Kyri Alysa Baker, Ph.D.

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Boulder, CO, USA

Summary

Creative researcher passionate about transforming the electric power grid, renewable energy, and interdisciplinary collaboration. Expertise in stochastic and distributed optimization spanning electricity markets, power grids, and buildings. Excellent communication and analytical skills that support both theoretical and applied energy research.

Current Position

Assistant Professor August 2017 - Present
University of Colorado Boulder
Department of Civil, Environmental, and Architectural Engineering
Deptartment of Electrical, Energy, and Computer Engineering (by courtesy)
Joint Appointment in the Renewable and Sustainable Energy Institute (RASEI)

Previous Position

Research Engineer, Power Systems Group
National Renewable Energy Laboratory Feb. 2016 - August 2017

Postdoctoral Position

Postdoctoral Researcher, Residential Buildings Group
National Renewable Energy Laboratory Jan. 2015 - Feb. 2016

Education

Ph.D, Electrical and Computer Engineering 2010 - Dec. 2014
Carnegie Mellon University, Pittsburgh, PA
Advisor: Prof. Gabriela Hug (Now at ETH Zürich)
Co-Advisor: Prof. Xin Li (Now at Duke University)
Thesis: "Coordination of Resources across Areas for the Integration of Renewable Generation: Operation, Sizing and Siting of Storage Devices." [Online]

M.S., Electrical and Computer Engineering 2009-2010
Carnegie Mellon University, Pittsburgh PA
Research Focus: Biometrics, Advised by Prof. Marios Savvides

B.S., Electrical and Computer Engineering 2006-2009
Carnegie Mellon University, Pittsburgh PA
Research Focus: Bioinformatics, Advised by Prof. Takeo Kanade and Dr. Mei Chen

Patents

K. Baker, A. Bernstein, and E. Dall'Anese, "Network-Cognizant Voltage Droop Control," *Patent Pending.*

Publications

Peer-reviewed Journal Articles

(J6) K. Baker, A. Bernstein, E. Dall'Anese, and C. Zhao, "Network-Cognizant Voltage Droop Control for Distribution Grids," *IEEE Transactions on Power Systems*, Vol. 33, No. 2, pp 2098-2108, Mar 2018. [Online]

(J5) X. Jin, **K. Baker**, D. Christensen, and S. Isley, "Foresee^{TM}: A User-Centric Home Energy Management System for Energy Efficiency and Demand Response," *Applied Energy*, Vol. 205, pp 1583-1595, Nov 2017. [Online]

(J4) E. Dall'Anese, **K. Baker**, and T.H. Summers, "Chance-Constrained AC Optimal Power Flow for Distribution Systems with Renewables," *IEEE Transactions on Power Systems*, Vol. 32, No. 5, pp 3427-3438, Sep 2017. [Online]

(J3) **K. Baker** and B. Toomey, "Efficient Relaxations for Joint Chance Constrained AC OPF," *Electric Power Systems Research*, 148 (2017), pp. 230-236. [Online]

(J2) **K. Baker**, G. Hug, and X. Li, "Energy Storage Sizing Taking into Account Wind Forecast Uncertainties," *IEEE Transactions on Sustainable Energy*, Vol. 8, No. 1, pp. 331-340, Jan 2017. [Online]

(J1) **K. Baker**, G. Hug, and X. Li, "Distributed MPC for Efficient Coordination of Storage and Renewable Energy Sources across Control Areas," *IEEE Transactions on Smart Grid, Special Issue on Distributed Energy Management Systems*, Vol. 7, No. 2, pp. 992-1001, Mar. 2016 (444 submissions, 20 published). [Online]

Peer-reviewed Conference Articles

(C16) K. Garifi, **K. Baker**, B. Touri, and D. Christensen, "Stochastic Model Predictive Control for Demand Response in a Home Energy Management System," *IEEE Power and Energy Society General Meeting*, Portland, OR, 2018.

(C15) **K. Baker** and K. Garifi, "Power Signature Obfuscation using Flexible Building Loads," *4th International Workshop on Non-Intrusive Load Monitoring*, Austin, TX, 2018. [Online].

(C14) Y. Guo, **K. Baker**, E. Dall'Anese, Z. Hu, and T.H. Summers, "Stochastic optimal power flow based on data-driven distributionally robust optimization," *accepted to the American Controls Conference*, Milwaukee, WI, 2018. [Online].

(C13) **K. Baker**, A. Bernstein, C. Zhao, and E. Dall'Anese, "Network-cognizant Design of Decentralized Volt/VAR Controllers," *Innovative Smart Grid Technologies (ISGT)*, Arlington, VA, 2017. [Online].

(C12) X. Jin, **K. Baker**, S. Isley, and D. Christensen, "User-Preference-Driven Multi-Objective Model Predictive Control of Residential Building Loads and Battery Storage for Demand Response," *American Controls Conference (Invited Paper)*, Seattle, WA, 2017 [Online].

(C11) X. Zhou, L. Chen, E. Dall'Anese, and **K. Baker**. "Incentive-Based Voltage Regulation in Distribution Networks," *American Controls Conference*, Seattle, WA, 2017. [Online]

(C10) E. Raszmann, **K. Baker**, Y. Shi, and D. Christensen, "Modeling Stationary Lithium-Ion Batteries for Optimization and Predictive Control," *Power and Energy Conference at Illinois (PECI)*, [**Best Paper Award**], Champaign, IL, 2017. [Online]

(C9) E. Dall'Anese, **K. Baker**, and T.H. Summers, "Adaptive Optimal Power Flow for Distribution Systems under Uncertain Forecasts," *2016 Conference on Decision and Control (CDC)*, Las Vegas, NV, Dec. 2016. [Online]

(C8) **K. Baker**, X. Jin, D. Vaidhynathan, W. Jones, D. Christensen, B. Sparn, J. Woods, H. Sorensen, and M. Lunacek, "Short Paper: Frequency Regulation Services from Connected Residential Devices," *ACM BuildSys '16*, Stanford, CA, Nov. 2016. [**5 out of 68 Short Papers accepted $\approx$ 7%**]. [Online]

(C7) K. Baker, E. Dall'Anese, and T.H. Summers, "Distribution-Agnostic Stochastic Optimal Power Flow for Distribution Grids," *IEEE North American Power Symposium*, Denver, CO, Sept. 2016. [Online]

(C6) B. Palmintier, E. Hale, B.-M. Hodge, **K. Baker**, and T. Hansen, "Experiences integrating transmission and distribution simulations for DERs with the Integrated Grid Modeling System (IGMS)," *Power Systems Computation Conference (PSCC)*, Genoa, Italy, 2016. [Online]

(C5) F. Ding, B. Mather, N. Ainsworth, P. Gotseff, and **K. Baker**, "Locational Sensitivity Investigation on PV Hosting Capacity and Fast Track PV Screening," *IEEE PES T&D*, Dallas, TX, USA, 2016 [Online].

(C4) K. Baker, G. Hug, and X. Li, "Optimal Storage Sizing using Two-Stage Stochastic Optimization for Intra-Hourly Dispatch," *IEEE North American Power Symposium*, Pullman, WA, 2014 [Online].

(C3) K. Baker, D. Zhu, G. Hug, and X. Li, "Jacobian Singularities in Optimal Power Flow Problems Caused by Intertemporal Constraints," *IEEE North American Power Symposium*, Manhattan, Kansas, USA, 2013 [Online].

(C2) K. Baker, G. Hug, and X. Li, "Inclusion of Inter-Temporal Constraints into a Distributed Newton-Raphson Method," *IEEE North American Power Symposium*, Urbana-Champaign, USA, 2012 [Online].

(C1) K. Baker, G. Hug, and X. Li, "Optimal Integration of Intermittent Energy Sources Using Distributed Multi-step Optimization," *IEEE Power and Energy Society General Meeting*, San Diego, USA, 2012 [Online].

Technical Reports

(TR3) *On the Path to SunShot: Emerging Issues and Challenges in Integrating Solar with the Distribution System*, Technical Report NREL/TP-5D00-6533, B. Palmintier, R. Broderick, B. Mather, M. Coddington, **K. Baker**, F. Ding, M. Reno, M. Lave, and A. Bharatkumar, National Renewable Energy Laboratory, May 2016 [Online].

(TR2) *Integrated Distribution-Transmission Analysis for Very High Penetration Solar PV*, Technical Report NREL/TP-5D00-65550, B. Palmintier, E. Hale, T. Hansen, W. Jones, D. Biagioni, **K. Baker**, H. Wu, J. Giraldez, H. Sorensen, M. Lunacek, N. Merket, J. Jorgenson, B-M. Hodge, National Renewable Energy Laboratory, Jan. 2016 [Online].

(TR1) *Model Predictive Control of a Steam Turbine*, **K. Baker** and T.S. Leong, 2009.

Data Management

Public Dataset. Baker, Kyri et al. (2016): *Grid Connected Functionality.* National Renewable Energy Laboratory. [Online]

Sponsored Projects

Reducing Water Consumption via Free Market Renewable Integration
Sponsor: University of Colorado, Boulder, Water Energy Nexus IRT
Total Award: **$15,697**
PI: **Kyri Baker**
Co-PI: Rafael Frongillo (Computer Science)
Period: 2/2018 - 12/2018

Student Advising

PhD Students:

Amy Allen, Architectural Engineering (Co-advised by Gregor Henze), Fall 2017 - Present.

Kaitlyn Garifi, Electrical and Computer Engineering (Co-advised by Behrouz Touri), Fall 2017- Present.

James Hurtt, Electrical and Computer Engineering, Spring 2018 - Present.

Teaching

Electrical Circuits for Architectural Engineers (AREN 4830) - CU Boulder Spring 2018.

Electrical Systems for Buildings (AREN 4570/CVEN 5830) - CU Boulder Fall 2017.

Optimization of Energy Networks (18-879) - Carnegie Mellon University Teaching Assistant and Recitation Leader. Fall 2011, Spring 2013.

Outreach

Volunteer - *Andrew Carnegie Society (ACS)* April 2014.
Demonstrated CMU Energy Club's solar cooker at the Andrew Carnegie Society (ACS) Environment and Energy Showcase to families and members of the community.

Volunteer - *Summer Engineering Experience for Girls (SEE)* Summer 2011, 2013-14.
Helped develop a guide for middle school girls and assisted them in building and testing miniature wind generators.

Volunteer - *SWE High School Days @ CMU* Fall 2011.
Mentored students as they learned how to read schematics and construct circuits.

Professional Service

Faculty Advisor, IEEE, University of Colorado Boulder Chapter	2017 - Present
Faculty Advisor, NASA BIG Idea Challenge	2017 - Present
Technical Advisor, The Alt-E Fund	2017 - Present
Member, Women in ECE (WinECE), Carnegie Mellon University,	2007 - 2014
Vice President, CMU Energy Club, Carnegie Mellon University,	2012
Member, Institute of Electrical and Electronic Engineers (IEEE),	2015 - Present
Webmaster, CMU Energy Club, Carnegie Mellon University	2013 - 2014
Member, Engineering Graduate Organization (EGO),	2010 - 2014.

Awards and Honors

Finalist, NASA BIG Idea Challenge (Faculty advisor),	2018
Best Paper Award, Power and Energy Conference at Illinois (PECI),	2017
NREL Employee of the Month	Oct. 2016
NETL-RUA Student Travel Award	2014
Benjamin Garver Lamme/Westinghouse Graduate Fellowship	2010
Carnegie Institute of Technology Deans Tuition Fellowship	2010
Intel First Year Research Experience Award	2008

Reviewing/ Organizing Activities

Panel Reviewer, National Science Foundation (NSF), 2015, 2016.

Technical Committee Member, SmartGridComm 2016

Session Chair, North American Power Symposium, 2016

Journal Reviewer, IEEE Transactions on Power Systems, IEEE Transactions on Smart Grid, IEEE Transactions on Automatic Control, IEEE Transactions on Sustain-

able Energy, IEEE Transactions on Parallel and Distributed Systems, IEEE Transactions on Energy Conversion, IEEE Transactions on Industrial Electronics, IEEE Systems Journal, IEEE Transactions on Control Systems Technology, IEEE Transactions on Industry Applications, IET Generation, Transmission, and Distribution, IET Cyber-Physical Systems, International Transactions on Electrical Energy Systems, Energies

Conference Reviewer, Conference on Decision and Control, Power Systems Computation Conference, ACM Transactions on Cyber-Physical Systems, North American Power Symposium, IEEE SmartGridComm, Complex Networks, Power and Energy Conference at Illinois, IEEE Green Technologies Conference, International Federation of Automatic Control

Other Research Experience

Carnegie Mellon University - *Masters Researcher* Mar. 2010 - May 2010.
Worked with a team of researchers performing long range iris recognition under low-lighting conditions, and facial detection and classification in YouTube videos.

Carnegie Mellon University - *Student Researcher* Sept. 2008 - Jun. 2009.
Assisted in the modeling of stem cell growth. Developed a software program in Java for importing, parameter specification, and visualizing population growth of stem cells using mathematical models.

Boise State University - *Undergraduate Researcher* Jun. - Aug. 2008.
Wrote Verilog code for memory (SRAM) testing on FPGAs, worked with a class VI laser to characterize light sensitive materials, and monitored optical absorption of test structures using DC probe stations.

Intel Research - *Undergraduate Researcher* Feb. - May 2008.
Developed a stem cell labeling program in C++ for verifying tracking results.

Industry Experience

Xerox Corporation - *Imaging Intern* Jun. - Aug. 2009.
Created a framework for automatic control of laser printer equipment in Labview easing the testing process for fellow engineers.

Hewlett-Packard - *Software Intern* Jun. - Aug. 2007.
I exercised my creativity with printer functionality testing in C# and Visual Basic.

Sapidyne Instruments - *General Assistant Emphasizing in Information Technology* Mar. - Aug. 2005.
Setup and configuration of company's Linux backup server. Converted C++ application to Adobe Flash for interactive use on the company's website.