Manuel Garcia

Curriculum Vitae

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Education

2015–2019 **Ph.D. Electrical and Computer Engineering**, *Emphasis: Optimization and Electricity Markets*, University of Texas at Austin, Austin, Texas.
Dissertation: "Non-Convex Myopic Electricity Markets: The AC Transmission Network and Interdependent Reserve Types." Advisor: Professor Ross Baldick
Coursework: Restructured Electricity Markets, Power System Operation and Control, Smart Grids, Applied Optimization, Convex Optimization, Stochastic Optimization

2011–2013 **M.S. Mechanical Engineering**, *Major: Control Systems*, University of California at Berkeley, Berkeley, California.
Master's Thesis: "Uncertainty Quantification for State Estimation in Power Systems"
Relevant Coursework: Linear and Non-Linear Systems, Control Theory

2009–2011 **B.S. Mechanical Engineering**, University of California at Berkeley, Berkeley, California.

2005–2009 **A.S. Engineering and Mathematics**, *Shasta College*, Redding, California .

Experience and Training

August 2015 -Present **Graduate Student Researcher**, *UT Austin*, Austin, Texas.
- Transmission Losses in the Electricity Market: Studied and developed economic dispatch problems and pricing structures that consider transmission line losses. (Motivated by a proposed ERCOT market rule change)
- Interdependent Reserve Types in the Electricity Market: Studied and developed economic dispatch problems and pricing structures that consider the coupling effects of different reserve types that contribute to primary frequency control. (Motivated by a proposed ERCOT market rule change)
- Cyber Security Project: Developed detection/classification strategies for data integrity attacks, which compromise SCADA meters in the power system.

June-August 2018 **Research Intern**, *Los Alamos National Laboratory*, Los Alamos, New Mexico.
- Change-point Detection using Dynamic Phasor-Measurement Data: Developed an algorithm to detect disturbances in a dynamic power system on fine time scales using subspace identification and Kalman filtering.

June-August 2017 **Research Intern**, *Argonne National Laboratory*, Lemont, Illinois.
- Offer strategies for Wind Power Producers: Developed offer strategies in two stage Energy Markets with uncertain wind availability and energy prices using stochastic optimization techniques.

September-December 2016 **Visiting Scholar**, *Pontifical University of Chile*, Santiago, Chile.
- Power System Flexibility: Researched metrics of flexibility in the power system and market mechanisms that improve flexibility.

May-August 2016 **Visiting Scholar**, *Massachusetts Institute of Technology*, Cambridge, Massachusetts.
- Dynamic Market Mechanism: Developed a cost effective control scheme for performing frequency regulation in a power system.

June 2013-August 2015 **Post-Master's Intern**, *Los Alamos National Laboratory*, Los Alamos, New Mexico.
- Power System Fault Classification: Developed a linear multinomial regression classifier used to localize line outages using transient phasor measurements in the power system.
- Power System Stability Project: Developed decentralized generator controls to improve a power systems transient response to faults/contingencies. Wrote LANL's contribution to the quarterly report every three months.

2011-2013 **Graduate Student Researcher**, *UC Berkeley*, Berkeley, California.

- Uncertainty Quantification for State Estimation in Power Systems Project: Developed a state estimation tool that places tight bounds the system state using semi-definite programming relaxations.
- Scheduling of Distributed Resources Project: Developed strategies to charge a fleet of electric vehicles under uncertain wind power availability and uncertain task arrival times.

2010-2011 **Undergraduate Student Researcher**, *UC Berkeley*, Berkeley, California.

- Greenhouse Project: Built a small greenhouse and formulated a control system that operates the greenhouse in order to optimize the health of the plants.

Fellowships and Awards

Cockrell School of Engineering Fellowship, *University of Texas, Austin Department of Electrical and Computer Engineering*, Fall 2015 - Spring 2019.

Graduate Student Research Grant, *University of California, Berkeley Department of Mechanical Engineering*, Spring 2013.

Graduate Student Research Grant, *University of California, Berkeley Department of Mechanical Engineering*, Summer 2012.

Journal Publications

M. Garcia, H. Nagarajan, R. Baldick. "Convex Hull Pricing for the AC Optimal Power Flow Problem." *IEEE Transactions on Control of Network Systems*. (Under Revision)

M. Garcia, R. Baldick. "Approximating Economic Dispatch by Linearizing Transmission Losses." *IEEE Transactions on Power Systems*, 2019. (Accepted)

M. Garcia, T. Catanach, S. Vander Wiel, R Bent, E. Lawrence. "Line Outage Localization using Phasor Measurement Data in Transient State." *IEEE Transactions on Power Systems*, 2016.

A. Subramanian, M.Garcia, D. Callaway, K. Poolla, P. Varaiya. "Real-time Scheduling of Distributed Resources." *IEEE Transactions on Smart Grid*, 2013.

A. Giani, E. Bitar, M. Garcia, M. McQueen, P. Khargonekar, K. Poolla. "Smart Grid Data Integrity Attacks." *IEEE Transactions on Smart Grid*, 2012.

Conference Publications/Presentations

M. Garcia. "Non-Convex Electricity Markets." 11th Seminar of Next Generation of Researches in Power Systems. (Presentation Only). Copenhagen, Denmark, 2019.

M. Garcia, R. Baldick. "Real-Time Co-Optimization: Interdependent Reserve Types for Primary Frequency Response." Association for Computing Machinery Conference: The Second International Workshop on Electricity Market Engineering, 2019.

M. Garcia, S. Siddiqi, R. Baldick. "A General Economic Dispatch Problem with Marginal Losses." American Control Conference, 2019.

M. Garcia, T. Nudell, A. Annaswamy. "A Dynamic Regulation Market Mechanism for Improved Financial Settlements." American Control Conference, 2017.

M. Garcia, A. Giani, R. Baldick. "Smart Grid Data Integrity Attacks: Observable Islands." Power and Energy Society General Meeting, 2015.

M. Garcia, S. Backhaus, R. Bent. "Power Flow-Based Adaptive Generator Controls." Allerton Conference, 2015.

M. Garcia, A. Giani, K. Poolla. "Partial State Estimation for Electricity Grids." Conference on Decision and Control, 2013.

A. Subramanian, M. Garcia, A. Dominguez-Garcia, D. Callaway, K. Poolla, and P. Varaiya. “Real-time Scheduling of Deferrable Electric Loads.” American Controls Conference, 2012.

A. Giani, E. Bitar, M. Garcia, M. McQueen, P. Khargonekar, K. Poolla, Smart Grid Data. “Integrity Attacks: Characterizations and Countermeasures.” IEEE SmartGridComm, 2011.