# YU YANG

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## POSITION

**University of California, Berkeley** *Aug. 2018 - present*
Postdoctoral Scholar
Berkeley Education Alliance for Research in Singapore (BEARS), Singapore
Advisor: Prof. Costas J. Spanos (UC Berkeley) and Prof. Guoqiang Hu (NTU)

## EDUCATION

**Tsinghua University, Beijing, China** *Sept. 2013 - Jul. 2018*
PhD., Department of Automation
Advisor: Prof. Xiaohong Guan and Prof. (Samuel) Qing-Shan Jia

**Huazhong University of Science and Technology, Wuhan, China** *Sept. 2009 - Jul. 2013*
B.S., School of Artificial Intelligent and Automation
GPA: 91.83/100 (Rank 1/300+)

## RESEARCH INTERESTS

My research interests are in the area of cyber-physical systems, such as smart grid and smart buildings from the perspective of market mechanism design, optimization and control. The goal is to achieve a principled coordination of the complex dynamic systems with the integrated interdisciplinary theories and techniques such as **decentralized control**, **reinforcement learning (RL)**, **game theory** and **market mechanisms**.

## RESEARCH SUMMARY

**1. Market mechanism design for the integration of renewables and energy storage techniques in energy systems** (Building Efficiency and Sustainability in the Tropics, NRF of Singapore), *2019 - present*.

. Designed an optimal and fair sharing mechanism for community energy storage based on coalition game theory which could facilitate the deployment of capital-intensive energy storage techniques in energy systems.

. Developed a cloud energy storage model to enable economic penetration of volatile renewable generation based on non-cooperative game theory, which could work as an example how market mechanism can shape the efficiency of energy systems.

. Design efficient and scalable peer-to-peer energy trading market via coalition formation based on cooperative and non-cooperative game theory (*in progress*).

**2. Adaptive and scalable control of air-conditioning and mechanical ventilation (ACMV) systems** (Building Efficiency and Sustainability in the Tropics, NRF of Singapore), *2018 - 2019*.

. Developed an adaptive and scalable control method for commercial ACMV systems to achieve high energy efficiency and human comfort (i.e, thermal comfort and indoor air quality) based on reinforcement learning (RL) and decentralized optimization techniques.

. Proposed a generalized decentralized optimization method for structured non-convex and non-linear problems which could be applied to address the computational challenges of various complex networked systems.

**3. Scalable coordination of electric vehicle (EV) charging in microgrid of buildings** (National Natural Science Foundation of China), *2015 - 2018*

. Data-driven analysis of the stochastic EV charging behaviors and roof-top wind power generation in cities.

. Proposed a distributed algorithm to learn the scheduling policies of EV charging in buildings based on reinforcement learning (RL).

. Developed a decentralized method for the coordination of EV charging with distributed renewable energy in microgrids of buildings.

**4. Data-driven analysis of energy consumption behaviors of Occupants in buildings** (National Natural Science Foundation of China), *2014 - 2015*.

. Built an experimental platform for collecting the location-based energy consumption data of individual occupants in buildings.

. Improved the prediction accuracy of occupant's energy consumption via a data-driven model triggered by multi-dimensional information.

## PUBLICATIONS

### Selected Journal Papers

. **Y. Yang**, S. Srinivasan, G. Hu, and C. J. Spanos, "Distributed Control of Multi-zone HVAC Systems Considering Indoor Air Quality" submitted to *IEEE Transactions on Control System Technology*, accepted to appear, 2020. (**IF=5.312**)

. **Y. Yang**, G. Hu, and C. J. Spanos, "Stochastic Optimal Control of HVAC system for Energy-efficient Buildings," *IEEE Transactions on Control Systems Technology*, accepted to appear, 2020. (**IF=5.312**)

. **Y. Yang**, G. Hu, and C. J. Spanos, "HVAC Energy Cost Optimization for a Multi-zone Building via A Decentralized Approach," *IEEE Transactions on Automation Science and Engineering*, vol. 17, no. 4, pp. 1950-1960, 2020. (**IF=4.938**)

. **Y. Yang**, Q.-S. Jia, X. Guan, X. Zhang, Z. Qiu, and G. Deconinck,"Decentralized EV-based Charging Optimization With Building Integrated Wind Energy," *IEEE Transactions on Automation Science and Engineering*, vol. 16, no. 3, pp. 1002-1017, 2019. (**IF=4.938**)

. **Y. Yang**, Q.-S. Jia, G. Deconinck, X. Guan, Z. Qiu, and Z. Hu, "Distributed Coordination of EV Charging with Renewable Energy in a Microgrid of Buildings," *IEEE Transactions on Smart Grid*, vol. 9, no. 6, pp. 6253-6264, 2018. (**IF=8.267**)

. Q.-S. Jia, **Y. Yang**, L. Xia, and X. Guan, "A Tutorial on Event-Based Optimization With Application in Energy Internet," *Control Theory & Applications*, vol. 35, no. 1, pp. 32-40, 2018.

### Conference Papers

. **Y. Yang**, Q.-S. Jia, and X. Guan, "Stochastic Coordination of Aggregated Electric Vehicle Charging With On-site Wind Power at Multiple Buildings," *56th IEEE Conference on Decision and Control* (CDC), Melbourne, Australia, Dec. 12-15, 2017, pp. 4434-4439.

. **Y. Yang**, Q.-S. Jia, and X. Guan, "The joint scheduling of EV charging load with building mounted wind power using simulation-based policy improvement," *IEEE International Symposium on Flexible Automation* (ISFA), Cleveland, Ohio, USA, Aug. 1-3, 2016, pp. 165-170.

. **Y. Yang**, Q.-S. Jia, and X. Guan, "Improving the Prediction Accuracy of Building Energy Consumption using Location of Occupant-A Case Study," *IEEE International Conference on Industrial Technology* (ICIT), Taipei, China, Mar. 14-17, 2016, pp.1550-1555.

**Preprints**

. **Y. Yang**, G. Hu, and C. J. Spanos, "Optimal Sharing and Fair Cost Allocation of Community Energy Storage", submitted to *IEEE Transactions on Smart Grid*, under review, 2020. (arXiv:2010.15455)

. **Y. Yang**, U. Agwan, G. Hu, and C. J. Spanos, "Selling Renewable Utilization Service to Consumers via Cloud Energy Storage", under submission, 2020. (arXiv:2012.14650)

. **Y. Yang**, G. Hu, and C. J. Spanos, "A Proximal Linearization-based Decentralized Method for Nonconvex Problems with Nonlinear Constraints", under submission, 2020. (arXiv:2001.00767v1)

## PRESENTATIONS

. *Stochastic Coordination of Aggregated Electric Vehicle Charging With On-site Wind Power at Multiple Buildings*, Conference talk, hosted by 56th IEEE Conference on Decision and Control, Melbourne, Australia, Dec. 12-15, 2017.

. *Analysis and Coordination of Supply and Demand in Energy Internet*, Invited talk, hosted by Northeastern University, Shenyang, China, Jun. 12, 2017.

## HONORS AND AWARDS

**Outstanding Reviewer Award** for IEEE Control Systems Letters (L-CSS), 2019.
**Outstanding Graduates**, Huazhong University of Science and Technology, 2013.
**National Encouragement scholarship**, Huazhong University of Science and Technology, 2012.
**First Prize of the ADI Electronic Technology Design Contest**, Huazhong University of Science and Technology, 2012.
**National Scholarship**, Huazhong University of Science and Technology, 2011.
**Scholarship of Academic Excellence**, Huazhong University of Science and Technology, 2011.
**National Encouragement Scholarship**, Huazhong University of Science and Technology, 2010.
**Scholarship of Academic Excellence**, Huazhong University of Science and Technology, 2010.

## ACADEMIC SERVICE

. **Accociate Editor**, Conference Editorial Board of the 16th IEEE International Conference on Control & Automation, 2020.

. **Reviewer** of IEEE Access, IEEE Control System Letters (L-CSS), SCIENCE CHINA Information Sciences, IEEE Transactions on Control Systems Technology, IEEE Transactions on Smart Grid, IEEE Transactions on Automation Science and Engineering, IEEE Transactions on Automatic Control, IEEE Conference on Decision and Control , American Control Conference, IEEE International Conference on Automation Science and Engineering.

## INTERNSHIP

**JD's Company, Beijing, China** (E-commerce) *Jul. 2017 - Oct. 2017*
Project researcher of *Smart and Intelligent logistics system*

**Zhongming Electronic Industrial Company, Guangdong, China** *Jul. 2015 - Aug. 2015*
Software engineer

## TEACHING EXPERIENCE

. Teaching assistant, **Computer Network's Theory and Applications** (undergraduate course), Tsinghua University, 2017.

. Teaching assistant, **C++ Program Design** (undergraduate course), Tsinghua University, 2016.

. Teaching assistant, **Data Structure** (undergraduate course), Tsinghua University, 2015.

## VISITING EXPERIENCE

**University of Leuven, Leuven, Belgium** *Mar. 2016 - May 2016*
Visiting Prof. Geert Deconinck, Department of Electrical Engineering (two joint publications).

## HOBBIES

Reading and writing, regular exercises.