

JUNJIE QIN

Contact Information

Postdoctoral Researcher
Mechanical Engineering, UC Berkeley
www.ocf.berkeley.edu/~jqin

5105 Etcheverry Hall, Berkeley, CA 94720
Phone: (650) 391-6549
E-mail: qinj@berkeley.edu

Research Interests

- **Smart Cities:** Smart Power and Energy Systems, Smart Transportation Systems
- **Markets and Sharing Economy Platforms:** Modeling, Control, Economics, Data Analytics
- **Data-Driven Decision Making:** Risk Management, Learning, Control and Optimization

Education

University of California, Berkeley

- **Mechanical Engineering** (Postdoc) Jan. 2018 – Present
 - Advisors: Prof. Kameshwar Poolla and Prof. Pravin Varaiya
 - Topic 1: Service Provision in Electrified Transportation Network Companies
 - Topic 2: Sharing Platforms for Distributed Energy Resources

Lawrence Berkeley National Laboratory

- **Grid Integration Group** (Postdoc) Jan. 2018 – Sept. 2019
 - Supervisor: Rahul Chopra
 - Topic: Control and Market Design for Microgrids

Stanford University

- **Computational and Mathematical Engineering** (Ph.D.) Sept. 2011 – Jan. 2018
 - Advisor: Prof. Ram Rajagopal
 - Thesis: Distributed Energy Resource Networks: Planning, Control & Market Design
- **Management Science and Engineering** (Ph.D. Minor) Sept. 2011 – Jan. 2018
- **Statistics** (Master of Science) Sept. 2011 – Jun. 2017
- **Civil and Environmental Engineering** (Master of Science) Sept. 2010 – Aug. 2011

Tsinghua University

- **Hydraulic Engineering** (Bachelor of Engineering) Sept. 2006 – Aug. 2010
- **Economics** (Bachelor of Economics) Sept. 2007 – Aug. 2010

Distinctions

- Finalist for Best Student Paper (Top 4) IEEE Conference on Decision and Control 2016
- Third Place in Poster Competition IEEE Power and Energy Society General Meeting 2015
- Stanford Interdisciplinary Graduate Fellowship on Energy (Satre Family Fellow) Stanford University 2013-2016
- National Innovative Research Grant for Undergraduate Students Ministry of Education of China 2008-2010
- Fellowship for Excellent Academic Performance Tsinghua University 2007, 2008

Working Papers

- W1** Junjie Qin, Jared Porter, Kameshwar Poola, and Pravin Varaiya, "Spatial pricing of transportation and electricity services in electrified TNCs," *Manuscript in preparation*, 2019
- W2** Junjie Qin, Rongxin Yin, Kameshwar Poola, and Pravin Varaiya, "Peaks in building electricity consumption: Spatial-temporal statistics and community demand management," *Manuscript in preparation*, 2019
- W3** Junjie Qin, Shai Vardi, and Adam Wierman, "Convex prophet inequalities for online procurement," *To be submitted to ACM Sigmetrics*, 2019, Extended abstract appeared in the Workshop on Mathematical Performance Modeling and Analysis (MAMA) 2018

Journal Publications

- J1** Junjie Qin, Kameshwar Poola, and Pravin Varaiya, "Mobile storage for demand charge reduction," *Submitted to IEEE Transactions on Intelligent Transportation Systems*, 2018
- J2** Junjie Qin, Insoon Yang, and Ram Rajagopal, "Submodularity of storage placement optimization in power networks," *IEEE Transactions on Automatic Control*, vol. 64, no. 8, pp. 3268–3283, 2019.
- J3** Junjie Qin, Ram Rajagopal, and Pravin Varaiya, "Flexible market for smart grid: co-ordinated trading of contingent contracts," *IEEE Transactions on Control of Network Systems*, vol. 5, no. 4, pp. 1657–1667, 2018. **(Featured in Felix Wu Distinguished Lecture in Power Systems)**
- J4** Rishee K Jain, Junjie Qin, and Ram Rajagopal, "Data-driven planning of distributed energy resources amidst socio-technical complexities," *Nature Energy*, vol. 2, no. 8, p. 17112, 2017. **(Featured by an editorial in Nature Energy and by articles in ArsTechnica and Stanford Engineering Magazine)**
- J5** Junjie Qin, Yin-Lam Chow, Jiyan Yang, and Ram Rajagopal, "Online modified greedy algorithm for storage control under uncertainty," *IEEE Transactions on Power Systems*, vol. 31, no. 3, pp. 1729–1743, 2016
- J6** Junjie Qin, Yin-Lam Chow, Jiyan Yang, and Ram Rajagopal, "Distributed online modified greedy algorithm for networked storage operation under uncertainty," *IEEE Transactions on Smart Grid*, vol. 7, no. 2, pp. 1106–1118, 2016. **(Third place in Poster Competition at IEEE PES General Meeting 2015)**
- J7** Yue Zhao, Junjie Qin, Ram Rajagopal, Andrea Goldsmith, and H Vincent Poor, "Wind aggregation via risky power markets," *IEEE Transactions on Power Systems*, vol. 30, no. 3, pp. 1571–1581, 2015
- J8** Jianxiao Wang, Junjie Qin, Haiwang Zhong, Ram Rajagopal, Qing Xia, and Chongqing Kang, "Reliability value of distributed solar+storage systems amidst rare weather events," *IEEE Transactions on Smart Grid*, vol. 10, no. 4, pp. 4476–4486, 2019
- J9** Jianxiao Wang, Haiwang Zhong, Junjie Qin, Wenyuan Tang, Ram Rajagopal, Qing Xia, and Chongqing Kang, "Incentive mechanism for sharing distributed energy resources," *Journal of Modern Power Systems and Clean Energy*, vol. 7, no. 4, pp. 837–850, 2019
- J10** Huimiao Chen, Zechun Hu, Haocheng Luo, Junjie Qin, Ram Rajagopal, and Hongcai Zhang, "Design and planning of a multiple-charger multiple-port charging system for PEV charging station," *IEEE Transactions on Smart Grid*, vol. 10, no. 1, pp. 173–183, 2019
- J11** Hatef Monajemi, Sina Jafarpour, Matan Gavish, David L Donoho *et al.*, "Deterministic matrices matching the compressed sensing phase transitions of gaussian random matrices," *Proceedings of the National Academy of Sciences*, vol. 110, no. 4, pp. 1181–1186, 2013

- J12** Qingrong Kong, Chunbo Jiang, Junjie Qin, and Bin Guo, "Sediment transportation and bed morphology reshaping in Yellow River Delta," *Science in China Series E: Technological Sciences*, vol. 52, no. 11, pp. 3382–3390, 2009

Conference Proceedings

- C1** Junjie Qin, Jared Porter, Kameshwar Poolla, and Pravin Varaiya, "Piggyback on TNCs for electricity service: Spatial pricing and synergetic value," *Submitted to American Control Conference*, 2019
- C2** Junjie Qin, Sen Li, Kameshwar Poolla, and Pravin Varaiya, "Distributed storage investment in power networks," in *Proc. American Control Conference (ACC)*, 2019, pp. 1579–1586
- C3** Sen Li, Junjie Qin, Akhil Shetty, Kameshwar Poolla, and Pravin Varaiya, "Data-driven capacity bidding for frequency regulation," in *Proc. American Control Conference (ACC)*, 2019, pp. 3901–3908
- C4** Junjie Qin, Jonathan Mather, Jhi-Young Joo, Ram Rajagopal, Kameshwar Poolla, and Pravin Varaiya, "Automatic power exchange for distributed energy resource networks: Flexibility scheduling and pricing," in *Proc. IEEE Conference on Decision and Control (CDC)*, 2018, pp. 1572–1579
- C5** Junjie Qin, Kameshwar Poolla, and Pravin Varaiya, "Direct data-driven methods for risk limiting dispatch," in *Proc. IEEE Conference on Decision and Control (CDC)*, 2018, pp. 3994–4001
- C6** Jiafan Yu, Junjie Qin, and Ram Rajagopal, "On certainty equivalence of demand charge reduction using storage," in *Proc. American Control Conference (ACC)*. IEEE, 2017, pp. 3430–3437
- C7** Junjie Qin, Insoon Yang, and Ram Rajagopal, "Submodularity of energy storage placement in power networks," in *Proc. IEEE Conference on Decision and Control (CDC)*. IEEE, 2016, pp. 686–693. **(Best Student Paper Finalist at IEEE CDC 2016)**
- C8** Ana Radovanović, Anand Ramesh, Ross Koningstein, David Fork *et al.*, "Powernet for distributed energy resource networks," in *Proc. IEEE Power and Energy Society General Meeting (PESGM)*. IEEE, 2016
- C9** Anthony Kim, Vahid Liaghat, Junjie Qin, and Amin Saberi, "Online energy storage management: an algorithmic approach," in *Proc. Approximation, Randomization, and Combinatorial Optimization Algorithms and Techniques (APPROX/RANDOM)*, vol. 60, 2016
- C10** Wenyuan Tang, Junjie Qin, Rahul Jain, and Ram Rajagopal, "Pricing sequential forward power contracts," in *Proc. IEEE International Conference on Smart Grid Communications (SmartGridComm)*. IEEE, 2015, pp. 563–568
- C11** Junjie Qin, Yin-Lam Chow, Jiyan Yang, and Ram Rajagopal, "Modeling and online control of generalized energy storage networks," in *Proc. International Conference on Future Energy Systems (E-Energy)*. ACM, 2014, pp. 27–38
- C12** Junjie Qin and Ram Rajagopal, "Price of uncertainty in multistage stochastic power dispatch," in *Proc. IEEE Conference on Decision and Control (CDC)*. IEEE, 2014, pp. 4065–4070
- C13** Yin-Lam Chow and Junjie Qin, "Weighted difference approximation of value functions for slow-discounting markov decision processes," in *Proc. IEEE Conference on Decision and Control (CDC)*. IEEE, 2014, pp. 1085–1090
- C14** Junjie Qin, Baosen Zhang, and Ram Rajagopal, "Risk limiting dispatch with ramping constraints," in *Proc. IEEE International Conference on Smart Grid Communications (SmartGridComm)*. IEEE, 2013, pp. 791–796

- C15** Yue Zhao, Junjie Qin, Ram Rajagopal, Andrea Goldsmith, and H Vincent Poor, "Risky power forward contracts for wind aggregation," in *Proc. Allerton Conference on Communication, Control, and Computing*. IEEE, 2013, pp. 54–61
- C16** Junjie Qin, Han-I Su, and Ram Rajagopal, "Storage in risk limiting dispatch: Control and approximation," in *Proc. American Control Conference (ACC)*. IEEE, 2013, pp. 4202–4208
- C17** Junjie Qin and Ram Rajagopal, "Dynamic programming solution to distributed storage operation and design," in *Proc. IEEE Power and Energy Society General Meeting (PESGM)*. IEEE, 2013
- C18** Junjie Qin, Raffi Sevlain, David Varodayan, and Ram Rajagopal, "Optimal electric energy storage operation," in *Proc. IEEE Power and Energy Society General Meeting (PESGM)*. IEEE, 2012

**Patent
Disclosures**

- P1** Junjie Qin, Kameshwar Poola, Pravin Varaiya, "Mobile Storage for Demand Charge Reduction," Disclosure of invention, Intellectual Property Office, Lawrence Berkeley National Laboratory, Oct 2018.
- P2** Rishee Jain, Junjie Qin, Ram Rajagopal, "ReMatch: Data-Driven Software for Planning Distributed Energy Resources Infrastructure," Disclosure of invention, Office of Technology Licensing, Stanford University, Dec 2017.
- P3** Junjie Qin, Jonathan Mather, Ram Rajagopal, Kameshwar Poola, Pravin Varaiya, "Automatic Power Exchange (APEX) for Distributed Energy Resource Networks," Disclosure of invention, Office of Technology Licensing, Stanford University, Jun 2017.

**Proposal
Experience**

- Lead Author; *Distributed Reliability: Feasibility, Cluster Forming and Market Design*; PI: Kameshwar Poola; ENEL-CITRIS Seed Grant; \$50K; Funded
- Major Contributor; *Shared Electricity Services in Connected Communities: Transition-to-Practice Supplement*; PI: Kameshwar Poola; NSF; \$300K; Funded
- Major Contributor; *APEX: Automated Power Exchange: A Matching Platform for Distributed Energy Transactions*; Lead PIs: Kameshwar Poola, Pravin Varaiya, Ram Rajagopal, Rahul Chopra; ARPA-e; \$4.8M; Not funded
- Major Contributor; *Open and Scalable Distributed Energy Resource Networks*; Lead PI: Ram Rajagopal; ARPA-e; \$4.3M; Funded
- Contributor; *Open-Source Data Analytics for Distribution Systems Management and Operations*; PI: Ram Rajagopal; NSF; \$500K; Funded

**Teaching
Experience**

- Teaching Assistant, *Machine Learning* (CS 229) Taught by Andrew Ng 2016 Aut. Stanford University
- Teaching Assistant, *Numerical Optimization* (CME 304/MS&E 315) Taught by Walter Murray 2015 Win. Stanford University
- Teaching Assistant, *Computer Organization and Systems* (CS 107) Taught by Michael Chang and Nate Hardison 2014 Sum. Stanford University
- Teaching Assistant, *Modern Power Systems Engineering* (CEE 272R) Taught by Ram Rajagopal 2014 Spr. Stanford University

Mentoring Experience

- Jared Porter, Ph.D. Student
Topic: Platforms for Energy and Transportation Systems
Apr. 2018 – Present
UC Berkeley
- Fabio Moret, Ph.D. Student
Topic: Markets for Distributed Energy Resources
Oct. 2018 – Jan. 2019
DTU
- Jonathan Mather, Ph.D. Student
Topic: Markets for Distributed Energy Resources
Oct. 2016 – Jun. 2018
UC Berkeley
- Camille Pache, Research Engineer
Topic: Business Model for Transmission Energy Storage
Oct. 2016 – Jan. 2018
RTE France
- Jiafan Yu, Ph.D. Student
Topic: Energy Storage Operations
Oct. 2015 – May 2017
Stanford University
- Jianxiao Wang, Ph.D. Student
Topic: Solar+Storage Systems
Nov. 2016 – Nov. 2017
Tsinghua University
- Huimiao Chen, M.S. Student
Topic: EV Charging Station Design
Jul. 2016 – Oct. 2016
Tsinghua University
- Christoph Trabert, M.S. Student
Topic: Stochastic Dispatch
Feb. 2014 – Oct. 2014
ETH

Talks and Presentations

- Mobile Storage for Demand Charge Reduction, Invited Talk, INFORMS Annual Meeting, Seattle, Oct. 2019
- Distributed Storage Investment in Power Networks, Talk, American Control Conference, Philadelphia, Jul. 2019
- Distributed Energy Resource Networks: Planning, Control and Market Design, Invited Talk, Columbia University, Mar. 2019
- Distributed Energy Resource Networks: Planning, Control and Market Design, Invited Talk, University of Denver, Feb. 2019
- Direct Data-Driven Methods for Risk Limiting Dispatch, Talk, IEEE Conference on Decision and Control, Miami, Dec. 2018
- Automatic Power Exchange for Distributed Energy Resource Networks: Flexibility Scheduling and Pricing, Talk, IEEE Conference on Decision and Control, Miami, Dec. 2018
- Convex Prophet Inequalities, Talk and Poster, ACM Sigmetrics and Workshop on Mathematical Performance Modeling and Analysis, Irvine, Jun. 2018
- Coordinated Trading for Smart Grid: Theory and Implementation of Transactive Energy, Invited Talk, Energy Technology Area, Lawrence Berkeley National Laboratory, Feb. 2018
- Network Effects of Energy Storage in Power Networks: Planning and Investment, Invited Talk, UC Berkeley, Nov. 2017
- Submodularity of Energy Storage Placement in Power Networks, Talk, IEEE Conference on Decision and Control, Las Vegas, Dec. 2016
- Contingent Coordinated Trading for Electricity Markets, Invited Talk, UC Berkeley, Aug. 2016
- Online Modified Greedy Algorithm for Storage Control under Uncertainty, Talk, IEEE Power and Energy Society General Meeting, Boston, Jul. 2016
- Powernet for Distributed Energy Resource Networks, Poster, IEEE Power and Energy Society General Meeting, Boston, Jul. 2016
- Distributed Online Modified Greedy Algorithm for Networked Storage Operation under Uncertainty, Poster, INFORMS Annual Meeting, Philadelphia, Nov. 2015

- Minimal System Operator in Smart Grid, Invited Talk, Bits and Watts Seminars, Stanford, Nov. 2015
- Distributed Online Modified Greedy Algorithm for Networked Storage Operation under Uncertainty, Poster, IEEE Power and Energy Society General Meeting, Denver, Jul. 2015
- Price of Uncertainty in Multistage Stochastic Power Dispatch, Talk, IEEE Conference on Decision and Control, Los Angeles, Dec. 2014
- Modeling and Online Control of Generalized Energy Storage Networks, Talk, ACM e-Energy, Cambridge UK, Jun. 2014
- Dynamic Programming Solution to Distributed Storage Operation and Design, Talk and Poster, IEEE Power and Energy Society General Meeting, Vancouver, Jul. 2013
- Storage in Risk Limiting Dispatch: Control and Approximation, Talk, American Control Conference, Washington, D.C., Jun. 2013
- Optimal Electric Energy Storage Operation, Talk and Poster, IEEE Power and Energy Society General Meeting, San Diego, Jul. 2012

Service

- **TPC Member:** IEEE International Conference on Smart Grid Communications (SmartGridComm), 2015, 2016.
- **Reviewer:**
 - **Journals:** IEEE Transactions on Automatic Control, IEEE Transactions on Control of Network Systems, IEEE Transactions on Power Systems, IEEE Transactions on Smart Grid, IEEE Transactions on Sustainable Energy, IEEE Transactions on Network Science and Engineering, IEEE Transactions on Sustainable Computing, IEEE Transactions on Control Systems Technology, International Journal of Electrical Power and Energy Systems, Applied Energy
 - **Conferences:** IEEE Conference on Decision and Control (CDC), American Control Conference (ACC), European Control Conference (ECC), IEEE Power and Energy Society General Meeting (PESGM), IEEE SmartGridComm

Membership

IEEE, INFORMS, ACM, SIAM