

Zhe Yu

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RESEARCH INTERESTS

Pattern recognition, optimal control and algorithm design, stochastic dynamic programming, power system and smart grid, statistical signal processing, detection and estimation.

EDUCATION

- Cornell University**, Ithaca, NY, GPA: 4.0 Jan 2011 to Dec. 2016
- Ph.D. student, Electrical and Electronics Engineering. Adviser: Professor Lang Tong
 - Minor: Applied Economics and Management.
- Carnegie Mellon University**, Pittsburgh, PA, GPA: 3.7 Aug 2009 to Dec 2010
- MS, Electrical and Computer Engineering. Adviser: Professor Gabriela Hug
- Tsinghua University**, Beijing, China, GPA: 3.9 Aug 2005 to Jul 2009
- B.S., Electrical Engineering

Work EXPERIENCE

- Research Engineer, GEIRI North America, San Jose, USA** Feb. 2017 to Present
- Real-time analysis of power systems utilizing PMU data. Development prototypes of online power system analysis tools including parameters calibration, voltage stability analysis, and low-frequency oscillation analysis [12, 13, 14, 15, 18, 19, 20, 21].
 - Research in distributed frameworks of analysis and control algorithm in power systems. Proposed distributed control of generations in micro-grids and distributed low-frequency oscillation detection algorithm in transmission systems. [11, 16]
 - Analysis of large dimension high frequency time series data. Recognizing and estimating both geographic and temporal patterns from big data.
 - Developing algorithms to estimate data modes from thousands of data sources in both centralized and distributed ways. Programming online applications for fast and adaptive pattern extraction.

RESEARCH EXPERIENCE

- Graduate Research Assistant, Cornell University** Jan 2011 to Present
- Developing the admission and scheduling algorithm for Energy Management of large-scale EV charging stations. Modeling the deadline scheduling of EV charging problem as multi-armed bandit problems and improving Whittle's index scheduling policy. Proposing a threshold admission policy which is optimal in both average case and worst case [6, 7, 8, 9, 10, 22, 23].
 - Modeling the relationship of EV, consumers and charging facility investor as a two-sided market problem; Deriving the market share of EV with respect to charging facility number and EV price; Developing the optimal strategy of investment on charging stations using game theory; analysis on social planner policy on EV and charging stations [4, 5, 17].
 - Developing the control algorithm of a Home Energy Management system, which dealing with air conditioner, electrical vehicles and other residential loads, based on stochastic programming and Model Predictive Control. Modeling and validating the thermal dynamics of residential house using Linear Regression [1, 2, 3].

- Graduate Research Assistant, Carnegie Mellon University** Jan 2010 to Nov 2010

- Steady and dynamic simulation and analysis of voltage change in demand response using PSCAD. Tests based on IEEE 14 and 30 feeder systems.
- Effectivity analysis of optimality condition decomposition in state estimation. Performance comparison with central state estimation.

INTERNSHIP EXPERIENCE

Research Intern, Schneider Electric, Beijing, China

Jul 2008 to Aug 2008

- Development and test of the low-loss transformers by using new structure design and new materials. Investigation and summarization of low-voltage circuit breaker.

TECHNICAL SKILLS

- Programming: C/C++, Matlab, Java, R, SQL
- Relevant Courses: Power System, Stability Analysis of Electric Power System, Smart Grids and Future Power System, Engineering and Economics of Electric Energy Systems, Power Electronics, Electric Machinery Fundamentals, High Voltage Engineering, Linear Programming, Nonlinear Programming, Semi-Definite Programming, Statistical Signal Processing, Applied Random Process
- Software: PSCAD, PSpice, PROTEL, Eclipse
- Languages Skills: Mandarin - native

PUBLICATIONS

- [1] L. Jia, **Z. Yu**, M. C. Murphy-Hoye, E. G. Piccioli, A. Pratt, and L. Tong, "Multi-Scale Stochastic Optimization for Home Energy Management," in *Proc. of International Workshop on Computational Advances in Multi-Sensor Adaptive Processing*, San Juan, Puerto Rico, Dec 13-16, 2011.
- [2] **Z. Yu**, L. McLaughlin, L. Jia, M. C. Murphy-Hoye, A. Pratt, and L. Tong, "Modeling and Stochastic Control for Home Energy Management," in *Proc. of 2012 Power & Energy Society General Meeting*, San Diego, CA, July 22-26, 2012.
- [3] **Z. Yu**, L. Jia, M. C. Murphy-Hoye, A. Pratt, and L. Tong, "Modeling and Stochastic Control for Home Energy Management," *IEEE Transaction on Smart Grid*, Vol 4, Issue 4, 2013.
- [4] **Z. Yu**, S. Li, and L. Tong, "On Market Dynamics of Electric Vehicle Diffusion," in *Proc. of the 52nd Annual Allerton Conference on Communication, Control, and Computing*, Oct 01-03, 2014.
- [5] **Z. Yu**, S. Li, and L. Tong, "Market Dynamics and Indirect Network Effects in Electric Vehicle Diffusion," *Transportation Research: Part D*, Vol 47, 2016.
- [6] **Z. Yu**, Y. Xu, and L. Tong, "Large Scale Charging of Electric Vehicles: A Multi-Armed Bandit Approach," in *Proc. of the 53rd Annual Allerton Conference on Communication, Control, and Computing*, Sept. 29 - Oct. 02, 2015.
- [7] **Z. Yu**, S. Chen, and L. Tong, "An Intelligent Energy Management Systems for Large Scale Charging of Electric Vehicles," *CSEE Journal of Power and Energy Systems*, Vol 2, Issue 1, 2016.
- [8] **Z. Yu**, and L. Tong, "Demand Response via Large Scale Charging of Electric Vehicles," in *Proc. of 2016 IEEE Power & Energy Society General Meeting*, Boston, MA, July 18-22, 2016.
- [9] **Z. Yu**, Y. Xu, and L. Tong, "Deadline Scheduling as Restless Bandits," accepted by *Proc. of the 54th Annual Allerton Conference on Communication, Control, and Computing*, Sept. 27 - 30, 2016.
- [10] **Z. Yu**, Y. Xu, and L. Tong, "Deadline Scheduling as Restless Bandits," *Transactions on Automatic Control* 2018.

- [11] D. Shi, X. Chen, X. Zhang, **Z. Yu**, X. Wang, and D. Bian, "A Distributed Cooperative Control Framework for Synchronized Reconnection of Multi-Bus Microgrid," *IEEE Transaction on Smart Grid*, 2017.
- [12] X. Wang, D. Shi, Z. Wang, C. Xu, Q. Zhang, X. Zhang, and **Z. Yu**, "Online Calibration of Phasor Measurement Unit Using Density-Based Spatial Clustering," *IEEE Transactions on Power Delivery*, 2017.
- [13] X. Zhang, D. Shi, Z. Wang, **Z. Yu**, X. Wang, D. Bian, and K. Tomsovic, "Bilevel Optimization Based Transmission Expansion Planning Considering Phase Shifting Transformer," *North American Power Symposium*, Morgantown, WV, 2017.
- [14] Y. Meng, **Z. Yu**, D. Shi, D. Bian, Z. Wang, "Forced Oscillation Source Location via Multivariate Time Series Classification," *2018 IEEE PES Transmission & Distribution Conference and Exposition*, Denver, CO, 2018.
- [15] M. Liao, D. Shi, **Z. Yu**, W. Zhu, Z. Wang, Y. Xiang, "Estimate the lost Phasor Measurement Unit Data using Alternating Direction Multipliers Method," *2018 IEEE PES Transmission & Distribution Conference and Exposition*, Denver, CO, 2018.
- [16] **Z. Yu**, D. Shi, Z. Wang, Q. Zhang, J. Huang, and S. Pan, "Distributed Estimation of Oscillations in Power Systems: an Extended Kalman Filtering Approach," *CSEE Journal of Power and Energy Systems*, *Accepted*, 2018.
- [17] T. Zhang, X. Chen, **Z. Yu**, X. Zhu, and D. Shi, "A Monte-Carlo Simulation Approach to Evaluate Service Capacities of EV Charging and Battery Swapping Stations," *IEEE Transactions on Industrial Information*, Vol 14, Issue 9, 2018.
- [18] H. Banna, **Z. Yu**, D. Shi, Z. Wang, D. Su, C. Xu, S. Solanki, and J. Solanki, "Online Coherence Identification Using Dynamic Time Warping for Controlled Islanding," *Journal of Modern Power Systems and Clean Energy*, 2018.
- [19] L. Mang, D. Shi, **Z. Yu**, W. Zhu, Z. Wang, Y. Xiang, "An ADMM Based Approach for Phasor Measurement Unit Data Recovery" *IEEE Transsaction on Smart Grid (Early Access)*, 2018.
- [20] **Z. Yu**, Di Shi, Haifeng Li, Yishen Wang, Zhehan Yi, and Zhiwei Wang, "An Extended Kalman Filter Enhanced Hilbert-Huang Transform in Oscillation Detection," *2018 IEEE PES ISGT Europe*, DSarajevo, Bosnia and Herzegovina, 2018.
- [21] Y Wang, Z Yi, D Shi, **Z. Yu**, B Huang, and Z Wang, "Optimal Distributed Energy Resources Sizing for Commercial Building Hybrid Microgrids," in *Proc. of 2018 Power & Energy Society General Meeting*, Portland, OR, Aug 5-9, 2018.
- [22] **Z. Yu**, "Large scale charging of electric vehicles: Technology and economy," Thesis, Cornell, 2017.
- [23] **Z. Yu**, Soheil Eshghi, and L. Tong, "Large Scale Charging of Electric Vehicles: Optimal Scheduling and Smart Grid integration," Book in process.

Patent

- [1] **Z. Yu**, Y. Wang, H. Li, C. Fu and Z. Wang, "An Approach of Parameter Estimation for Composite Load Based on Bayesian Estimation," US Provisional Patent App. No: 62/756.387

HONORS

- **Excellent Graduate**, Tsinghua University (2 out of 120) Jun 2009
- **Hitachi Scholarship**, Tsinghua University (1 out of 450) Dec 2008
- **Top Honor Association Scholarship**, Tsinghua University Dec 2008

- **Schneider Scholarship**, Tsinghua University Dec 2007
- **Innovative Spirit Scholarship**, Tsinghua University (1 out of 120) Jun 2007
- **Second Prize**, National Physics Competition of College Students Dec 2006
- **First Prize**, National Mathematic Competition of Middle School Students Nov 2002