HOSSEIN AKHAVAN-HEJAZI

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EDUCATION

University of California Riverside, Riverside, CA
Ph.D., Electrical Engineering - Power Systems 2016

Thesis: *Optimal operation of energy storage units in power transmission and distribution networks.*

Amirkabir University of Technologye, Tehran, Iran
M.Sc., Electrical Engineering - Power Systems 2011

Iran University of Science and Technology, Tehran, Iran
B.Sc., Electrical Engineering - Power Systems 2008

RESEARCH INTERESTS

Smart grid research:	Energy storage, demand response, distributed energy resources.
Power system analysis:	Operation, planning, electricity market operations, risk analysis.
Optimization:	Stochastic programming, convex relaxations, decomposition.
Data analysis:	Statistical analysis, time-series analysis, state estimation.

TEACHING INTERESTS

System analysis:	Engineering circuit analysis, power systems analysis, energy systems operation & planning.
Optimization and Control:	Linear systems, control theory, optimization theory, stochastic optimization.
Data analysis:	Statistical analysis, state estimation.

RESEARCH EXPERIENCE

Assistant Professional Researcher September 2017-Present
Winston Chung Global Energy Center, University of California at Riverside

PI in the proposal submitted in response to CEC-GFO-16-311

Advancing The Resilience And Environmental Performance Of California's Electricity System.

UCR PI in the CSULB proposal submitted in response to CEC-GFO-17-302-G3

Demonstrate Business Case for Advanced Microgrids in Support of California's Energy and GHG Policies

UCR Co-PI in the Willdan Inc. proposal submitted in response to CEC-GFO-17-302-G1

Demonstrate Business Case for Advanced Microgrids in Support of California's Energy and GHG Policies.

Post-doctoral Fellow June 2017 - September 2017
Smart Grid Research Lab, University of California at Riverside

Developing proposal for UCOP GFO UC-National Lab Collaborative Research and Training Awards

Developing proposal for CEC GFO 16-310- Improving Performance and Cost Effectiveness of Wind Energy Technologies

Post-doctoral Fellow April 2017 - June 2017

System Energy Efficiency Lab, University of California at San Diego

Mission planning and task allocation for a group of unmanned aerial vehicles in multi-criteria environmental applications.

Post-doctoral Fellow 2016 - 2017

Smart Grid Research Lab, University of California at Riverside

Utility-scale implementation of a battery-assisted distribution feeder peak-shaving system:

Developed offline and online stochastic optimization frameworks for peak-shaving on an industrial 12 kV distribution feeder using batteries located at UCR CE-CERT micro-grid.

Utilized the RPU SCADA data to predict the feeder load using ARMA models.

Lab-scale implementation of a P-HIL testbed for grid-connected battery systems

Graduate Research Assistant 2012 - 2016

Smart Grid Research Lab, University of California at Riverside

Energy storage operation in distribution systems via chance-constrained stochastic programming:

Developed non-parametric CC-OPF for energy storage operation in distribution systems.

Developed convex approximation of CC-OPF for energy storage operation in distribution systems.

Developed mathematical models for battery storage characteristics, analysis of cost, sizing, and coordinated charging of battery storage.

Developed a test data set for electric vehicle fleet applications in smart grid research.

Utility-scale independent energy storage bidding for multiple revenue streams.

Formulated stochastic optimization for energy storage bidding in day-ahead electricity market.

Obtained a convex approximations for the non-linear, non-convex storage operation problem.

Implemented a stochastic unit-commitment problem to calculate input bus prices/shadow prices.

HIL testing of VAR control in distribution girds via optimal operation of four-quadrant battery chargers:

Graduate Intern June 2014 - September 2014

Energy Management Department, NEC Laboratories America

Risk-controlled multi-temporal market optimization and bidding of utility-scale battery storage systems:

Developed an optimization for operation of battery storage based on NYISO two-settlement market.

Formulated a cost/revenue model and a revenue- risk model for energy storage system bidding/operation.

Obtained tractable models for battery features such as efficiency and wear cost.

Graduate Research Assistant 2011 - 2012

Electrical Engineering Department, Texas Tech University

Distribution system optimal expansion planning with distributed energy resources.

Analysis of the impacts of large scale automated demand response on the electric market operations.

Graduate Research Assistant 2009 - 2011

Electrical Engineering Department, Amirkabir University of Technology

Modeling dynamic characteristics of distribution systems based on the measurements of PMU.

Security-constrained co-allocation of energy and reserve in electricity market.

TEACHING EXPERIENCE

Teaching Assistant 2014 - 2016
Department of Electrical & Computer Engineering , University of California at Riverside

EE231: Convex Optimization in Engineering Applications (Graduate Course), Winter 2014
EE232: Introduction To Smart Grid (Graduate Course), Winter 2016

Teaching Assistant 2010
Department of Biomedical Engineering, Amirkabir University of Technology

DC Electrical Machines (Under-graduate Course), Fall 2010

PROPOSAL WRITING EXPERIENCE

Summary: Awarded: $ 4.8 M, Declined: $ 4.6 M, Pending $ 3 M.

- *UCOP-2018 UC-NLCRT:* UC-Lab Center for Electricity Distribution Cybersecurity. (**Pending: $3M**)
- *CEC-GFO-16-304:* Internet of Things and Ubiquitous Sensing in University Building Energy Management; Design Optimization and Technology Demonstration. (**Awarded: $2.5M**)
- *CEC-GFO-16-309:* Advanced Integrated Building Energy Management Technology Demonstration in a Permanent Supporting Housing Facility. (**Awarded: $2.1M**)
- *CEC-EISG-EISG-13-04:* PEV-Based Active and Reactive Power Compensation in Distribution Networks: Design Optimization and Technology Demonstration. (**Awarded: $100K**)
- *CEC-GFO-16-303-G3:* Optimized Large Vehicle Battery Recycling for Grid Integrated Applications. (Declined: $1.0M)
- *CEC-GFO-15-313-G3:* Exploiting PMU Data to Enable Bi-directionality, Enhance Reliability, and Improve Efficiency in California Distribution Feeders. (Declined: $1.7M)
- *RPU-EI-14:* Monitoring and Control of PVs, Battery Storage Systems, and EV Chargers at a 12 kV Industrial Substation Feeder Level. (**Awarded: $100K**)
- *RPU-EI-15:* Exploiting PMU Data at RPU's 12 kV Industrial Feeder; Innovative Data Analytics and Optimal Energy Resource Operation. (Declined: $100K)
- *DoE-FOA-1616:* Learning-Enhanced Algorithms, DER Synthesis. (Declined: $1.5M)
- *DoE-FOA-1493:* Tackling Market Economics and Grid Reliability Risk Tradeoffs in Market Aggregation of Demand Resources; A Decentralized Approach Driven by Big Data. (Declined: $300K)

TECHNICAL SKILLS

Optimization Software:	CPLEX, GUROBI, CVX, MOSEC
Power System Software:	PSCAD, RSCAD, Simulink, Power World, DIgSILENT
Real Time Digital Simulator (RTDS):	Hardware-in-Loop (HIL) Testing
Programming:	MATLAB, Python
Miscellaneous:	Bash, Git, LaTeX, MS. Office

REFEREED PUBLICATIONS

Journal Papers

J1 Z. Taylor, **H. Akhavan-Hejazi**, E. Cortez, L. Alvarez, S. Ula, M. Barth, H. Mohsenian-Rad, "Customer-side SCADA-assisted Large Battery Operation Optimization for Distribution Feeder Peak Load Shaving", IEEE Tans. on Smart Grid, September 2017, Online early Access.

J2 **H. Akhavan-Hejazi**, H. Mohsenian-Rad, "Energy Storage Planning in Active Distribution Grids: A Chance-Constrained Optimization with Non-Parametric Probability Functions," *IEEE Trans. on Smart Grid*, vol. PP, no. 99, pp. 1-11, September 2016.

J3 **H. Akhavan-Hejazi**, H. Mohsenian-Rad,"Optimal Operation of Independent Storage Systems in Energy and Reserve Markets with High Wind Penetration," *IEEE Trans. on Smart Grid*, vol. 5, no. 2, pp. 1088-1097, March 2014.

J4 **H. Akhavan-Hejazi**, A. Araghi, B. Vahidi, S. Hosseinian, M. Abedi, H. Mohsenian-Rad, "Independent Distributed Generation Planning to Profit Both Utility and DG Investors," *IEEE Trans. on Power Systems*, vol. 28, no. 2, pp. 1170-1178, July 2013.

J5 **H. Akhavan-Hejazi**, H. Mohabati, S. Hosseinian, M. Abedi, "Differential Evolution Algorithm for Security-Constrained Energy and Reserve Optimization Considering Credible Contingencies," *IEEE Trans. on Power Systems*, vol. 26, pp. 1145-1155, August 2011.

J6 Y. Zhan, M. Ghamkhari, **H. Akhavan-Hejazi**, D. Xu, H. Mohsenian-Rad, "Optimal Response to Burstable Billing under Demand Uncertainty", emphIEEE Transactions on Services Computing, in press (minor revision) , arXiv preprint, arXiv:1603.05752.

J7 **H. Akhavan-Hejazi**, H. Mohsenian-Rad, "Power Systems Big Data Analytics: An Assessment of Paradigm Shift, Barriers, and Prospects", *Energy Reports*, in press (first revision).

Book Chapters

B1 **H. Akhavan-Hejazi**, H. Mohsenian-Rad, "Optimal Operation of Independent Storage Systems in Energy and Reserve Markets with High Wind Penetration," in *Energy Storage for Smart Grids: Planning & Operation for Renewable and Variable Energy Resources*, Edited by P. Du and N. Lu, Elsevier, 2014.

Conference Papers

C1 Z. Taylor, **H. Akhavan-Hejazi** , H. Mohsenian-Rad, "Power Hardware-in-Loop Simulation of Grid-connected Battery Systems with Reactive Power Control Capability," in Proc. of North American Power Symposium (NAPS), September 2017, Morgantown, WV.

C2 Z. Taylor, **H. Akhavan-Hejazi** , E. Cortez, L. Alvarez, S. Ula, M. Barth, H. Mohsenian-Rad, "Battery-assisted distribution feeder peak load reduction: Stochastic optimization and utility-scale implementation." In Proc. of Power and Energy Society General Meeting (PESGM), July 2016, Boston, MA.

C3 **H. Akhavan-Hejazi**, B. Asghari, R. Sharma, "A joint bidding and operation strategy for battery storage in multi-temporal energy markets," in Proc. of the *IEEE PES Innovative Smart Grid Technologies Conference*, Washington, DC, Feb. 2015.

C4 H. Darvishi, A. Darvishi, **H. Akhavan-Hejazi**, "Integration of demand side management in security constrained energy and reserve market," in Proc. of the *IEEE PES Innovative Smart Grid Technologies Conference*, Washington, DC, Feb. 2015.

C5 **H. Akhavan-Hejazi**, H. Mohsenian-Rad, A. Nejat, "Developing a test data set for electric vehicle applications in smart grid research," in Proc. of the *IEEE Vehicular Tec. Conf.*, Vancouver, BC, 2014.

C6 Chenye Wu, **H. Akhavan-Hejazi**, H. Mohsenian-Rad, Jianwei Huang "PEV-based P-Q Control in Line Distribution Networks with High Requirement for Reactive Power Compensation", in Proc. of the *IEEE PES Innovative Smart Grid Technologies Conference*, Washington, DC, Feb. 2014.

C7 **H. Akhavan-Hejazi**, H. Mohsenian-Rad, "A Stochastic Programming Framework for Optimal Storage Bidding in Energy and Reserve Markets," in Proc. of the *IEEE PES Innovative Smart Grid Technologies Conference*, Washington, DC, Feb. 2013.

C8 **H. Akhavan-Hejazi**, Z. Bahar, H. Mohsenian-Rad, "Challenges & Opportunities in Large-Scale Deployment of Automated Energy Consumption Scheduling in Smart Grid," in Proc. of *the IEEE Conf. on Smart Grid Communications*, Tainan, Taiwan, Oct. 2012.

C9 **H. Akhavan Hejazi**, M. Abedi, H. R. Mohabati, M. Hajizade, "A New Approach for Fast Identification of Distribution System Dynamic Model from Measured Data," in Proc. of the *International Conference on Clean Electrical Power*, Ischia, Italy, 2011.

C10 **H. Akhavan-Hejazi**, M. Hejazi, G. Gharehpatian, M. Abedi, "Distributed Generation Site and Size Allocation Through a Techno Economical Multi-objective Differential Evolution Algorithm," in Proc. of *the IEEE Power & Energy Int. Conference*, Kuala Lumpur, Malaysia, 2010.

PROFESSIONAL SERVICES

Technical Program Committee Member, IEEE Conference on Smart Grid Communications, 2014-2017.

Technical Program Committee Member, IEEE Global Communications Conference, 2016.

Technical Program Committee Member, Smart Grid Inspired Future Technologies Conference, 2016.

Technical Program Committee Member, IEEE Vehicular Technology Conference, 2014.

Reviewer for IEEE Transactions on Power Systems and IEEE Transactions on Smart Grid.

FELLOWSHIPS & AWARDS

Dissertation Year Award, University of California, Riverside, Graduate Division, 2015

Dean's Distinguished Fellowship Award, University of California, Riverside, Graduate Division, 2012

Deans Sybil Harrington Living Trust Fellowship, Texas Tech University, Graduate School, 2011