Na (Lina) Li

Electrical Engineering & Applied Mathematics
School of Engineering and Applied Sciences
Harvard University

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Appointments

Assistant Professor of Electrical Engineering and Applied Mathematics — Jul. 2014 -
School of Engineering and Applied Sciences
Harvard University

Postdoc Associate — Jul. 2013 - Jun. 2014
Laboratory of Information and Decision Systems
Massachusetts Institute of Technology

Education

Ph.D. in Control and Dynamical Systems — Sep. 2007 - Jun. 2013
California Institute of Technology

B.S. in Mathematics and Applied Mathematics — Sep. 2003 - Jun. 2007
Zhejiang University, P.R.China

Visiting Student in Mechanical and Aerospace Engineering — Jul. - Aug. 2006; Jan. - May. 2007
University of California, Los Angeles, — Undergraduate research assistant

Honors and Awards (selected)

10/2016, AFOSR Young Investigator Program (YIP) Award

09/2016, One of the five invited speakers in the inaugural Resnick Institute Young Investigators Symposium, The Resnick Sustainability Institute at Caltech.

01/2016, NSF CAREER Award

03/2015, One of the 2 nominees of Harvard University for Packard Fellowships for Science and Engineering

11/2012, "Rising Stars in EECS: An academia workshop for women", MIT

12/2011, Best Student Paper Award Finalist in 50th IEEE Conference on Decision and Control,

02/2006, Meritorious Winner in International Interdisciplinary Contest in Modeling(ICM), United States

12/2006, Chu KoChen Honors Scholarship (Highest Honor for students in Zhejiang University, only awarded to 12/20,000 undergraduates each academic year)

Student Honors

04/2016, Masoud Badiei received IBM PhD fellowship

04/2015, Ariana Minot received "Runner-up for 1st Place" award in the poster session of AWM (Association for Women in Mathematics) Research Symposium

Teaching & Education

2016-Present American Control Conference (ACC) Technical Committee on Education.

Spring 2016, Harvard SEAS: ES 202/AM 232: Estimation and Control of Dynamical Systems.

Fall 2015, 2016, Harvard SEAS ES 158: Feedback Control Systems: Analysis and Design.

Spring 2015, Harvard SEAS: ES 202: Estimation and Control of Dynamical Systems.

Concentration Adviser for Undergraduates: 14 Applied Mathematics, 5 Electrical Engineering.

2016-2017: Freshman Adviser for 4 freshmen.

2007-2013: Teaching Assistant for Four Different Classes.

Advising

PhD students:
Yingying Li (09/2015-present, G2)
Guannan Qu (09/2014-present, G3)
Masoud Badiei (09/2014-present, G3)
Ariana Minot (01/2014-present, G6, co-advising with Prof. Yue Lu)

Postdoc Associates
Xuan Zhang (11/2015-present)
Chinwendu Enyioha (07/2015-present, co-supervised with Prof. Vahid Tarokh)
Wei Wei (12/2014-03/2015, Now as a research assistant professor in Tsinghua University)

Master students
David Brown (09/2014-06/2015, Now as a researcher in Lincoln Lab)
Yannick Meier (12/2015-06/2016, Master in ETH)

Undergraduate senior thesis advisor
Austen Novis (2015-2016)
Tyler Barringer (2015-2016)

Other graduate mentoring
Kathryn Heal (07/2015-present, G2, co-advising with Prof. Vahid Tarokh, Harvard)
Sindri Magnusson (07/2015-10/2015, from KTH)
Martin Anderasson (07/2015, from KTH)
Xiaoqi Tan (11/2015-05/2016, from HKUST)

Journal Publications

- Masoud Baidei and **Na Li**, "Distributed Primal-Dual Algorithms with Regularizers: Tradeoff between Efficiency and Constraints Violation", submitted to *IEEE Transactions on Automatic Control*.
- Guannan and **Na Li**, " Harnessing Smoothness to Accelerate Distributed Optimization", submitted to *IEEE Transactions on Control of Network Systems*.
- Sindri Magnusson, Chinwendu Enyioha, **Na Li**, Carlo Fischione, and Vahid Tarokh, "Convergence of Limited Communications Gradient Methods", submitted to *IEEE Transactions on Automatic Control*.
- Xuan Zhang, Bin Yan, Wenbo Shi, Ali Malkawi, **Na Li**, "Decentralized and Distributed Temperature Control via HVAC Systems in Energy Efficient Buildings", submitted to *Automatica*.
- Xuan Zhang, Antonis Papachiristodoulou, **Na Li**, "Distributed Control for Achieving Optimal Steady State", submitted to *IEEE Transactions on Automatic Control*.
- Xiaoqi Tan, Guannan Qu, Bo Sun, **Na Li**, and Danny H.K. Tsang, "Optimal Charging Scheduling of Battery Charging Stations for Electric Vehicles", submitted to *IEEE Transactions on Power Systems*.

1. Wei Wei, **Na Li**, Jianhui Wang, Shengwei Mei, "Estimating the Probability of Infeasible Real-time Dispatch without Exact Distributions of Stochastic Wind Generations", Accepted to *IEEE Transactions on Power Systems*, 2016.
2. Ariana Minot, Yue Lu, **Na Li**, "A Distributed Newton Method for Power System State Estimation", Accepted to *IEEE Transactions on Power Systems*, 2015.
3. Wenbo Shi, **Na Li**, Chi-Cheng Chu, and Rajit Gadh, "Real-Time Energy Management in Microgrids", Accepted to *IEEE Transactions on Smart Grid*, 2015.
4. Qingqing Huang, Leilai Shao, **Na Li**, "Dynamic Detection of Transmission Line Outages Using Hidden Markov Models", Accepted to *IEEE Transactions on Power Systems*, 2015.
5. **Na Li**, Lijun Chen, Changhong Zhao, "Connecting Automatic General Control and Economic Dispatch from an Optimization View", Accepted to *IEEE Transactions on Control of Network Systems*, 2015.

6. Yunjian Xu, **Na Li**, Steven Low, "Demand Response with Capacity Constrained Supply Function Bidding", Accepted to *IEEE Transactions on Power Systems*, 2015.
7. Lijun Chen, **Na Li**, "On the Interaction between Load Balancing and Speed Scaling", *IEEE Journal on Selected Areas Communication (JSAC)- Series on Green Communications and Networking*, 33(12), Pages 2567-2578, 2015.
8. **Na Li**, Lijun Chen, Munther Dahleh, "Demand Response Using Linear Supply Function Bidding", *IEEE Transactions on Smart Grid*, 6(4), Pages 1827-1838, 2015.
9. Lingwen Gan, **Na Li**, Ufuk Topcu, Steven Low, "Exact Convex Relaxation for Optimal Power Flow in Radial Networks", *IEEE Transactions on Automatic Control*, 60(1), Pages 72-87, 2015.
10. **Na Li**, Jerry Cruz, Chenghao Chien, Somayeh Sojoudi, Ben Recht, David Stone, Marie Csete, Daniel Bahmiller, John Doyle, "Robust Efficiency and Actuator Saturation Explain Healthy Heart Rate Control and Variability", *Proceedings of National Academia Sciences*, 111(33), Pages E3476E3485, 2014.
11. Wenbo Shi, **Na Li**, Xiaorong Xie, Chi-Cheng Chu, and Rajit Gadh, "Optimal Residential Demand Response in Distribution Network", *IEEE Journal on Selected Areas in Communications*, 32(7), Pages 1-10, 2014.
12. Changhong Zhao, Ufuk Topcu, **Na Li**, Steven Low, "Design and Stability of Load-Side Primary Frequency Control in Power System", *IEEE Transactions on Automatic Control*, 59(5), Pages 1177-1189, 2014.
13. **Na Li**, Jason Marden, "Decoupling Coupled Constraints through Utility Design", *IEEE Transactions on Automatic Control*,59(8), Pages 2289-2294, 2014.
14. **Na Li**, Jason Marden, "Designing Games for Distributed Optimization", *the Journal of IEEE Selected Topics in Signal Processing*,7(2), Pages:230 - 242, 2013.

Book (Chapters)

1. Lijun Chen, **Na Li**, Libin Jiang, Steven H. Low, "Optimal Demand Response: Problem Formulation and Deterministic Case", Chapter in Control and Optimization Theory for Electric Smart Grids, Aranya Chakarabortty and Marija Ilic (Eds.), Springer, 2012.

Peer-Reviewed Conference Publications

1. Reza Azimi, Masoud Badiei, Xin Zhan, Na Li, Sherief Reda, "Fast decentralized power capping for server clusters", 23th IEEE Symposium on High Performance Computer Architecture (HPCA), 2017. (acceptance rate, 22%)
2. Guannan Qu, **Na Li**, "Harnessing Smoothness to Accelerate Distributed Optimization", Conference on Decision and Control (CDC), 2016.
3. Donya Ghavidel Dobakhshari, **Na Li**, Vijay Gupta, "An Incentive-Based Approach to Distributed Estimation with Strategic Sensors", Accepted to Conference on Decision and Control (CDC) 2016.
4. Sindri Magnusson, Chinwendu Enyioha, **Na Li**, Carlo Fischione, "Practical Coding Schemes For Bandwidth Limited One-Way Communication Resource Allocation", Accepted to Conference on Decision and Control (CDC), 2016.
5. Masoud Badiei, **Na Li**,"Distributed Regularized Primal-Dual Method", Accepted to GlobalSIP, 2016.
6. Xuan Zhang, Wenbo Shi, Xiwang Li, Bin Yan, Ali Malkawi, **Na Li**, "Decentralized Temperature Control via HVAC Systems in Energy Efficient Buildings: An Approximate Solution Procedure", Accepted to GlobalSIP, 2016
7. Hongyao Ma, Valentin Robu, **Na Li**, David Parkes, "Incentivizing Reliability in Demand-Side Response", Accepted to *International Joint Conference on Artificial Intelligence IJCAI-16*, 2016.
8. Ariana Minot, Yue Lu, Na Li, "A Distributed Primal-Dual Interior Point Method for Optimal Power Flow", *Power Systems Computation Conference (PSCC)*, 2016.

9. Sindri Magnusson, Chinwendu Enyioha, Kathryn Heal, Na Li, Carlo Fischione, and Vahid Tarokh, "Convergence of Limited Communications Gradient Methods", *American Control Conference (ACC)*, 2016.
10. Masoud Badiei Khuzani, Xin Zhan, Reza Azimi, Sherief Reda and **Na Li**, "DiBA: Distributed Power Budget Allocation for Large-Scale Computing Clusters", *IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing(CCGrid)*, 2016. (acceptance rate, 20%)
11. Sindri Magnusson, Chinwendu Enyioha, Kathryn Heal, **Na Li**, Carlo Fischione, and Vahid Tarokh, "Distributed Resource Allocation Using One-Way Communication with Applications to Power Networks", *Conference on Information Sciences and Systems (CISS)*, 2016.
12. Hao Zhu, **Na Li**, "Asynchronous Local Voltage Control in Power Distribution Networks", *IEEE Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2016.
13. Guannan Qu, Dave Brown, **Na Li**, "Distributed Greedy Algorithm for Satellite Assignment Problem with Submodular Utility Function", *5th IFAC Workshop on Estimation and Control of Networked Systems (NecSys'15)*, 2015.
14. Masoud Badiei, **Na Li**, Adam Wierman, "Online Convex Optimization with Ramp Constraints", *Proceedings of 54th IEEE Conference on Decision and Control*, 2015.
15. Xuan Zhang, Antonis Papachristodoulou, **Na Li**, "Distributed Optimal Steady-state Control Using Reverse- and Forward- Engineering", *Proceedings of 54th IEEE Conference on Decision and Control*, 2015.
16. **Na Li**, "A Market Design for Electricity Distribution Networks", *Proceedings of 54th IEEE Conference on Decision and Control*, 2015.
17. Xuan Zhang, **Na Li**, Antonis Papachristodoulou, "Achieving Real-time Economic Dispatch in Power Networks via a Saddle Point Design Approach", *Power & Energy Society General Meeting*, 2015.
18. Qingqing Huang, Leilai Shao, **Na Li**, "Dynamic Fault Diagnosis in Power Grids Using Hidden Markov Models", *Proceedings of American Control Conference*, 2015.
19. Ariana Minot, **Na Li**, "Distributed State Estimation", *Proceedings of American Control Conference*, 2015.
20. **Na Li**, Changhong Zhao Lijun Chen, Steven Low, "Connecting Automatic Generation Control and Economic Dispatch from an Optimization View", *Proceedings of American Control Conference*, 2014.
21. **Na Li**, Guannan Qu, Munther Dahleh, "Real-time decentralized voltage control in distribution networks", *52nd Annual Allerton Conference on Communication, Control, and Computing*, 2014.
22. Minghui Zhu, **Na Li**, "Stability Constrained Incentive Mechanisms for Distributed Frequency Control of Power Grid", *Proceedings of 53rd IEEE Conference on Decision and Control*, 2014.
23. Minghui Zhu, **Na Li**, Wenbo Shi, Rajit Gadh, "Distributed Access Control of Volatile Renewable Energy Resources", *Power & Energy Society General Meeting* 2014.
24. Lingwen Gan, **Na Li**, Ufuk Topcu, Steven Low, "Optimal Power Flow in Distribution Networks", *Proceedings of 52nd IEEE Conference on Decision and Control*, 2013.
25. **Na Li**, Lingwen Gan, Lijun Chen, Steven Low, "An Optimization-based Demand Response in Radial Distribution Networks", *IEEE Workshop on Smart Grid Communications: Design for Performance*, 2012.
26. **Na Li**, Lijun Chen, Steven Low, "Demand Response in Radial Distribution Networks: Distributed Algorithm (Invitied Paper)", *Asilomar Conference on Signals, Systems and Computers*, 2012.
27. **Na Li**, Lijun Chen, Steven Low, "Exact Convex Relaxation for Radial Networks Using Branch Flow Models", *IEEE International Conference on Smart Grid Communications*, 2012.
28. Rui Huang, Tiana Huang, Rajit Gadh and **Na Li**, "Solar Generation Prediction Using the ARMA Model in a Laboratory-level Micro-grid", *IEEE International Conference on Smart Grid Communications*, 2012.
29. Lingwen Gan, **Na Li**, Ufuk Topcu, Steven Low, "Branch Flow Model for Radial Networks: Convex Relaxation", *Proceedings of the 51st IEEE Conference on Decision and Control*, 2012.

30. **Na Li**, Jason Marden, "Designing Games for Distributed Optimization with a Time-Varying Communication Graph" *Proceedings of the 51st IEEE Conference on Decision and Control*, 2012.
31. **Na Li**, Jason Marden, " Designing Games for Distributed Optimization", *Proceedings of the 50th IEEE Conference on Decision and Control*, 2011. **Best Student Paper Award Finalist**
32. **Na Li**, Lijun Chen, Steven H. Low, "Optimal Demand Response based on Utility Maximization in Power Networks" *IEEE Power Engineering Society General Meeting*, 2011. **Cited by 383 times by Feb 2016.**
33. Lijun Chen, **Na Li**, Steven H. Low, "On the Interaction between Load Balancing and Speed Scaling", *Information Theory and Applications Workshop*, 2011.
34. Lijun Chen, **Na Li**, Steven H. Low and John C. Doyle, "Two Market Models for Demand Response in Power Networks", *IEEE International Conference on Smart Grid Communications*, 2010.
35. **Na Li**, Jason Marden, "Designing Games to Handle Coupled Constraints", *Proceedings of the 49th IEEE Conference on Decision and Control*, 2010.
36. **Na Li**, Jason Marden, Jeff S. Shamma, "Learning Approaches to the Witsenhausen Counterexample from a View of Potential Games", *Proceedings of the 48th IEEE Conference on Decision and Control*, 2009.

Research Support

PI, AFOSR Yong Investigator Program (YIP) Award, $360,000.00, 07/01/2017-06/30/2020.

PI, NSF Collaborative Research: Towards Communication-Cognizant Voltage Regulation and Energy Management for Power Distribution Systems, $221,111.00, 08/01/1016-07/31/2019.

PI, NSF CAREER: Optimization, Control, and Incentive Design for Power Networks with High Levels of Distributed Energy Resources, PI, $500,003, 02/01/2016-01/31/2021.

co-PI, ARPA-E NODES: Real-time optimization and control of next-generation, $340,000 for Harvard team, 08/01/2016-07/31/2019.

PI, Optimal Bidding Strategy and Assets Allocation Plan for Generation Companies, Guodian Nanjing Automation Co., Ltd, $342,000, 04/01/2016-03/31/2018.

co-PI, NSF Eager: Limited Communications Demand Control in the Power Grid, , $225,000, 08/15/2015-07/31/2017.

PI, Lincoln Laboratory, "Optimization of Distributed Space Systems", PI, $102,811, 09/01/2014-08/31/2015.

Invited Talks and Presentations (Selected)

"Market Design in Transforming Future Electric Distribution Networks", University of Maryland, College Park, October 2016.

"Distributed Energy Management with Limited Communication", Worcester Polytechnic Institute (WPI), October 2016.

"DistributedEnergyManagementin Power Networks", Harvard SEAS/HBS symposium on the Internet of Things, September, 2016.

"Market Design in Transforming Future Electric Distribution Networks", the inaugural Resnick Institute Young Investigators Symposium, The Resnick Sustainability Institute at Caltech, September 2016.

"Distributed Energy Management with Limited Communication", ETH Zurich, June 2016.

"Distributed Control for Achieving Optimal Steady State", DFG-JST-RCN-NSF, May 2016.

"Distributed Energy Management with Limited Communication", North Carolina State University, Apr. 2016.

"Distriuted Energy Management with Limited Communication", University of Southern California, Mar. 2016.

"Connecting Distributed Control and Distributed Optimization in the Power Grid", Tsinghua University, Dec. 2015

"Connecting Distributed Control and Distributed Optimization in the Power Grid", Young Researchers Workshop on Distributed Energy Management Systems Toward International Collaborations between NSF, NRF and JST CREST projects, Osaka, Japan, Dec. 2015

"Distributed Energy Management with Limited Communication", Workshop on Power Systems and Markets, Penn State University, Nov. 2015

"Distributed Energy Management with Limited Communication", Computer Engineering Seminar Series, Brown University, Nov. 2015

"Demand Response Using Supply Function Bidding", Informs Annual Meeting, Nov. 2015

"A Market for Electricity Distribution Networks", Informs Annual Meeting, Nov. 2015

"Connecting Distributed Control and Distributed Optimization in the Power Grid", KAUST Conference on Human-Machine Networks and Intelligent Infrastructure, Oct. 2015

"Distributed Control and Decision Making Over Networks", Institute for Mathematics and its Applications (IMA), University of Minnesota in Minneapolis, Sep. 2015

"Distributed Mechanism in Electricity Distribution Networks", Panel session in IEEE Power and Energy Society General Meeting, Jul. 2015

"Fully-Decentralized and Robust Voltage Control in Distribution Networks", SIAM Conference on Control and Its Application, France, Jul. 2015

"Distributed Optimal Steady-state Control Using Reverse- and Forward- Engineering", Los Alamos National Lab, May. 2015

"Distributed Optimal Steady-state Control Using Reverse- and Forward- Engineering", Rensselaer Polytechnic Institute, May. 2015

"Robust Efficiency and Actuator Saturation Explain Heart Rate Control and Variability", MIT CIR seminar, Apr. 2015

"Real-time Decentralized and Robust Voltage Control in Distribution Networks", ITA Workshop in San Diego, Feb. 2015

"Distributed Algorithm and Mechanism in Smart Grid", Harvard University Center for Environment(HUCE) Graduate Consortium seminar, Oct. 2014

"Distributed Optimization and Control in Smart Grid", Workshop on Urban Research, Harvard-MIT-University of Madrid, Oct. 2014

"Distributed Energy Management in Power Networks", New England ISO, Mar. 2014

"Connecting AGC and Economic Dispatch from an Optimization Point of View", NSF Workshop: Role of Distributed Coordination in Resilient & Fine-Grain Control of Power Grids, Feb. 2014

"Distributed Energy Management in Power Networks", Cornell University, Mar. 2013

"Robust Efficiency and Actuator Saturation Explain Healthy Heart Rate Control and Variability",University of California–San Diego, Mar. 2013

Professional Service

Committee-related duties

2016-Present, Associate Editor of the Conference Editorial Board (CEB) of the IEEE Control Systems Society (CSS).

2016-Present, American Automatic Control Council (AACC) Technical Committees on Education.

2016, Technical Program Committee on the 2017 International Conference on Cyber-Physical Systems (ICCPS).

2016, Guest editor for a Special Issue of IET Generation Transmission & Distribution titled with "Distributed & autonomous dispatch and control for active distribution network/microgrids– potential scheme to realize plug & play of DER".

2015, IEEE Technical Committee on Cybernetics for Cyber-Physical Systems (CPS)

2015, Organize Invited Session in IEEE Conference on Decision and Control;

2015, Session Chair in American Control Conference and IEEE Conference on Decision and Control;

2014, Session Chair in Allerton conference;

2014, 2012 Technical program committee for IEEE SmartGridComm;

2014, Technical program committee for ACM Workshop of GreenMetrics;

Invited Referee for Journals and Conferences

Automatica; IEEE Transactions on Automatic Control; IEEE Transactions on Control of Network Systems; IEEE Transactions on Smart Grid; IEEE Transactions on Power Systems; IEEE Transactions on Systems, Man, and Cybernetics; IEEE Transactions on Signal Processing; IEEE Signal Processing Magazine; IEEE Journal of Selected Topics in Signal Processing; IEEE Transactions on Industrial Informatics; IEEE Transactions on Mobile Computing; IEEE System Journal; ACM Transactions on Internet Technology; IEEE SmarGridComm Conference; IEEE Conference on Decision and Control; American Control Conference; European Control Conference; Power Systems Computation Conference; SIAM conference on Control and Its Applications;