

# Stanford

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## Ram Rajagopal

Assistant Professor of Civil and Environmental Engineering and, by courtesy, of Electrical Engineering

### CONTACT INFORMATION

- **Administrator**

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### Bio

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#### BIO

Prof. Rajagopal's primary research focus is on advancing the design, optimization and data-driven modelling of electric power systems. His work involves creating novel sensing and control platforms, robust data processing algorithms and dynamical statistical decision methods. He has also extensively worked on sensing infrastructure systems and transportation networks.

#### ACADEMIC APPOINTMENTS

- Assistant Professor, Civil and Environmental Engineering
- Assistant Professor (By courtesy), Electrical Engineering
- Member, Child Health Research Institute
- Affiliate, Precourt Institute for Energy

#### HONORS AND AWARDS

- NSF CAREER Award, NSF (2016)

#### LINKS

- Ram Rajagopal: <http://web.stanford.edu/~ramr/>

### Teaching

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#### COURSES

##### 2016-17

- Data Analytics for Urban Systems: CEE 322 (Aut)
- Modern Power Systems Engineering: CEE 272R (Spr)
- SmartGrids and Advanced Power Systems Seminar: CEE 272T, EE 292T (Aut, Win, Spr)

##### 2015-16

- Data Analytics for Urban Systems: CEE 322 (Aut)

- Introduction to Sensing Networks for CEE: CEE 155, CEE 255 (Win)
- Modern Power Systems Engineering: CEE 272R (Spr)
- SmartGrids and Advanced Power Systems Seminar: CEE 272T, EE 292T (Aut, Win, Spr)

#### 2014-15

- Data Analytics for Urban Systems: CEE 322 (Aut)
- Introduction to Sensing Networks for CEE: CEE 155 (Win)
- Modern Power Systems Engineering: CEE 272R (Spr)
- SmartGrids and Advanced Power Systems Seminar: CEE 272T, EE 292T (Aut, Win, Spr)

#### 2013-14

- Introduction to Sensing Networks for CEE: CEE 155 (Win)
- Modern Power Systems Engineering: CEE 272R (Spr)
- SmartGrids and Advanced Power Systems Seminar: CEE 272T (Aut, Win, Spr)

## STANFORD ADVISEES

### Postdoctoral Faculty Sponsor

Yuting Ji, Peter Kairouz, Michaelangelo Tabone

## Publications

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### PUBLICATIONS

- **Wind Aggregation Via Risky Power Markets** *IEEE TRANSACTIONS ON POWER SYSTEMS*  
Zhao, Y., Qin, J., Rajagopal, R., Goldsmith, A., Poor, H. V.  
2015; 30 (3): 1571-1581
- **Competition and Coalition Formation of Renewable Power Producers** *IEEE TRANSACTIONS ON POWER SYSTEMS*  
Zhang, B., Johari, R., Rajagopal, R.  
2015; 30 (3): 1624-1632
- **Optimal dynamic pricing for morning commute parking** *TRANSPORTMETRICA A-TRANSPORT SCIENCE*  
Qian, Z. (., Rajagopal, R.  
2015; 11 (4): 291-316
- **Thermal Profiling of Residential Energy Use** *IEEE TRANSACTIONS ON POWER SYSTEMS*  
Albert, A., Rajagopal, R.  
2015; 30 (2): 602-611
- **SnowFort: An Open Source Wireless Sensor Network for Data Analytics in Infrastructure and Environmental Monitoring** *IEEE SENSORS JOURNAL*  
Liao, Y., Mollineaux, M., Hsu, R., Bartlett, R., Singla, A., Raja, A., Bajwa, R., Rajagopal, R.  
2014; 14 (12)
- **Optimal occupancy-driven parking pricing under demand uncertainties and traveler heterogeneity: A stochastic control approach** *TRANSPORTATION RESEARCH PART B-METHODOLOGICAL*  
Qian, Z. (., Rajagopal, R.  
2014; 67: 144-165
- **Network Risk Limiting Dispatch: Optimal Control and Price of Uncertainty** *IEEE TRANSACTIONS ON AUTOMATIC CONTROL*  
Zhang, B., Rajagopal, R., Tse, D.  
2014; 59 (9): 2442-2456
- **Household Energy Consumption Segmentation Using Hourly Data** *IEEE TRANSACTIONS ON SMART GRID*  
Kwac, J., Flora, J., Rajagopal, R.

2014; 5 (1): 420-430

- **Smart Meter Driven Segmentation: What Your Consumption Says About You** *IEEE TRANSACTIONS ON POWER SYSTEMS*  
Albert, A., Rajagopal, R.  
2013; 28 (4): 4019-4030
- **Value of Aggregation In Smart Grids** *IEEE International Conference on Smart Grid Communications (SmartGridComm)*  
Sevlian, R., Rajagopal, R.  
IEEE.2013: 714-719
- **Online Modified Greedy Algorithm for Storage Control Under Uncertainty** *IEEE TRANSACTIONS ON POWER SYSTEMS*  
Qin, J., Chow, Y., Yang, J., Rajagopal, R.  
2016; 31 (3): 1729-1743
- **Scheduling Non-Preemptive Deferrable Loads** *IEEE TRANSACTIONS ON POWER SYSTEMS*  
O'Brien, G., Rajagopal, R.  
2016; 31 (2): 835-845
- **Distributed Online Modified Greedy Algorithm for Networked Storage Operation Under Uncertainty** *IEEE TRANSACTIONS ON SMART GRID*  
Qin, J., Chow, Y., Yang, J., Rajagopal, R.  
2016; 7 (2): 1106-1118
- **Shapley Value Estimation for Compensation of Participants in Demand Response Programs** *IEEE TRANSACTIONS ON SMART GRID*  
O'Brien, G., El Gamal, A., Rajagopal, R.  
2015; 6 (6): 2837-2844
- **Ranking appliance energy efficiency in households: Utilizing smart meter data and energy efficiency frontiers to estimate and identify the determinants of appliance energy efficiency in residential buildings** *ENERGY AND BUILDINGS*  
Kavousian, A., Rajagopal, R., Fischer, M.  
2015; 99: 220-230
- **Structural health monitoring of progressive damage** *EARTHQUAKE ENGINEERING & STRUCTURAL DYNAMICS*  
Mollineaux, M., Rajagopal, R.  
2015; 44 (4): 583-600
- **The impacts of electricity dispatch protocols on the emission reductions due to wind power and carbon tax.** *Environmental science & technology*  
Yu, Y., Rajagopal, R.  
2015; 49 (4): 2568-2576
- **Where Ds My Parking Spot? Online and Offline Prediction of Time-Varying Parking Occupancy** *TRANSPORTATION RESEARCH RECORD*  
Tamrazian, A., Qian, Z. (., Rajagopal, R.  
2015: 77-85
- **Cost-of-Service Segmentation of Energy Consumers** *IEEE TRANSACTIONS ON POWER SYSTEMS*  
Albert, A., Rajagopal, R.  
2014; 29 (6): 2795-2803
- **Optimal dynamic parking pricing for morning commute considering expected cruising time** *TRANSPORTATION RESEARCH PART C-EMERGING TECHNOLOGIES*  
Qian, Z. (., Rajagopal, R.  
2014; 48: 468-490
- **RSSI-Fingerprinting-Based Mobile Phone Localization With Route Constraints** *IEEE TRANSACTIONS ON VEHICULAR TECHNOLOGY*  
Ergen, S. C., Tetikol, H. S., Kontik, M., Sevlian, R., Rajagopal, R., Varaiya, P.  
2014; 63 (1): 423-428
- **A Model For The Effect of Aggregation on Short Term Load Forecasting** *IEEE PES General Meeting*  
Sevlian, R. A., Rajagopal, R.  
IEEE.2014
- **Do Wind Power Producers have Market Power and Exercise It?** *IEEE PES General Meeting*

- Yu, Y., Zhang, B., Rajagopal, R.  
IEEE.2014
- **Aggregation for Load Servicing** *IEEE PES General Meeting*  
Patel, S., Sevlian, R., Zhang, B., Rajagopal, R.  
IEEE.2014
  - **Data-Driven Benchmarking of Building Energy Efficiency Utilizing Statistical Frontier Models** *JOURNAL OF COMPUTING IN CIVIL ENGINEERING*  
Kavousian, A., Rajagopal, R.  
2014; 28 (1): 79-88
  - **Towards optimal allocation of computer resources: Trade-offs between uncertainty quantification, discretization and model reduction** *ENVIRONMENTAL MODELLING & SOFTWARE*  
Leube, P. C., de Barros, F. P., Nowak, W., Rajagopal, R.  
2013; 50: 97-107
  - **Sequential structural damage diagnosis algorithm using a change point detection method** *JOURNAL OF SOUND AND VIBRATION*  
Noh, H., Rajagopal, R., Kiremidjian, A. S.  
2013; 332 (24): 6419-6433
  - **Detection and Statistics of Wind Power Ramps** *IEEE TRANSACTIONS ON POWER SYSTEMS*  
Sevlian, R., Rajagopal, R.  
2013; 28 (4): 3610-3620
  - **Determinants of residential electricity consumption: Using smart meter data to examine the effect of climate, building characteristics, appliance stock, and occupants' behavior** *ENERGY*  
Kavousian, A., Rajagopal, R., Fischer, M.  
2013; 55: 184-194
  - **Risk-limiting dispatch for integrating renewable power** *INTERNATIONAL JOURNAL OF ELECTRICAL POWER & ENERGY SYSTEMS*  
Rajagopal, R., Bitar, E., Varaiya, P., Wu, F.  
2013; 44 (1): 615-628
  - **Risky Power Forward Contracts for Wind Aggregation** *51st Annual Allerton Conference on Communication, Control, and Computing*  
Zhao, Y., Qin, J., Rajagopal, R., Goldsmith, A., Poor, H. V.  
IEEE.2013: 54-61
  - **Building dynamic thermal profiles of energy consumption for individuals and neighborhoods** *IEEE International Conference on Big Data (Big Data)*  
Albert, A., Rajagopal, R.  
IEEE.2013
  - **Demand Response Targeting Using Big Data Analytics** *IEEE International Conference on Big Data (Big Data)*  
Kwac, J., Rajagopal, R.  
IEEE.2013
  - **Dynamic Programming Solution to Distributed Storage Operation and Design** *General Meeting of the IEEE-Power-and-Energy-Society (PES)*  
Qin, J., Rajagopal, R.  
IEEE.2013
  - **Financial Transmission Rights Perform Well in Power Markets with High Penetration of Wind Energy?** *General Meeting of the IEEE-Power-and-Energy-Society (PES)*  
Yu, Y., Rajagopal, R.  
IEEE.2013
  - **Outage Detection in Power Distribution Networks with Optimally-Deployed Power Flow Sensors** *General Meeting of the IEEE-Power-and-Energy-Society (PES)*  
Zhao, Y., Sevlian, R., Rajagopal, R., Goldsmith, A., Poor, H. V.  
IEEE.2013
  - **Storage in Risk Limiting Dispatch: Control and Approximation** *American Control Conference (ACC)*  
Qin, J., Su, H., Rajagopal, R.

IEEE.2013: 4202–4208

- **A Method for Automatically Scheduling Notified Deferrable Loads** *American Control Conference (ACC)*  
O'Brien, G., Rajagopal, R.  
IEEE.2013: 5080–5085
- **Utility Customer Segmentation Based on Smart Meter Data: Empirical Study** *IEEE International Conference on Smart Grid Communications (SmartGridComm)*  
Kwac, J., Tan, C., Sintov, N., Flora, J., Rajagopal, R.  
IEEE.2013: 720–725
- **Oriented Wireless Sensing for Structural Health Monitoring** *9th International Workshop on Structural Health Monitoring (IWSHM)*  
Mollineaux, M., Rajagopal, R., Kiremidjian, A., Balafas, K.  
DESTECH PUBLICATIONS, INC.2013: 73–80
- **Risk Limiting Dispatch with Ramping Constraints** *IEEE International Conference on Smart Grid Communications (SmartGridComm)*  
Qin, J., Zhang, B., Rajagopal, R.  
IEEE.2013: 791–796
- **Data-Driven Forecasting Algorithms for Building Energy Consumption** *Conference on Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems*  
Noh, H. Y., Rajagopal, R.  
SPIE-INT SOC OPTICAL ENGINEERING.2013
- **Sequential detection of progressive damage** *Conference on Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems*  
Mollineaux, M., Rajagopal, R.  
SPIE-INT SOC OPTICAL ENGINEERING.2013
- **Risk Limiting Dispatch in Congested Networks** *50th Annual Allerton Conference on Communication, Control, and Computing (Allerton)*  
Rajagopal, R., Tse, D., Zhang, B.  
IEEE.2013: 1900–1907
- **Bringing Wind Energy to Market** *IEEE TRANSACTIONS ON POWER SYSTEMS*  
Bitar, E. Y., Rajagopal, R., Khargonekar, P. P., Poolla, K., Varaiya, P.  
2012; 27 (3): 1225-1235
- **Damage diagnosis algorithm using a sequential change point detection method with an unknown distribution for damage** *Conference on Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems*  
Noh, H. Y., Rajagopal, R., Kiremidjian, A. S.  
SPIE-INT SOC OPTICAL ENGINEERING.2012
- **Risk Limiting Dispatch of Wind Power** *American Control Conference (ACC)*  
Rajagopal, R., Bitar, E., Wu, F., Varaiya, P.  
IEEE COMPUTER SOC.2012: 4417–4422
- **Risk Limiting Dispatch** *General Meeting of the IEEE-Power-and-Energy-Society*  
Entriken, R., Varaiya, P., Wu, F., Bialek, J., Dent, C., Tuohy, A., Rajagopal, R.  
IEEE.2012
- **Optimal Electric Energy Storage Operation** *General Meeting of the IEEE-Power-and-Energy-Society*  
Qin, J., Sevlian, R., Varodayan, D., Rajagopal, R.  
IEEE.2012
- **Wind Power Ramps: Detection and Statistics** *General Meeting of the IEEE-Power-and-Energy-Society*  
Sevlian, R., Rajagopal, R.  
IEEE.2012
- **Simultaneous Optimization of Sensor Placements and Balanced Schedules** *IEEE TRANSACTIONS ON AUTOMATIC CONTROL*  
Krause, A., Rajagopal, R., Gupta, A., Guestrin, C.  
2011; 56 (10): 2390-2405

- **Damage Diagnosis Algorithm for Civil Structures Using a Sequential Change Point Detection Method and Time-Series Analysis** *8th International Workshop on Structural Health Monitoring*  
Noh, H. Y., Rajagopal, R., Kiremidjian, A. S.  
DESTECH PUBLICATIONS, INC.2011: 55–62
- **The Role of Co-located Storage for Wind Power Producers in Conventional Electricity Markets** *American Control Conference (ACC)*  
Bitar, E., Rajagopal, R., Khargonekar, P., Poolla, K.  
IEEE.2011: 3886–3891
- **Arterial Travel Time Estimation Based On Vehicle Re-Identification Using Magnetic Sensors: Performance Analysis** *14th International IEEE Conference on Intelligent Transportation Systems (ITSC)*  
Sanchez, R. O., Flores, C., Horowitz, R., Rajagopal, R., Varaiya, P.  
IEEE.2011: 997–1002
- **Real-Time Measurement of Link Vehicle Count and Travel Time in a Road Network** *IEEE TRANSACTIONS ON INTELLIGENT TRANSPORTATION SYSTEMS*  
Kwong, K., Kavalier, R., Rajagopal, R., Varaiya, P.  
2010; 11 (4): 814-825
- **Arterial travel time estimation based on vehicle re-identification using wireless magnetic sensors** *TRANSPORTATION RESEARCH PART C-EMERGING TECHNOLOGIES*  
Kwong, K., Kavalier, R., Rajagopal, R., Varaiya, P.  
2009; 17 (6): 586-606