sponsored by the DOE Solar Office and Building Technology Office (BTO). In his work, he uses methods from a variety of fields including controls, optimization, statistics, and machine learning. Towards the goal of building intelligent Grid-Interactive Efficient Buildings (GEB), behave and interact with the power grid as any distributed energy resources (DERs) do, his research interests lie in the intersection of smart buildings, building-to-grid integration, optimal control and optimization, multi-agent system and game theory, machine learning and artificial intelligence.

EDUCATION

Ph.D. **Department of Electrical Engineering and Computer Science** August**, 2016**
University of Tennessee, Knoxville, TN, USA
B.Sc. Electrical Engineering and Automation July**, 2010**
Harbin Institute of Technology, Heilongjiang, China

PROJECTS

- **July 2017 - Now** Virtual Storage project
- **July 2016 - Now** Dynamic Building Load Control to Facilitate High Penetration of Solar Photovoltaic Generation (Sunlamp) project
- **July 2016 - Now** Advancements in Building Controls for Energy Efficiency: Adaptive Control project
- **July 2016 - Now** GMLC Definitions, Standards and Test Procedures for Grid Services from Devices project
- **Sep 2015 – June 2016** Wireless Sensor Node for Advanced Occupancy Sensing and Building Control (Occupancy) project
- **Dec 2012 - June 2016** Operator Theoretic Approach to the Optimal Distributed Control Problem for Spatially Invariant Systems
- **Feb 2014 - Dec 2015** Energy Management System for Smart Operations of a Residential Building
- **Sep 2013 - Oct 2015** Occupancy-based Optimal Stochastic Control for HVAC Systems in Energy Efficient Buildings
- **July 2013 - May 2014** Power-efficient resource management for co-located virtualized web servers: A stochastic control approach

ACTIVITY, SCHOLARSHIPS AND AWARDS

- June 2018 **Best paper award** in the 9th International Symposium on Power Electronics for Distributed Generation Systems (PEDG 2018).
- July 2016 **ACC Student Travel Award**
  American Control Conference (ACC), Boston, MA 2016.
- Sept. 2015 **Travel Award for Workshop on Distributed Control and Decision Making**
  Institute for Mathematics and its Applications (IMA), Minneapolis, Minnesota.

- June 2014 **ACC Student Travel Award**

  American Control Conference (ACC), Portland, OR 2014.
- May 2014 **Travel Award for IMA New Directions Short Course Topics in Control Theory**

  Institute for Mathematics and its Applications (IMA), Minneapolis, Minnesota.
- May 2013 **Min Kao Fellowship**

  Department of Electrical Engineering & Computer Science, University of Tennessee, 2010-2013.

Referee for:

- *IEEE Transactions on Industrial Electronics*
- *IEEE Transaction on Control Network Systems*
- *IEEE Transactions on Power Systems*
- *IEEE Transactions on Power Electronics*
- *IEEE Transactions on Sensor Journal*
- *IEEE Transactions on Instrumentation & Measurement*
- *IEEE Control Systems Letters*
- *IEEE Journal of Emerging and Selected Topics in Power Electronics*
- *Energy and Building*
- *Applied Energy*
- *International Journal of Electrical Power and Energy Systems*
- *Journal of Cleaner Production*
- *Simulation: Transactions of the Society for Modeling and Simulation International*
- *Nonlinear Analysis: Hybrid Systems*
- *Asian Journal of Control*

Associate Editor for: *International Journal of Electrical Engineering Education*

INTELLECTUAL PROPERTY

1. **Invention Disclosure 201804095:** Kyle Gluesenkamp, Tim LaClair, Jeffrey Munk and **Jin Dong**, "Thermal Storage System for Residential Space Conditioning".
2. **Invention Disclosure (under review): Jin Dong**, Teja Kuruganti, Yaosuo Xue, Seddik M. Djouadi and Melissa Lapsa "Combined Power and Thermal Aware Optimization for Sustainable Data Centers".

JOURNAL PAPERS

3. A. K. Mikkilineni, **J. Dong**, T. Kuruganti and D. L. Fugate, "High Performance Wireless Occupancy Sensor Node and Optimal Placement," *Energy and Buildings* (under review).
4. **J. Dong**, T. Kuruganti, A. M. Melin, S. M. Djouadi and Y. Zhang, "Novel stochastic methodologies to forecast short-term highre solution solar irradiance and photovoltaic power," *Renewable Energy* (under review).
5. B. Cui, C. Fan, J. Munk, N. Mao, F. Xiao, **J. Dong** and T. Kuruganti. "A hybrid building thermal modeling approach for predicting temperatures in typical, detached, two-story houses", *Applied Energy* (under review).
6. M. Olama, T. Kuruganti, J. Nutaro and **J. Dong**, "Coordination and Control of Building HVAC Systems to Provide Frequency Regulation to the Electric Grid", *Energies* (Accepted).
7. R. E. Edward, J. New, L. E. Parker, B. Cui and **J. Dong**, "Constructing Large Scale EnergyPlus Surrogates from Big Data," *Applied Energy, vol. 202, pp. 685-699*, 2017.
8. I. Sharma, **J. Dong**, A. Andreas, M. Street, J. Ostrowski, T. Kuruganti and R. Jackson, "Energy Management System for Smart Operations of a Residential Building", *Energy and Buildings*, 2016.
9. X. Shi, **J. Dong**, S. M. Djouadi, Y. Wang, X. Ma and Y. Feng, "PAPMSC: Power-Aware Performance Management for Web Applications on Virtualized Servers via Stochastic Control," *Journal of Grid Computing*, pp. 1-21, 2015.
10. **J. Dong**, X. Ma, S. M. Djouadi, H. Li, and Y. Liu, "Frequency Prediction of Power Systems in FNET based on State Space Approach and Uncertain Basis Functions," *IEEE Transactions on Power Systems*, vol. 29, no. 6, pp. 2602-2612, 2014.

11. A. Wu, **J. Dong** and G. Duan, "Robust H-infinity estimation for linear time-delay systems: An improved LMI approach", International Journal of Control, Automation and Systems, vol. 7, no. 4, pp. 668-673, 2009.

CONFERENCE PROCEEDINGS AND PRESENTATIONS

1. **J. Dong**, P. Im, S. Huang, Y. Chen, J. Munk and T. Kuruganti, "Development and Calibration of an Online Energy Model for AHU Fan", in *Proc. ASHRAE Winter Conference*, Atlanta, GA, Jan 2019 (under review).
2. **J. Dong**, M. Olama, T. Kuruganti, J. Nutaro, Y. Xue, C. Winstead and A. Melin, "Model Predictive Control of Building On/Off HVAC Systems to Compensate Fluctuations in Solar Power Generation", in *Proc. IEEE 9th International Symposium on Power Electronics for Distributed Generation Systems (PEDG)*, **Best Paper Award**, Charlotte, NC, June 25-28, 2018.
3. **J. Dong**, Y. Xue, M. Olama, T. Kuruganti, J. Nutaro and C. Winstead, "Distribution Voltage Control: Current Status and Future Trends", in *Proc. of the 9th International Symposium on Power Electronics for Distributed Generation Systems (PEDG)*, Charlotte, NC, June 25-28, 2018.
4. B. Telsang, M. Olama, S. Djouadi, **J. Dong**, T. Kuruganti and Y. Xue, "Model-free Temperature Control for Building Air-conditioning Systems to Accommodate Solar Photovoltaic Energy", in *Proc. of the 9th International Symposium on Power Electronics for Distributed Generation Systems (PEDG)*, Charlotte, NC, June 25-28, 2018.
5. **J. Dong**, J. Munk, B. Cui, P. Boudreaux and T. Kuruganti, "Machine-Learning Model of Electric Water Heater for Electricity Consumption Prediction", in *5th International High Performance Buildings Conference at Purdue*, July 9-11, 2018.
6. B. Cui, **J. Dong**, J. Munk, N. Mao and T. Kuruganti, "A simplified regression building thermal modelling method for detached two-floor house in U.S.", in *5th International High Performance Buildings Conference at Purdue*, July 9-11, 2018.
7. **J. Dong**, Y. Xue, T. Kuruganti, I. Sharma, J. Nutaro, M. Olama, and D. Fugate, "Impact of Increased Penetration of Solar Power Generation on Distribution Circuit: A Case Study," in *Proc. IEEE PES Innovative Smart Grid Technologies (ISGT)*, 2018.
8. Y. Zhang, A. Melin, M. Olama, S. Djouadi, **J. Dong** and K. Tomsovic, "Battery Energy Storage Scheduling for Optimal Load Variance Minimization," in *Proc. IEEE PES Innovative Smart Grid Technologies (ISGT)*, 2018.
9. **J. Dong**, S. M. Djouadi, T. Kuruganti and M. M. Olama, "Augmented Optimal Control for Buildings under High Penetration of Solar Photovoltaic Generation," in *Proc. 2017 IEEE Conference on Control Technology and Applications, 2017*.
10. M. M. Olama, **J. Dong**, A. M. Melin, J. Dong, S. M. Djouadi and Y. Zhang, "Stochastic Prediction of Short-term Solar Irradiance and Photovoltaic Power Output," in *Proc. North American Power Symposium (NAPS), 2017*.
11. Y. Xue, I. Sharma, T. Kuruganti, **J. Dong**, J. Nutaro, M. M. Olama, D. Fugate, and M. Starke, "Voltage Impacts of Solar Photovoltaic Penetrations on Distribution Load Tap Changer Operations," in *Proc. North American Power Symposium (NAPS), 2017*.
12. **J. Dong**, M. M. Olama, T. Kuruganti, J. Nutaro, Y. Xue, I. Sharma and S. M. Djouadi, "Adaptive Building Load Control to Enable High Penetration of PV Generation," in *Proc. 2017 IEEE Power & Energy Society General Meeting, 2017*.
13. M. M. Olama, I. Sharma, T. Kuruganti, **J. Dong**, J. Nutaro and Y. Xue, "Spectral Analytics of Solar Photovoltaic Power Output for Optimal Distributed Energy Resource Utilization," in *Proc. 2017 IEEE Power & Energy Society General Meeting, 2017*.
14. **J. Dong**, T. Kuruganti and S. M. Djouadi, "Very Short-term Photovoltaic Power Forecasting using Uncertain Basis Function," in *Proc. Conference on Information Sciences and Systems (CISS 2017), 2017*.
15. **J. Dong**, T. Kuruganti, A. A. Malikopoulos, S. M. Djouadi and L. Wang, "Home Energy Management based on Optimal Production Control Scheduling with Unknown Regime Switching," in *Proc. IEEE American Control Conference (ACC), 2017*.
16. **J. Dong** and S. M. Djouadi, "Distributed Mixed L_2/H_1 Control Synthesis for Spatially Invariant Systems," in *Proc. IEEE American Control Conference (ACC), 2017*.
17. **J. Dong**, S. M. Djouadi and T. Kuruganti, "Application of Optimal Production Control theory for Home Energy Management in a Micro Grid," in *Proc. IEEE American Control Conference (ACC), 2016*.
18. **J. Dong**, C. Winstead, S. M. Djouadi, J. Nutaro and T. Kuruganti, "Occupancy-based Optimal Stochastic Control for HVAC Systems in Energy Efficient Buildings," *in the 4th International High Performance Buildings Conference at Purdue, 2016*.
19. M. Mahmoudi, **J. Dong**, K. Tomsovic and S. M. Djouadi, "Application of Distributed Control to Mitigate Disturbance Propagations in Large Power Networks," in *North American Power Symposium (NAPS), 2015*, vol., no., pp.1-6, 4-6 Oct. 2015.
20. X. Ma, **J. Dong**, S. M. Djouadi, J. Nutaro and P. T. Kuruganti, "Stochastic Control of Energy Efficient Buildings: A Semidefinite Programming Approach", in *Proc. IEEE Smart- GridComm*, 2015.
21. S. M. Djouadi and **J. Dong**, "On the Distributed Control of Spatially Invariant Systems", in *IEEE Conference on Decision and Control (CDC)*, 2015.
22. S. M. Djouadi, A. M. Melin, E. M. Ferragut, J. A. Laska and **J. Dong**, "Finite Energy and Bounded Actuator Attacks on Cyber-Physical Systems", in *Proc. IEEE European Control Conference (ECC)*, 2015.
23. S. M. Djouadi and **J. Dong**, "Operator theoretic approach to the optimal distributed control problem for spatially invariant systems", in *Proc. IEEE American Control Conference (ACC)*, pp. 2613-2618, 2015.
24. **J. Dong**, S. M. Djouadi, J. Nutaro and P. T. Kuruganti "Secure Control Systems with Application to Cyber-Physical Systems", in *ACM 9th Annual Cyber and Information Security Research (CISR) Conference*, pp. 9-12, 2014.

25. S. M. Djouadi, A. M. Melin, E. M. Ferragut, J. A. Laska and **J. Dong**, "Finite Energy and Bounded Attacks on Control System Sensor Signals," in *Proc. IEEE American Control Conference (ACC)*, pp. 1716-1722, 2014.
26. X. Shi, **J. Dong**, S. M. Djouadi, Y. Wang, X. Ma and Y. Feng, "Power-efficient resource management for co-located virtualized web servers: A stochastic control approach," in *Proc. IEEE International Green Computing Conference (IGCC)*, pp. 1-9, 2014.
27. S. M. Djouadi and **J. Dong**, "Duality of the optimal distributed control for spatially invariant systems," in *Proc. IEEE American Control Conference (ACC)*, pp. 2214-2219, 2014.
28. **J. Dong**, X. Ma, S. M. Djouadi, H. Li and P. T. Kuruganti, "Real-time prediction of power system frequency in FNET: A state space approach," in *Proc. IEEE International Conference on Smart Grid Communications (SmartGridComm)*, pp. 109-114, 2013.
29. S. Sahyoun, **J. Dong** and S. M. Djouadi. "Reduced Order Modeling for Fluid Flows Based on Nonlinear Balanced Truncation," in *Proc. IEEE American Control Conference (ACC)*, pp. 1284-1289, 2013.
30. S. Sahyoun, **J. Dong** and S. M. Djouadi. "Reduced order modeling for fluid flows subject to quadratic type nonlinearities," in *Proc. IEEE 51st Conference on Decision and Control (CDC)*, pp. 961-966, 2012.