

Claudio Adrián Cañizares Curriculum Vitae

1. PERSONAL DATA

a. Address:

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b. Education:

DEGREE	PLACE	DATES	COMMENTS
PhD Electrical Engineering	University of Wisconsin-Madison USA	Sept. 1991	Thesis: Voltage Collapse Analysis of AC/DC Systems. Advisors: Profs. Fernando L. Alvarado and Christopher DeMarco. Major: Power Systems. Minors: Control, Computer Science. GPA: 4.0/4.0
M.Sc. Electrical Engineering	University of Wisconsin-Madison USA	May 1988	Thesis: Graphic and Symbolic Simulation Techniques Applied to the Analysis of Power Systems. Advisors: Prof. Fernando L. Alvarado. GPA: 3.9/4.0
Ingeniero Eléctrico (Electrical Engineer Diploma)	Escuela Politécnica Nacional Quito-Ecuador	April 1984	Thesis: New Algorithms for the Computation of Short-circuits in Large Power Systems (Spanish). Advisor: Ing. Alfredo Mena GPA: 9.1/10.0 SUMMA CUM LAUDE

c. Employment:

POSITION	PLACE	DATES	COMMENTS
Professor Associate Professor Assistant Professor	University of Waterloo E&CE Department Canada	July 2003- present July 1998- June 2003 Sept. 1993- June 1998	Instructor of several Electrical Engineering undergraduate and graduate courses. Supervision of undergraduate, graduate and post-graduate research assistants, research associates and visitors, and teaching assistants. Lead and collaborate in research grants and contracts funded by government agencies and industry.
Associate Chair for Research	University of Waterloo E&CE Department Canada	Sept. 2015- Aug. 2016	Support and promote research activities in the Department, such as grants, awards, recognitions, and highlight research accomplishments.
Hydro One Endowed Chair	University of Waterloo Canada	May 2010- present	Research chair position supported by a \$1.5 million endowment from Hydro One to sponsor the Chair's research program in support of Hydro One activities, particularly in the areas of Smart Networks and Emerging Industry Infrastructure.
Associate Director	University of Waterloo Waterloo Institute for Sustainable Energy (WISE) Canada	Sept. 2008- Dec. 2015	Collaborate with the Executive Director of WISE in the set up of the Institute, including hiring new staff for the Institute, developing links with industry partners in the energy sector and raising the Institute's profile, playing a leadership role within the Institute.
Acting Executive Director	University of Waterloo Waterloo Institute for Sustainable Energy (WISE) Canada	Jan.-Aug. 2015	Replace the Executive Director of WISE during his sabbatical leave, leading all administrative and technical activities of the Institute.
Invited Professor	University of Castilla-La Mancha and University of Seville, Electrical Engineering, Spain	Nov. 2006- Feb. 2007	Continue collaborative research work on electricity market auctions and power system security.
Invited Professor	Swiss Federal Institute of Technology (ETH), Power Systems and High Voltage Lab., Zurich, Switzerland	Sept. 2006- Oct. 2006	Start collaborative research work on the study of multi-carrier energy systems.

Acting Chair	University of Waterloo E&CE Department Canada	July 2004- August 2004	Temporary Chair of the largest department at the University of Waterloo (2003-2004 figures: 60+ faculty members, 40+ office and technical staff, 1200+ undergraduate students, 300+ graduate students, \$12+ millions in research funding).
Deputy Chair	University of Waterloo E&CE Department Canada	January 2003- June 2004	In charge of most of the internal affairs of the E&CE Department, which included year-end evaluations of faculty members and secretarial and technical staff; chairing several standing committees for teaching, alumni and co-op affairs, and hiring; etc.
Associate Chair of Graduate Studies	University of Waterloo E&CE Department Canada	Sept. 2000- December 2002	In charge of the Graduate Program of the E&CE Department, with a 250+ enrollment at the time. The work included making decisions on funding for graduate students, student-supervisor ombudsman, maintaining academic and research program standards, etc.
Visiting Professor	Politecnico di Milano Dipartimento di Elettrotecnica Milan, Italy	Sept. 1999- July 2000	Collaborated in several research projects with Prof. A. Berizzi. Taught a short course on power systems stability to grad students and people from industry.
Consultant	ENEL-Ricerca and CESI Milan, Italy	Sept. 1999- January 2001	Work as a consultant for a research project entitled "Uses of FACTS and their Influence on Automatic Voltage Regulation in Networks with Secondary Voltage Controls," with M. Pozzi and S. Corsi.
Professor Assistant Professor	Escuela Politécnica Nacional Quito, Ecuador	April 1992- August 1993 July 1984- March 1992	In charge of sophomore level courses in machines and senior level courses in power systems analysis and simulation. Chairman of the Power Systems Area, helping on the restructuring the Electrical Engineering Faculty. Research: power systems computational techniques and stability.
Consultant	Self Waterloo, Canada	Sept. 1993- present	Consultant, instructor, and evaluator in power engineering academic and technical matters for several institutions and companies around the world, such as: Ziena Optimization Inc., US; ADEWA, Abu Dhabi; CELEC, Ecuador; McMaster University, Canada; Universidad de Chile, Santiago; Simon Fraser University, Canada; Escuela Politécnica Nacional, Ecuador; Universidad de Cuenca, Ecuador; and others.

Consultant	Self Quito, Ecuador	Sept. 1991- August 1993	Evaluate and inspect distribution network projects.
Consultant	University of Wisconsin-Madison ECE Department USA	Sept. 1991- Dec. 1992	Research and develop new software tools for ac dc power system analysis, and prepare technical papers in the subject.
Research Assistant	University of Wisconsin-Madison ECE Department USA	Jan. 1987- August 1991	Research several areas in power systems simulation, modeling and analysis; manage a small computer network; help in the development of the EMTP EPRI Workbooks II, III and IV; assist on computer setup and simulations for EMTP and Power Systems summer courses.
Teaching Assistant	University of Wisconsin-Madison ECE Department USA	Sept. 1988- May 1990	Taught two semesters of basic circuit analysis to non-electrical engineering students, and two semesters of the corresponding labs.
Lab Assistant	Escuela Politécnica Nacional Facultad de Ingeniería Eléctrica Quito, Ecuador	August 1983- June 1984	Help in the setup and delivery of several undergraduate labs in power systems and basic circuit analysis.
Engineering Assistant	INELIN Quito-Ecuador	August 1982- July 1983	Analysis and design of distribution networks.
Teacher	Colegio Americano Quito-Ecuador	Oct. 1979- Sept. 1982	Teach basic physics and related labs to senior, junior and sophomore high school students.
Engineering Assistant	Dirección de Aviación Civil Quito-Ecuador	Aug. 1982- Sept. 1982	Assist in the repair of electronic equipment at the Airport in Quito, Ecuador.

2. RESEARCH

a. Areas:

The following is a list of the various research topics in which my research group is involved:

i. Smart grids and microgrids:

- Energy management systems for customers and distribution feeders, and study and optimal management of the impact of smart loads in transmission, distribution systems, and microgrids.
- Microgrids planning, dispatch, control, and stability analysis, particularly of unbalanced, remote (isolated) systems, considering technical, economic, and social issues.
- Modeling, simulation, and control of distributed generation (DG), for both large grids and microgrids.
- Integration of renewables, particular wind and solar power, and energy storage systems considering their impact in dispatch, stability, and control in large grids and microgrids.
- Electric vehicles' smart charging and their impact on transmission and distribution systems.

ii. Stability and security analysis and improvements of power systems in a deregulated environment and in the context of smart grids:

- Pricing of system security and controls.
- Stability analysis of power systems including HVDC and FACTS controllers, and development of new analysis methodologies and control strategies to monitor and avoid stability problems.
- Development of efficient computational tools for the analysis of stability, dispatch and planning problems in power systems.
- Application of optimization techniques to bifurcation and stability-constrained OPF problems.
- Nonlinear system theory application to power systems, particularly the study of bifurcations and chaotic behavior.

iii. Optimal management and forecasting:

- Development of dispatch tools including DG and generation and load uncertainties.
- Reactive power management and markets.
- Probabilistic and stochastic OPF problems in grid dispatch and planning considering variable load and generation.
- Load and price forecasting.

iv. Simulation and studies of energy systems with multiple energy carriers:

- Optimization and economic studies of multi-energy systems.
- Feasibility studies of hydrogen systems with emphasis on the use of hydrogen as a storage medium for solar and wind power integration.

v. Simulation, modeling and analysis of FACTS controllers in power systems:

- Development and validation of transient and power flow models.
- Development of stability control strategies.

b. Publications: 306

	Google Scholar April 2017	SCOPUS April 2017
Citations	13151	6136
h-index	55	40

(i) Journal Papers: 100

- [1] D. Remon (Visitor), **C. A. Cañizares**, and P. Rodriguez, "Impact of 100-MW-scale PV Plants with Synchronous Power Controllers on Power System Stability in Northern Chile," *IET Generation, Transmission & Distribution*, submitted February 2017, revised and resubmitted April 2017, accepted May 2017, 18-page manuscript.
- [2] B. V. Solanki (Student), K. Bhattacharya, and **C. A. Cañizares**, "A Sustainable Energy Management System for Isolated Microgrids," *IEEE Transactions on Sustainable Energy*, submitted November 2016, revised and resubmitted February 2017, accepted March 2017, 11 double-column pages.
- [3] A. Mosaddegh (Student), **C. A. Cañizares**, and K. Bhattacharya, "Optimal Demand Response for Distribution Feeders with Existing Smart Loads," *IEEE Transactions on Smart Grid*, submitted October 2016, revised and resubmitted February 2017, accepted March 2017, 10 double-column pages.
- [4] M. Restrepo (Student), **C. A. Cañizares**, and M. Kazerani, "Three-Stage Distribution Feeder Control Considering Four-Quadrant EV Chargers," *IEEE Transactions on Smart Grid*, submitted June 2016, revised and resubmitted October 2016, accepted December 2016, 12 double-column pages.
- [5] M. Farrokhhabadi (Student), **C. A. Cañizares**, K. Bhattacharya, "Unit Commitment for Isolated Microgrids Considering Frequency Control," *IEEE Transactions on Smart Grid*, submitted May 2016, revised and resubmitted August 2016, accepted October 2016, 11 double-column pages.
- [6] M. Restrepo (Student), J. Morris (Student), M. Kazerani, and **C. A. Cañizares**, "Modeling and Testing of a Bidirectional Smart Charger for Distribution System EV Integration," *IEEE Transaction on Smart Grid*, submitted June 2015, revised and resubmitted February 2016, accepted March 2016, 11 double-column pages.
- [7] A. Vaccaro (Student) and **C. A. Cañizares**, "A Knowledge-based Framework for Power Flow and Optimal Power Flow Analyses," *IEEE Transactions on Smart Grid*, submitted May 2015, revised and resubmitted January 2016, accepted February 2016, 11 double-column pages.
- [8] B. V. Solanki (Student), A. Raghurajan (Student), K. Bhattacharya, and **C. A. Cañizares**, "Including Smart Loads for Optimal Demand Response in Integrated Energy Management Systems for Isolated Microgrids," *IEEE Transactions on Smart Grid*, submitted July 2015, revised and resubmitted November 2015, accepted November 2015, 10 double-column pages.
- [9] A. Mosaddegh (Student), **C. A. Cañizares**, K. Bhattacharya, and H. Fan, "Distributed Computing Architecture for Optimal Control of Distribution Feeders with Smart Loads," *IEEE Transactions on Smart Grid*, **invited paper**, special section "High Performance Computing Applications for a More Reliable and Efficient Power Grid," vol. 8, no. 3, May 2017, pp. 1469-1478.
- [10] M. Farrokhhabadi (Student), **C. A. Cañizares**, and K. Bhattacharya, "Frequency Control in Isolated/Islanded Microgrids Through Voltage Regulation," *IEEE Transactions on Smart Grid*, vol. 8, no. 3, May 2017, 1185-1194.
- [11] B. Tamimi (Student), **C. A. Cañizares**, and C. Battistelli (PDF), "Hybrid Power Flow Controller Steady-State Modelling, Control and Practical Application," *IEEE Transactions on Power Systems*, vol. 32, no. 2, March 2017, pp. 1483-1492.
- [12] IEEE Task Force on Benchmark Systems for Stability Controls: **C. A. Cañizares**, T. Fernandes, E. Geraldi Jr., L. Gerin-Lajoie, M. Gibbard, I. Hiskens, J. Kersulis, R. Kuiava, L. Lima, F. De Marco, N.

- Martins, B. C. Pal, A. Piardi, R. Ramos (Chair), J. dos Santos, D. Silva, A. K. Singh, B. Tamimi (Student), and D. Vowles, "Benchmark Models for the Analysis and Control of Small-Signal Oscillatory Dynamics in Power Systems," *IEEE Transaction on Power Systems*, vol. 32, no. 1, January 2017, pp. 715-722.
- [13] A. Vaccaro (Student) and **C. A. Cañizares**, "An Affine Arithmetic-based Framework for Uncertain Power Flow and Optimal Power Flow Studies," *IEEE Transactions on Power Systems*, vol. 32, no. 1, January 2017, pp. 274-288.
- [14] M. Chávez-Lugo, C. R. Fuerte-Esquivel, **C. A. Cañizares**, and V. J. Gutierrez-Martinez, "Practical Security Boundary-Constrained DC Optimal Power Flow for Electricity Markets," *IEEE Transactions on Power Systems*, vol. 31, no. 5, September 2016, pp. 3358-3368.
- [15] M. Arriaga (Student), **C. A. Cañizares**, and M. Kazerani, "Long-Term Renewable Energy Planning Model for Remote Communities," *IEEE Transactions on Sustainable Energy*, vol. 7, no. 1, January 2016, pp. 221-231.
- [16] D. Olivares (Student), J. D. Lara (Student), **C. A. Cañizares**, and M. Kazerani, "Stochastic-Predictive Energy Management System for Isolated Microgrids," *IEEE Transactions on Smart Grid*, vol. 6, no. 6, November 2015, pp. 2681- 2693.
- [17] B. Le (Student), **C. A. Cañizares**, and K. Bhattacharya, "Incentive Design for Voltage Optimization Programs for Industrial Loads," *IEEE Transactions on Smart Grid*, vol. 6, no. 4, July 2015, pp. 1865-1873.
- [18] D. Saez (Visitor), F. Avila (Visitor), D. Olivares (Student), **C. A. Cañizares**, and L. Marin, "Fuzzy Prediction Interval Models for Forecasting Renewable Resources and Loads in Microgrids," *IEEE Transactions on Smart Grid*, vol. 6, no. 2, March 2015, pp. 548-556.
- [19] S. Paudyal (Student), **C. A. Cañizares**, and K. Bhattacharya, "Optimal Operation of Industrial Energy Hubs in Smart Grids," *IEEE Transactions on Smart Grid*, vol. 6, no. 2, March 2015, pp. 684-694.
- [20] I. Sharma (Student), K. Bhattacharya, and **C. A. Cañizares**, "Smart Distribution System Operations with Price-Responsive and Controllable Loads," *IEEE Transactions on Smart Grid*, vol. 6, no. 2, March 2015, pp. 795-807.
- [21] M. Chehrehgani (Student), **C. A. Cañizares**, and K. Bhattacharya, "Optimal Energy Management of Greenhouses in Smart Grids," *IEEE Transactions on Smart Grid*, vol. 6, no. 2, March 2015, pp. 827-835.
- [22] M. Chehrehgani (Student), **C. A. Cañizares**, and K. Bhattacharya, "Optimal Operation of Climate Control Systems of Produce Storage Facilities in Smart Grids," *IEEE Transactions on Smart Grid*, vol. 6, no. 1, January 2015, pp. 351-359.
- [23] M. Pirnia (Student), **C. A. Cañizares**, K. Bhattacharya, and A. Vaccaro (Visitor), "A Novel Affine Arithmetic Method to Solve Optimal Power Flow Problems with Uncertainties," *IEEE Transactions on Power Systems*, vol. 29, no. 6, November 2014, pp. 2775-2783.
- [24] I. Das (Student), K. Bhattacharya, and **C. A. Cañizares**, "Optimal Incentive Design for Targeted Penetration of Renewables and Electricity Conservation," *IEEE Transactions on Sustainable Energy*, vo. 5, no. 4, October 2014, pp. 1213-1225
- [25] E. Nasr (Student), **C. A. Cañizares**, and K. Bhattacharya, "Stability Analysis of Unbalanced Distribution Systems With Synchronous Machine Based Distributed Generators," *IEEE Transactions on Smart Grid*, vol. 5, no. 5, September 2014, pp. 2326-2338.
- [26] IEEE PES TF in Microgrid Control: D. E. Olivares (Student), A. Mehrizi-Sani, A. H. Etemadi, **C. A. Cañizares** (Chair), R. Iravani, M. Kazerani, A. H. Hajimiragha, O. Gomis-Bellmunt, M. Saeedifard, R. Palma-Behnke (Secretary), G. A. Jiménez-Estévez, and N. D. Hatziargyriou, "Trends in Microgrid

- Control,” *IEEE Transactions on Smart Grid*, vol. 6, no. 4, July 2014, pp. 1905-1919. **IEEE-PES Technical Committee Working Group Recognition Award**, July 2015.
- [27] D. Olivares (Student), **C. A. Cañizares**, and M. Kazerani, “A Centralized Energy Management System for Isolated Microgrids,” *IEEE Transactions on Smart Grid*, vol. 6, no. 4, July 2014, pp. 1864-1875.
- [28] M. Arriaga (Student), **C. A. Cañizares**, and M. Kazerani, “Northern Lights,” *IEEE Power and Energy Magazine*, **invited paper**, vol. 12, no. 4, July-August 2014, pp. 50-59.
- [29] I. Sharma (Student), **C. A. Cañizares**, and K. Bhattacharya, “Smart Charging of PEVs Penetrating into Residential Distribution Systems,” *IEEE Transactions on Smart Grid*, vol. 5, no. 3, May 2014, pp. 1196-1209.
- [30] M. Pirnia (Student), **C. A. Cañizares**, and K. Bhattacharya, “Revisiting the Power Flow Problem Based on a Mixed Complementarity Formulation Approach,” *IET Generation, Transmission & Distribution*, vol. 7, no. 11, November 2013, pp. 1194-1201.
- [31] J. C. Muñoz (Student), **C. A. Cañizares**, K. Bhattacharya, and A. Vaccaro (Visitor), “An Affine Arithmetic Based Method for Voltage Stability Assessment of Power Systems with Intermittent Generation Resources,” *IEEE Transactions on Power Systems*, vol. 28, no. 4, November 2013, pp. 4475-4487.
- [32] A. Vaccaro (Visitor), **C. A. Cañizares**, and K. A. Bhattacharya, “A Range Arithmetic-Based Optimization Model for Power Flow Analysis Under Interval Uncertainty,” *IEEE Transactions on Power Systems*, vol. 28, no. 2, May 2013, pp. 1179-1186.
- [33] M. Arriaga (Student), **C. A. Cañizares**, and M. Kazerani, “Renewable Energy Alternatives for Remote Communities in Northern Ontario, Canada,” *IEEE Transactions on Sustainable Energy*, vol. 4, no. 3, July 2013, pp. 661-670.
- [34] B. Tamimi (PDF), **C. A. Cañizares**, and K. Bhattacharya, “System Stability Impact of Large-scale and Distributed Solar Photovoltaic Generation: The Case of Ontario, Canada,” *IEEE Transactions on Sustainable Energy*, vol. 4, no. 3, July 2013, pp. 680-688.
- [35] I. Das (Student), K. Bhattacharya, **C. A. Cañizares**, and W. Muneer (Student), “Sensitivity-Indices Based Risk Assessment of Large Scale Solar PV Investment Projects,” *IEEE Transactions on Sustainable Energy*, vol. 4, no. 2, April 2013, pp. 370-378.
- [36] M. Chehreghani (Student), S. A. Hashmi (Student), H. Hassen (Student), **C. A. Cañizares**, and K. Bhattacharya, “Optimal Operation of Residential Energy Hubs in Smart Grids,” *IEEE Transactions on Smart Grid*, vol. 3, no. 4, December 2012, pp. 1755-1766.
- [37] W. Muneer (Student), K. Bhattacharya, and **C. Cañizares**, “Large-scale Solar PV Investment Models, Tools and Analysis: The Ontario Case,” *IEEE Transactions on Power Systems*, vol. 26, no. 4, November 2011, pp. 2547-2555.
- [38] A. Hajimiragha (Student), **C. A. Cañizares**, M. W. Fowler, S. Moazeni, and A. Elkamel, “A Robust Optimization Approach for Planning the Transition to Plug-in Hybrid Electric Vehicles,” *IEEE Transactions on Power Systems*, vol. 26, no. 4, November 2011, pp. 2264-2274.
- [39] C. Buccella, **C. A. Cañizares**, C. Cecati, F. Muzi, and P. Siano, “Guest Editorial,” *IEEE Transactions on Industrial Electronics*, vol. 58, no. 10, October 2011, pp. 4483-4486.
- [40] S. Paudyal (Student), **C. A. Cañizares**, and K. Bhattacharya, “Optimal Operation of Distribution Feeders in Smart Grids,” *IEEE Transactions on Industrial Electronics*, special section on “Methods and Systems for Smart Grids Optimization,” vol. 58, no. 10, October 2011, pp. 4495-4503.
- [41] A. Hajimiragha (Student), **C. A. Cañizares**, M. W. Fowler, S. Moazeni, A. Elkamel, and S. Wong, “Sustainable Convergence of Electricity and Transport Sectors in the Context of a Hydrogen Economy,” *International Journal of Hydrogen Energy*, vol. 36, no. 11, June 2011, pp. 6357-6375.

- [42] A. A. Sousa, G. L. Torres (Visitor), and **C. A. Cañizares**, “Robust Optimal Power Flow Solution Using Trust Region and Interior-Point Methods,” *IEEE Transactions on Power Systems*, vol. 26, no. 2, May 2011, pp. 487-499.
- [43] V. J. Gutierrez-Martinez (Student), **C. A. Cañizares**, C. R. Fuerte-Esquivel, A. Pizano-Martinez, and X. Gu, “Neural-Network Security-Boundary Constrained Optimal Power Flow,” *IEEE Transactions on Power Systems*, vol. 26, no. 1, January 2011, pp. 63-72.
- [44] J. M. Gonzalez (Student), **C. A. Cañizares**, and J. M. Ramirez, “Stability Modeling and Comparative Study of Series Vectorial Compensators,” *IEEE Transactions on Power Delivery*, vol. 25, no. 2, April 2010, pp. 1093-1103.
- [45] A. Vaccaro (Visitor), **C. A. Cañizares**, and D. Villacci, “An Affine Arithmetic Based Methodology for Reliable Power Flow Analysis in the Presence of Data Uncertainty,” *IEEE Transactions on Power Systems*, vol. 25, no. 2, February 2010, pp. 624-632.
- [46] B. Tamimi (Student), **C. A. Cañizares**, and S. Vaez-Zadeh, “Effect of Reactive Power Limit Modeling on Maximum System Loading and Active and Reactive Power Markets,” *IEEE Transactions on Power Systems*, vol. 25, no. 2, February 2010, pp. 1106-1116.
- [47] H. Zareipour (Student), K. Bhattacharya, and **C. A. Cañizares**, “Economic Benefits of Improving Electricity Market Price Forecasting Accuracy: A Demand-side Analysis,” *IEEE Transactions on Power Systems*, vol. 25, no. 1, February 2010, pp. 254-262.
- [48] **C. A. Cañizares**, K. Bhattacharya, I. El-Samahy (Student), H. Haghighat (PDF), J. Pan, and C. Tan, “Re-defining the Reactive Power Dispatch Problem in the Context of Competitive Electricity Markets,” *IET Generation, Transmission and Distribution*, special issue on “Markets and Economics in Power Systems,” **invited paper**, vol. 4, no. 2, February 2010, pp. 162-177.
- [49] A. Hajimiragha (Student), **C. A. Cañizares**, M. Fowler, and A. Elkamel, “Optimal Transition to Plug-in Hybrid Vehicles in Ontario-Canada Considering the Electricity Grid Limitations,” *IEEE Transactions on Industrial Electronics*, special issue on “Plug-in Hybrid Electric Vehicles”, vol. 57, no. 2, February 2010, pp. 690-701.
- [50] A. Hajimiragha (Student), M. Fowler, and **C. A. Cañizares**, “Hydrogen Economy Transition in Ontario-Canada Considering the Electricity Grid Constraints,” *International Journal of Hydrogen Energy*, vol. 34, no. 13, July 2009, pp. 5275-5293.
- [51] M. B. Liu (Visitor), **C. A. Cañizares**, and W. Huang, “Reactive Power and Voltage Control in Distribution Systems with Limited Switching Operations,” *IEEE Transactions on Power Systems*, vol. 24, no. 2, May 2009, pp. 889-899.
- [52] R. J. Avalos (Student), **C. A. Cañizares**, F. Milano, and A. Conejo, “Equivalency of Continuation and Optimization Methods to Determine Saddle-node and Limit-induced Bifurcations in Power Systems,” *IEEE Transactions on Circuits and Systems I*, vol. 56, no. 1, January 2009, pp. 210-223.
- [53] G. Taljan (Student), M. Fowler, **C. A. Cañizares**, and G. Verbic, “Hydrogen Storage for Mixed Wind-Nuclear Power Plants in the Context of a Hydrogen Economy,” *International Journal of Hydrogen Energy*, vol. 33, no. 17, September 2008, pp. 4463-4475.
- [54] G. Taljan (Student), **C. A. Cañizares**, M. Fowler, and G. Verbic, “The Feasibility of Hydrogen Storage for Mixed Wind-Nuclear Power Plants,” *IEEE Transactions on Power Systems*, vol. 23, no. 3, August 2008, pp. 1507-1518. Highlighted on a **news report at PhysOrg.com**, August 6, 2008 (<http://www.physorg.com/news137238782.html>).
- [55] H. Ghasemi (Student) and **C. A. Cañizares**, “Confidence Intervals Estimation in the Identification of Electromechanical Modes from Ambient Noise,” *IEEE Transactions on Power Systems*, vol. 23, no. 2, May 2008, pp. 641-648.
- [56] I. El-Samahy (Student), K. Bhattacharya, **C. A. Cañizares**, M. Anjos, and J. Pan, “A Procurement Market Model for Reactive Power Services Considering System Security,” *IEEE Transactions on*

- Power Systems*, vol. 23, no. 1, February 2008, pp. 137-149. **Invited for presentation** at the Panel “Reactive Power Management and Payment Mechanisms in Competitive Electricity Markets,” IEEE-PES General Meeting 2008, Pittsburgh, PA, June 2008.
- [57] S. K. M. Kodsí (Student) and **C. A. Cañizares**, “Application of a Stability-constrained Optimal Power Flow to Tuning of Oscillation Controls in Competitive Electricity Markets,” *IEEE Transactions on Power Systems*, vol. 22, no. 4, November 2007, pp. 1944-1954.
- [58] H. Zareipour (Student), **C. A. Cañizares**, and K. Bhattacharya, “The Ontario Competitive Electricity Market: Overview, Experiences, and Lessons,” *IEEE Transactions on Power Systems*, vol. 22, no. 4, November 2007, pp. 1782-1793.
- [59] H. Zareipour (Student), K. Bhattacharya, and **C. A. Cañizares**, “Electricity Market Price Volatility: The Case of Ontario,” *Energy Policy*, vol. 35, no. 9, September 2007, pp. 4739-4748.
- [60] X. Gu (Visitor) and **C. A. Cañizares**, “Fast Prediction of Loadability Margins Using Neural Networks to Approximate Security Boundaries of Power Systems,” *IET Generation, Transmission and Distribution*, vol. 1, no. 3, May 2007, pp. 466-475.
- [61] H. Ghasemi (Student) and **C. A. Cañizares**, “On-Line Damping Torque Estimation and Oscillatory Stability Margin Prediction,” *IEEE Transactions on Power Systems*, vol. 22, no. 2, May 2007, pp. 667-674. **Invited for presentation** at the Panel “Advanced Stability Controls,” IEEE-PES General Meeting, Tampa, FL, June 2007.
- [62] G. Verbic (PDF) and **C. A. Cañizares**, “Probabilistic Optimal Power Flow in Electricity Markets Based on a Two-Point Estimate Method,” *IEEE Transactions on Power Systems*, vol. 21, no. 4, November 2006, pp. 1883-1893.
- [63] H. Zareipour (Student), **C. A. Cañizares**, K. Bhattacharya, and J. Thomson, “Application of Public-Domain Market Information to Forecast Ontario’s Wholesale Electricity Prices,” *IEEE Transactions on Power Systems*, vol. 21, no. 4, November 2006, pp. 1707-1717.
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- [65] H. Ghasemi (Student), **C. A. Cañizares**, and A. Moshref, “Oscillatory Stability Limit Prediction Using Stochastic Subspace Identification,” *IEEE Transactions on Power Systems*, vol. 21, no. 2, May 2006, pp. 736-745.
- [66] **C. A. Cañizares**, E. Uzunovic (Student), and J. Reeve, “Transient Stability and Power Flow Models of the Unified Power Flow Controller for Various Control Strategies,” *International Journal of Energy Technology and Policy*, **invited paper**, vol. 4, no. 3-4, 2006, pp. 349-378.
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- [280] **C. A. Cañizares**, discussion to “A Thyristor-controlled Series Compensator Model for the Power Flow Solution of Practical Power Networks” by C. R. Fuerte-Esquivel et al., *IEEE Transactions on Power Systems*, vol. 18, no. 3, August 2003, pp. 1218.
- [281] E. Uzunovic (Student) and **C. A. Cañizares**, discussion to “Application of Unified Power Flow Controller in Interconnected Power Systems—Modeling, Interface, Control Strategy and Case Study” by Z. Huang et al., *IEEE Transactions on Power Systems*, vol. 15, no. 4, November 2000, pp. 1461.
- [282] **C. A. Cañizares**, discussion to “Voltage Stability Analysis of Multi-infeed HVDC Systems” by D. L. Hau Aik et al., *IEEE Transactions on Power Delivery*, vol. 12, no. 3, July 1997, pp. 1318.
- [283] **C. A. Cañizares**, discussion to “A Simple Approach to Voltage Stability Assessment in Radial Networks” by F. Gubina et al., *IEEE Transactions on Power Systems*, vol. 12, no. 3, August 1997, pp. 1128.
- [284] **C. A. Cañizares**, discussion to “Maximum Loadability of Power Systems Using Interior Point Non-linear Optimization Methods” by G. D. Irisarri et al., *IEEE Transactions on Power Systems*, vol. 12, no. 1, February 1997, pp. 172.
- [285] **C. A. Cañizares**, discussion to “Sensitivity of the Loading Margin to Voltage Collapse with Respect to Arbitrary Parameters” by S. Green et al., *IEEE Transactions on Power Systems*, vol. 12, no. 1, February 1997, pp. 272.
- [286] **C. A. Cañizares**, discussion to “Determination of Needed FACTS Controllers that Increase Asset Utilization of Power Systems” by L. A. S. Pilotto et al., *IEEE Transactions on Power Delivery*, vol. 12, no. 1, January 1997, pp. 371.

- [287] **C. A. Cañizares**, discussion to “On-line Detection of Power System Small Disturbance Voltage Instability” by L. Wang et al., *IEEE Transactions on Power Systems*, vol. 11, no. 3, August 1996, pp. 1313
- [288] **C. A. Cañizares**, discussion to “Towards the Development of a Systematic Approach for Voltage Stability Assessment of Large-scale Power Systems” by B. Gao et al., *IEEE Transactions on Power Systems*, vol. 11, no. 3, August 1996, pp. 1324.
- [289] **C. A. Cañizares**, discussion to “A Neural Network-based Method for Voltage Security Monitoring” by M. La Scala et al., *IEEE Transactions on Power Systems*, vol. 11, no. 3, August 1996, pp. 1341.
- [290] **C. A. Cañizares**, discussion to “Application of an Optimization Method for Determining the Reactive Margin from Voltage Collapse in Reactive Power Planning” by C. J. Parker et al., *IEEE Transactions on Power Systems*, vol. 11, no. 3, August 1996, pp. 1481.
- [291] **C. A. Cañizares**, discussion to “Effective Calculation of Power System Low-voltage Solutions” by T. Overbye et al., *IEEE Transactions on Power Systems*, vol. 11, no. 1, February 1996, pp. 82.
- [292] **C. A. Cañizares**, discussion to “A Piecewise Global Small-disturbance Voltage-stability Analysis of Structure-preserving Power System Models” by B. Lee et al., *IEEE Transactions on Power Systems*, vol. 10, no. 4, November 1995, pp. 1971.
- [293] **C. A. Cañizares** and A. Z. de Souza (Student), discussion to “Estimating the Loading Limit Margin Taking Into Account Voltage Collapse Areas” by J. Barquin et al., *IEEE Transactions on Power Systems*, vol. 10, no. 4, November 1995, pp. 1962.
- [294] **C. A. Cañizares**, discussion to “A comprehensive Analysis of Mid-term Voltage Stability” by T. Van Cutsem et al., *IEEE Transactions on Power Systems*, vol. 10, no. 3, August 1995, pp. 1182.
- [295] **C. A. Cañizares**, discussion to “Voltage Stability and Controllability Indices for Multimachine Power Systems” by C. D. Vournas, *IEEE Transactions on Power Systems*, vol. 10, no. 3, August 1995, pp. 1194.
- [296] **C. A. Cañizares** and F. L. Alvarado, discussion to “CPFLOW: A Practical Tool for Tracing Power System Steady-State Stationary Behavior Due to Load and Generation Variations” by H. D. Chiang et al., *IEEE Transactions on Power Systems*, vol. 10, no. 2, May 1995, pp. 634.
- [297] **C. A. Cañizares**, discussion to “A More Efficient Formulation for Computation of Maximum Loading Points in Electric Systems” by H. D. Chiang et al., *IEEE Transactions on Power Systems*, vol. 10, no. 2, May 1995, pp. 646.
- [298] **C. A. Cañizares**, discussion to “Incorporation of HVDC and SVC Models in the Northern State Power Co. (NSP) Network for On-line Implementation of Direct Transient Stability Assessment” by C. Jing et al., *IEEE Transactions on Power Systems*, vol. 10, no. 2, May 1995, pp. 906.
- [299] **C. A. Cañizares**, discussion to “New Methods for Computing a Saddle-Node Bifurcation Point for Voltage Stability Analysis” by J. Lu et al., *IEEE Transactions on Power Systems*, vol. 10, no. 2, May 1995, pp. 989.
- [300] **C. A. Cañizares**, discussion to “Clarification of the BCU Method for Transient Stability Analysis” by A. Llamas et al., *IEEE Transactions on Power Systems*, February 1995, vol. 10, no. 1, pp. 219.
- [301] **C. A. Cañizares**, discussion to “Voltage Dependent Reactive Power Limits for Voltage Stability Studies” by P. A. Lof et al., *IEEE Transactions on Power Systems*, vol. 10, no. 11, February 1995, pp. 228.
- [302] F. L. Alvarado and **C. A. Cañizares**, discussion to “Voltage Stability Evaluation Using Modal Analysis” by B. Gao et al., *IEEE Transactions on Power Systems*, vol. 7, no. 4, November 1992, pp. 1542.
- [303] **C. A. Cañizares**, discussion to “Dynamic Aspects of Voltage/Power Characteristics” by C. Rajagopalan et al., *IEEE Transactions on Power Systems*, vol. 7, no. 3, August 1992, pp. 1000.

- [304] **C. A. Cañizares**, discussion to “Newly Developed Voltage Security Monitoring System” by M. Suzuki et al., *IEEE Transactions on Power Systems*, vol. 7, no. 3, August 1992, pp. 973.
- [305] F. L. Alvarado and **C. A. Cañizares**, discussion to “Calculation of Critical Loading Condition with Nose Curve Using Homotopy Continuation Methods” by K. Iba et al., *IEEE Transactions on Power Systems*, vol. 6, no. 2, May 1991, pp. 593.
- [306] F. L. Alvarado and **C. A. Cañizares**, discussion to “A Method to Compute Reactive Power Margins with respect to Voltage Collapse” by T. Van Cutsem, *IEEE Transactions on Power Systems*, vol. 6, no. 1, February 1991, pp. 156.

c. Awards, Fellowships, and Scholarships:

No.	TITLE & INSTITUTION	AWARD	DATES
21	IEEE-PES Outstanding Power Engineering Educator Award for fostering partnerships between industry and power engineering education and for developing innovative online power engineering programs	Plaque, \$1,000 USD, and \$1,000 travel allowance	July 2017
20	IEEE-PES Technical Committee Working Group Recognition Award (TF Member), Power System Dynamic Performance Committee	Diploma	July 2016
19	IEEE Canada Electric Power Medal for outstanding contributions to power engineering research and education	Silver medal, plaque, and travel allowance	May 2016
18	IEEE-PES Technical Committee Working Group Recognition Award (TF Chair), Power System Dynamic Performance Committee	Framed Diploma	July 2015
17	IEEE-PES PowerTech Conference A. Papadias Best Student Paper Award	Diploma, plaque, €1,000	August 2015
16	IEEE-PES Technical Committee Working Group Recognition Award (WG Member), Power System Dynamic Performance Committee	Diploma	July 2013
15	Fellow of the Canadian Academy of Engineering for outstanding contributions to power engineering research	Diploma and pin	June 2013
14	Fellow of the Royal Society of Canada for outstanding contributions to power engineering research	Diploma and pin	Nov. 2012
13	IEEE-PES Power System Dynamic Performance Committee Certificate of Appreciation for Outstanding Leadership	Certificate	July 2012
12	Outstanding Performance Award, Faculty of Engineering, University of Waterloo	\$3,434 CD salary increase	May 2012
11	IEEE-PES Technical Council Working Group Recognition Award for Outstanding Technical Report (WG Member)	Framed Diploma	July 2009
10	Outstanding Performance Award, Faculty of Engineering, University of Waterloo.	\$3,334 CD salary increase	May 2009
9	IEEE-PES Technical Committee Working Group Recognition Award (WG Member), Power System Dynamic Performance Committee	Diploma	July 2007
8	IEEE Fellow for outstanding contributions to voltage stability of power systems	Framed Diploma and pin	Jan. 2007
7	IEEE-PES Technical Council Working Group Recognition Award for Outstanding Technical Report (WG Chair)	Plaque	June 2005
6	IEEE-PES Technical Committee Working Group Recognition Award (WG Chair), Power System Dynamic Performance Committee	Framed Diploma	June 2005

5	Outstanding Performance Award, Faculty of Engineering, University of Waterloo	\$2,930 CD salary increase	May 2005
4	Distinguished Performance Award, Faculty of Engineering, University of Waterloo	\$2,500 CD	Feb. 2003
3	OAS Scholarship, Organization of American States, Washington, DC, USA	\$10,000 USD/year plus travel	Sept. 1989-Aug. 1991
2	EPN Scholarship, Escuela Politécnica Nacional (EPN), Quito, Ecuador	~\$6,000 USD/year	Aug. 1986-Nov. 1989
1	Fulbright-Laspau Scholarship, Institute of International Education, New York, NY, USA	\$8,500 USD/year plus travel	Aug. 1986-Aug. 1988

Grants and Contracts:

No.	HOLDERS	TITLE & INSTITUTION	CASH & IN-KIND (CD)	CASH & SHARE		DATES
				(CD)	(%)	
50	C. Cañizares (PI) , K. Bhattacharya, P. Su, E. Nasr, and S. Hohmann	“Thermal Energy Storage for Integration of Renewable Energy Sources in Microgrids,” International Energy Agency (IEA), Tech. Collab. Programme on DHC, Germany.	\$444,417	\$265,180	100	Applied Feb. 2017
49	C. Cañizares	“A Grid of Microgrids,” NSERC, Discovery Grant, Canada.	\$185,000	\$185,000	100	Apr. 2017-Mar. 2022
48	C. Cañizares	“Feasibility Study of Variable Speed Generators (VSG) for Canadian Arctic Communities,” Innovus Power, Research Contract, Canada.	\$16,500	\$16,500	100	Apr. 2017-May 2017
47	Zhengyu Lin (PM) and co-PIs from 9 institutions	“Research, Demonstration, and Commercialization of DC Microgrid Technologies” (RDC2MT), Aston Univ. and 8 other partners including Waterloo, Marie Skłodowska-Curie Research and Innovation Staff Exchange, European Commission.	\$638,654	0	0	Feb. 2017- Jan. 2021
46	M. Dusseault (PI) and 8 others (co-PIs)	“Compressed Air Energy Storage in Salt Caverns”, NSERC-OICE-AITF-Waterloo-6 other partners, CRD Grant, Canada.	\$1,380,796	\$1,024,096	9	Sept. 2016-Aug. 2018

45	C. Cañizares	“Feasibility Studies of Pilot Renewable Energy Deployment in Canadian Arctic,” World Wildlife Fund (WWF)-Canada, Contract, Canada.	\$61,800	\$52,800	100	Aug. 2016-Jan. 2017
44	C. Cañizares	“Pre-feasibility Studies of Pilot Renewable Energy Deployment in Canadian Arctic,” World Wildlife Fund (WWF)-Canada, Contract, Canada.	\$48,380	\$39,380	100	Sept. 2015-July 2016
43	B. Venkatesh (PI) and 4 other (co-PIs)	“NSERC Energy Storage Technology (NEST) Network”, NSERC-Ryerson-14 other partners, Strategic Network Grant, Canada.	\$11,587,213	\$421,500	5	June 2015-May 2020
42	B. Oliphant (PI) and several others	“Integrated Energy Management and Monitoring System,” Canada-Israel Industrial Research and Development Fund, Guelph Municipal Holding Inc.-Rafael Advance Defense Systems Ltd- Magna International-Ellisdon Construction-Sheridan College-Univ. Waterloo-Univ. Guelph, Research Grant, Canada.	\$4,903,000	0	0	June 2015-May 2017
41	B. Lu (PI) and several others	“CSI Renewable Energy (RE) Microgrid Test Centre,” Ontario Ministry of Energy-Canadian Solar-Univ. Waterloo-Guelph Hydro-Electrovaya-Kinetrics, Smart Grid Fund, Canada.	\$6,290,982	0	0	Jan. 2014-Sept. 2016
40	M. Sedighy (co-PI), C. Cañizares (co-PI), and several others	“Development of a Utility Grade Controller for Remote Microgrids with High Penetration of Renewable Generation,” NRCAN-Hatch-Hydro One-KLFN-UofT-Wenvor, ecoEnergyII, Research Grant, Canada.	\$3,096,733	\$600,000	30	Jan. 2013-Mar. 2016
39	C. Rosenberg (PI) and 3 others (co-PIs).	“Impact of Electric Vehicles on the Grid,” NSERC-Hydro One-IBM-GITS, CRD Grant, Canada.	\$1,156,155	\$193,000	30	Sept. 2012-Aug. 2016
38	C. Cañizares (PI), I. Rowlands (co-PI), G. Ellis (co-PI), and 2 others.	“The Energy Hub Management System II: Empowering LDCs to Enable the Smart Grid,” OCE-Hydro One-Energent-Milton Hydro, Special Energy Fund, Canada.	\$1,354,476	\$500,000	80	May 2012-Apr. 2016

37	C. Cañizares	“Techniques and Tools for Power System Operation and Control in the New Smart Grid Environment,” NSERC, Discovery Grant, Canada.	\$165,000	\$165,000	100	Apr. 2012-Mar. 2017
36	H. Farhangi (PI) and several others	“NSERC Smart Microgrid Network,” NSERC-28 partners, Strategic Network, Canada.	\$14,118,280	\$162,000	4	May 2011-April 2016
35	A. Khajepour (PI) and 25 others	“Green Intelligent Transportation Systems (GITS),” ORF and various industry partners, Research Grant, Canada	\$24,000,000	\$90,000	1	Apr. 2010-Mar. 2015
34	C. Cañizares	“Using Smart Grid Technologies to Reduce Production Costs and Increase Access to Renewable Energy in Power Systems,” NSERC-Hydro One, CRD Grant, Canada	\$318,500	\$124,500	100	Oct. 2011-Dec. 2014
33	C. Foster (PI) and 4 others	“Industrial Voltage Optimization,” OPA-Flakeboard-PCS UtiliData, Conservation Fund, Research Contract, Canada.	\$739,448	\$210,470	40	Jan. 2012-Oct. 2014
32	K. Bhattacharya (PI) and 4 others	“Operation, Communications and Information Management of Smart Electricity Grids,” NSERC-Hydro One-IBM-ABB, Strategic Grant, Canada.	\$1,623,394	\$324,679	50	Jan. 2011-Sept. 2014
31	A. Vannelli and M. Anjos (PIs), and 15 others	“High Performance Optimization: Theory, Algorithm Design and Engineering Applications,” MITACS, Research Grant, Canada.	\$300,000	\$60,000	20	Apr. 2010-Mar. 2012
30	R. Varma and M. Salama (PIs) and 14 others	“Large-Scale Photovoltaic Solar Power Integration in Transmission and Distribution Networks,” OCE-Hydro One-Opti Solar-London Hydro, Special Energy Fund, Research Grant, Canada.	\$6,278,560	\$147,264	5	Sept. 2009-Aug. 2012
29	C. Cañizares (PI), J. Nathwani (co-PI), and 6 others	“Development of Advanced Smart Grid Systems for integration of PHEVs,” OCE-OPG-Hydro One-OPA-NRCAN, Research Grant, Canada.	\$54,000	\$6,750	13	June 2009-Apr. 2010
28	C. Cañizares (PI) and K. Bhattacharya	“Operation of Power Systems with High DG Penetration,” ABB-MITACS, Contract, Canada.	\$130,600	\$65,300	50	Apr. 2009-Mar. 2011
27	C. Cañizares	Support for grad students from MEng Power Eng. Program, University of Waterloo, Canada.	\$173,280	\$173,280	100	Nov. 2008-today

26	I. Rowlands (PI), C. Cañizares (co-PI), G. Ellis (co-PI), and 2 others.	“The Energy Hub Management System: Enabling and Empowering Energy Managers Through Increased Information and Control,” OCE-Energent-Hydro One-Milton Hydro, Special Energy Fund, Research Grant, Canada.	\$3,753,600	\$500,000	50	June 2008-Dec. 2012
25	T. Terlaky and A. Vannelli (PIs), and 12 others	“High Performance Optimization: Theory, Algorithm Design and Engineering Applications,” MITACS, Research Grant, Canada.	\$295,000	\$50,000	15	Apr. 2008-Mar. 2010
24	C. Cañizares (PI) and K. Bhattacharya	“Improving Technologies for Deployment of Energy Conservation and Demand Management Programs,” OCE-Energent, Research Grant, Canada.	\$82,978	\$41,489	50	Nov. 2007-Feb. 2009
23	C. Cañizares	“Operation of Power Systems with Sustainable Energy Resources in Competitive Electricity Markets,” NSERC, Discovery Grant, Canada. (One of the few grant “increases” in 2007; the majority were reduced about 12% due to budgetary constraints.)	\$165,400	\$165,400	100	Apr. 2007-Mar. 2012
22	C. Cañizares (PI) and K. Bhattacharya	“Reactive Power Ancillary Service Markets and Dispatch: Design and Analysis,” OCE-ABB-OPA, Research Grant, Canada.	\$99,468	\$49,734	50	Nov. 2006-Oct. 2008
21	C. A. Cañizares	“Representing and Pricing Power System Security in Electricity Markets,” Invited Professor Grant, Ministry of Education, Spain.	\$18,000	\$18,000	100	Nov. 2006-Feb. 2007
20	C. A. Cañizares	Invited Professor Grant, EE Dept., Swiss Federal Institute of Technology (ETH), Zurich, Switzerland.	\$10,000	\$10,000	100	Sept.-Oct. 2006
19	T. Terlaky (PI) and 12 others	“High Performance Optimization and Applications,” MITACS, Canada.	\$290,000	\$22,500	7	Apr. 2006-Mar. 2008
18	M. Fowler (PI) and 3 others	“Bruce Power Hydrogen Economy Research and Development Initiative,” OCE-Bruce Power, Research Grant, Canada.	\$150,000	\$29,000	20	Mar. 2006-Apr. 2008
17	C. A. Cañizares (PI) and K. Bhattacharya	“Reactive Power Dispatch in Electricity Markets,” ABB Inc., Contract, US.	\$27,500	\$13,750	50	Jan.2006-Dec. 2006

16	C. A. Cañizares (PI) and K. Bhattacharya	“Reactive Power Ancillary Service Markets: Design and Analysis,” NSERC, CRD Grant, Canada.	\$26,520	\$13,260	50	Aug. 2005-July 2008
15	C. A. Cañizares (PI) and K. Bhattacharya	“Reactive Power Ancillary Service Market Design and Analysis,” ABB Inc., Contract, US.	\$33,204	\$16,602	50	Jan.2005- Dec. 2005
14	C. A. Cañizares (PI), K. Bhattacharya, and H. Zareipour (Student)	“Price Forecasting and Optimal Energy Scheduling,” NRGGen Inc., Contract, Canada.	\$24,624	\$12,312	50	Sept. 2004- Aug. 2005
13	C. A. Cañizares (PI) and H. Chen (Student)	“Research White Paper for Electrical Storage Systems,” NRGGen Inc., Contract, Canada.	\$10,400	\$10,400	100	June 2003
12	C. A. Cañizares	“Electricity Markets Simulation Lab,” NSERC and E&CE-Waterloo, Equipment Grant, Canada.	\$21,160	\$21,160	100	Apr. 2003- Mar. 2004
11	C. A. Cañizares	“Power System Stability and Controls and their Costs in Competitive Electricity Markets,” NSERC, Discovery Grant, Canada.	\$164,900	\$164,900	100	Apr. 2002- Mar. 2007
10	C. A. Cañizares	“Uses of FACTS and their Influence in Automatic Voltage Control in Networks with Secondary Voltage Control,” CESI and ENEL Ricerca, Contract, Italy.	\$30,000	\$30,000	100	Sept. 1999-Jan. 2001
9	M. Salama (PI), M. Kazerani, and C. A. Cañizares	“Development of High-Voltage Power Supply (HVPS) for Aerospace Applications,” Allied Signals and Honeywell Inc., Contract, Canada	\$60,000	\$10,000	15	Jan. 1999- Dec. 2001
8	C. A. Cañizares	“Modeling, Simulation and Stability Analysis of Power Networks with FACTS in an Open Electricity Market,” NSERC, Discovery Grant, Canada.	\$104,695	\$104,695	100	Apr. 1998- Mar. 2002
7	C. A. Cañizares (PI), V. H. Quintana, J. Reeve, A. Singh, and M. Kazerani	“Multiprocessor Computer Network for Power Systems Modeling and Simulation,” NSERC and E&CE-Waterloo, Equipment Grant, Canada	\$54,564	\$54,564	100	April 1998- Mar. 1999
6	C. A. Cañizares	“Bifurcation Analysis of AC DC Power Systems,” NSERC, Operating Grant, Canada	\$72,000	\$72,000	100	Apr. 1994- Mar. 1998

5	C. A. Cañizares	“Comparative Study of MAPLE, MATLAB and EES as Teaching Aids for Electrical Engineering Courses,” TRACE Learning Technologies Research Grant, Univ. Waterloo.	\$7,000	\$7,000	100	Apr. 1994- Mar. 1995
4	C. A. Cañizares	President’s NSERC, Univ. Waterloo.	\$2,187	\$2,187	100	Apr. 1994- Mar. 1995
3	C. A. Cañizares	ICR Equipment Grant, Univ. Waterloo.	\$8,000	\$8,000	100	Jan. 1994
2	C. A. Cañizares	President’s NSERC, Univ. Waterloo.	\$8,958	\$8,958	100	Sept. 1993- April 1994
1	C. A. Cañizares	E&CE Dept. Start-up Grant, Univ. Waterloo.	\$5,000	\$5,000	100	Sept. 1993-Apr. 1994
TOTALS			\$84,217,126	\$5,321,014		

e. Invited Keynote Speeches, Presentations, and Seminars: 156

1. “Replacing Diesel Generation with Renewable Sources in Arctic Communities,” presentation, WISE Energy Day, University of Waterloo, March 30, 2017.
2. “Remote Microgrids,” presentation, University of British Columbia, Vancouver, BC, December 16, 2016.
3. “Electrical Energy needs for Canadian Remote Communities,” presentation, IAGT Workshop, Montreal, October 18, 2016.
4. “Remote Microgrids,” keynote speech, IEEE ETCM, Guayaquil, Ecuador, October 12, 2016.
5. “Trends in Microgrid Control,” lecture, IEEE PES Technical Webinar Series, September 27, 2016.
6. “Energy Management Systems for Microgrids,” keynote speech, IEEE T&D Latin America, Morelia, Mexico, September 22, 2016.
7. “Renewable Energy opportunities in Nunavut,” presentation, WWF Renewable Energy Summit: Fueling change in Nunavut, Iqaluit, NU, September 15, 2016.
8. “The Energy Hub Management System (EHMS),” keynote speech, PhD Program Inauguration, Universidad Autónoma de Occidente, Cali, Colombia, August 11, 2016.
9. “Remote Microgrids,” lecture, IEEE PES EPN Student Chapter, Escuela Politécnica Nacional, Quito, Ecuador, August 4, 2016.
10. “The Energy Hub Management System (EHMS),” presentation, Göran Andersson’s Farewell Event, ETH, Zurich, Switzerland, June 19, 2016.
11. “Power System Components and Modeling,” PhD course, Escuela Politécnica Nacional, Quito, Ecuador, December 14-18, 2015.
12. “Microgrid Research at Waterloo,” lecture, Karlsruhe Institute of Technology (KIT), Germany, November 12, 2015.
13. “Energy Management Systems for Microgrids,” keynote speech, International Symposium on Energy System Optimization, Heidelberg, Germany, November 9, 2015.
14. “Overview of Remote Microgrid Research at Waterloo,” keynote speech, IEEE International Autumn Meeting on Power, Electronics and Computing (ROPEC), Ixtapa, Mexico, November 5, 2015.
15. “Renewable Energy Integration Issues and Approach at Remote Microgrids,” presentation, Panel “Arctic Renewable Energy: Alternatives for peoples and the environment”, Arctic Circle Assembly, Reykjavik, Iceland, October 17, 2015.
16. “Microgrid Stability and Control Issues,” presentation, University of Chile, Santiago, October 8, 2015.
17. “Overview of Remote Microgrid Research at Waterloo,” presentation, Catholic University of Chile, Santiago, October 7, 2015.
18. “Microgrid Stability and Control Issues,” presentation, University of Waterloo, October 2, 2015.
19. “Overview of Remote Microgrid Research at Waterloo,” keynote speech, IEEE International Conference on Smart Energy Grid Engineering (SEGE), UOIT, Oshawa, ON, August 17, 2015.
20. “2016-2025 Quebec’s Energy Policy Electricity Expert Panel,” keynote speech, Ministry of Energy and Natural Resources, Shawinigan, Quebec, March 30, 2015.
21. “Microgrids Overview and Research,” keynote speech, IEET Conference, Cuenca, Ecuador, December 5, 2014.

22. "Overview of Microgrids," seminar, IEEE PES T&D Latin America, Medellin, Colombia, September 10, 2014.
23. "Analysis and Dispatch of Microgrids with Variable Generation," presentation, University of Chile, Santiago, Chile, June 18, 2014.
24. "Microgrid Overview and Research," presentation, Universidad de Sevilla, Spain, May 22, 2014.
25. "Smart PEV Charging Impact on Residential Distribution Systems," presentation, TRANSLOG, McMaster, May 14, 2014.
26. "Microgrids," online seminar, Universidad Pontificia Bolivariana, Medellin, Colombia, March 7, 2014.
27. "The Energy Hub Management System (EHMS)," online seminar, University of Seville, Spain, February 12, 2014.
28. "Operation, Control and Stability Issues Related to the Integration of Variable Renewable Resources in Power Grids," keynote speech, 2014 Energy Conference, Quito, Ecuador, January 30, 2014.
29. "The Energy Hub Management System (EHMS)," presentation, IEEE PES Chapter, Quito, Ecuador, December 20, 2013.
30. "Remote Microgrids in Canada," lecture, Design and Operation of Intelligent Microgrids Seminar, University of Chile, Santiago, Chile, December 18, 2013.
31. "Overview of Microgrids," lecture, Design and Operation of Intelligent Microgrids Seminar, University of Chile, Santiago, Chile, December 16, 2013.
32. "Training Smart Grid HQP," presentation, Smart Grids Seminar, CIEEPI, Quito, Ecuador, November 22, 2013.
33. "FACTS Overview and Applications," presentation, Smart Grids Seminar, CIEEPI, Quito, Ecuador, November 21, 2013.
34. "Smart Grid Research Projects Overview," presentation, Ingeniar 2013, Universidad Pontificia Bolivariana, Medellin, Colombia, October 2, 2013.
35. "Power System Stability," seminar, Universidad Pontificia Bolivariana, Medellin, Colombia, October 1, 2013.
36. "Remote Microgrids in Canada," presentation, Ingeniar, Universidad Pontificia Bolivariana, Medellin, Colombia, September 30, 2013.
37. "Operation, Control and Stability Issues Related to the Integration of Variable Renewable Resources in Power Grids," presentation, Universidad Nacional, Manizales, Colombia, September 27, 2013.
38. "Remote Microgrids in Canada," presentation, Universidad Nacional, Manizales, Colombia, September 27, 2013.
39. "Flexible AC Transmission Systems (FACTS) Overview and Applications," presentation, Congreso Internacional de Operación de Sistemas de Mercados de Energia (COSMER), Medellin, Colombia, September 25, 2013.
40. "Operation, Control and Stability Issues Related to the Integration of Variable Renewable Resources in Power Grids," presentation, Congreso Internacional de Operación de Sistemas de Mercados de Energia (COSMER), Medellin, Colombia, September 24, 2013.
41. "Remote Microgrids in Canada," Super Session "Electricity Supply to Rural and Remote Communities," IEEE PES GM, Vancouver, July 24, 2013.

42. "Dealing with Uncertainties in OPFs," Panel Session "Intelligent OPF in an Uncertain and Variable Environment," IEEE PES GM, Vancouver, July 23, 2013.
43. "Power System Stability and Wind and Solar Renewable Energy Integration," short course, Centro de Investigaciones y Pruebas Electromagneticas (CIPEL), Havana, Cuba, May 29, 2013.
44. "Remote Microgrids in Canada," keynote speech, Second Cuban Electrical Engineering Congress, La Habana, Cuba, November 26, 2012.
45. "Ontario's Remote Community Microgrids," presentation, workshop "Remote Community Microgrids," CanmetEnergy, NRCAN, Varennes, Quebec, September 27, 2012.
46. "Impact of Electric Vehicles on Electricity Grids," keynote speech, II Latin American and Caribbean Seminar of Electricity, Latin American Energy Organization (OLADE), San Jose, Costa Rica, September 5, 2012.
47. "The Energy Hub Management System (EHMS)," presentation, MOPTA symposium, Lehigh University, PA, USA, August 1, 2012.
48. "The Energy Hub Management System (EHMS)," presentation, symposium "Trends in Electrical Energy Grids," CINVESTAV, Guadalajara, Mexico, June 7-8, 2012.
49. "Optimal Electrical Energy Management of Water Plant Facilities," presentation, Energy Matter Summit, Toronto, May 28, 2012.
50. "Remote Microgrids in Canada," seminar, IEEE-PES Local Chapter, COPPE, Federal University of Rio de Janeiro, Brazil, May 24, 2012.
51. "Remote Microgrids in Canada," presentation, workshop "Challenges in the Development of Smart Micro-grids in Remote Areas," University of Chile, Santiago, Chile, April 13, 2012.
52. "Remote Microgrids in Canada," presentation, workshop "Potential of Renewable Energy Options in Africa: Importance of Mini-grid Energy Systems," ICS-UNIDO, Trieste, Italy, April 3-5, 2012.
53. "Optimization Applications in Competitive Smart Grids," seminar, University of Bari, Italy, March 29-April 2, 2012.
54. "Green Energy," presentation, Extended Learning Opportunities Group, Erin, ON, February 16, 2012.
55. "PEV Impact on Ontario's Grid," presentation, FISE-The International Electric Sector Trade Show, Medellin, Colombia, December 1, 2011.
56. "Energy Hub Management System (EHMS) Project," presentation, FISE-The International Electric Sector Trade Show, Medellin, Colombia, December 1, 2011.
57. "PEV Impact on Ontario's Grid," presentation, University of Toronto, November 22, 2011.
58. "Energy Hub Management System (EHMS) Project," presentation, PEO Future of Energy in Ontario Symposium, Oakville, November 12, 2011.
59. "Energy Hub Management System (EHMS) Project," presentation, University of Sannio, Benevento, Italy, June 1, 2011.
60. "Energy Hub Management System (EHMS) Project," presentation, ETH, Zurich, Switzerland, May 27, 2011.
61. "Energy Hub Management System (EHMS) Project," presentation, Politecnico Di Milano, Milan, Italy, May 25, 2011.

62. "Stability-constrained Optimal Power Flows and Their Applications to Electricity Markets," presentation, Smart Grids Seminar Series, Los Alamos National Laboratory, Los Alamos, New Mexico, December 14, 2010.
63. "Storing electricity as Hydrogen: Does it make sense?," presentation, CINVESTAV, Guadalajara, Mexico, June 11, 2010.
64. "Power System Analysis," seminar, ADEWA, Abu Dhabi, June 29-July 3, 2010.
65. "Power System Components and Modeling," seminar, ADEWA, Abu Dhabi, June 23-27, 2010.
66. "Storing electricity as Hydrogen: Does it make sense?," presentation, University of Ljubljana, Slovenia, December 17, 2009.
67. "Reactive Power Procurement and Dispatch in Competitive Electricity Markets," presentation, University of Chile, Santiago, Chile, December 9, 2009.
68. "Storing electricity as Hydrogen: Does it make sense?," keynote speech, Carnegie Mellon, Pittsburgh, US, September 4, 2009.
69. "Storing electricity as Hydrogen: Does it make sense?," presentation, Università degli Studi del Sannio, Benevento, Italy, July 10, 2009.
70. "Power Systems Stability Analysis," seminar, Politecnico di Milano, July 3-8, 2009.
71. "Storing electricity as Hydrogen: Does it make sense?," presentation, Politecnico di Milano, Italy, July 8, 2009.
72. "Storing electricity as Hydrogen: Does it make sense?," presentation, University of Cuenca, Ecuador, June 28, 2009.
73. "Storing electricity as Hydrogen: Does it make sense?," keynote speech, Energy and Environmental Systems Seminar Series, University of Calgary, April 20, 2009.
74. "On-line Oscillatory Instability Prediction and its Application to Power System Protection," presentation, School of Electric Power, South China University of Technology, Guangzhou, China, August 8, 2008.
75. "On-line Oscillatory Instability Prediction and its Application to Power System Protection," presentation, Department of Electric Power Engineering, North China Electric Power University, Baoding Campus, China, August 6, 2008.
76. "Voltage Stability Constrained OPFs and their Application to Market Clearing and Dispatch," presentation, School of Electrical and Electronic Engineering, North China Electric Power University, Beijing Campus, China, August 4, 2008.
77. "Power Systems' Research and the Future of Power Engineering," presentation, University of Cuenca, Ecuador, May 16, 2008.
78. "Power Systems' Modeling and Stability Analysis," seminar, University of Cuenca, Ecuador, May 12-19, 2008.
79. "Power Systems' Current and Future Research Issues," presentation, McGill University, Montreal, May 9, 2008.
80. "Power Systems' Modeling and Stability Analysis," seminar, University of Merida, Venezuela, April 28-May 1, 2008.
81. "Optimizing Integrated Energy Systems in a Hydrogen Economy," presentation, Sustainable Development in Communities Workshop and Exhibit, McMaster University, November 26, 2007.

82. "Hydrogen and Electrical Systems at Waterloo," presentation, Cleantech Research Lab Showcase, Toronto, October 24, 2007.
83. "Power System Analysis Techniques and Tools: Past, Present and Future," presentation, University of Calgary, October 19, 2007.
84. "Power Systems Research and the Future of Power Engineering," keynote speech, University-Industry Dinner, University of Calgary, October 18, 2007.
85. "Stability-Constrained OPFs and their Applications in Energy Auctions," presentation, University of Calgary, October 18, 2007.
86. "Power System Analysis Techniques and Tools: Past, Present and Future," keynote speech, Italian Power Engineering Research Group Meeting, Caserta, Italy, September 29, 2007.
87. "Stability-Constrained OPFs and their Applications in Energy Auctions," presentation, Politecnico di Milano, Milan, Italy, September 28, 2007.
88. "Power System Stability and Blackouts," seminar, Federal University, Itajubá, Brazil, August 27-29, 2007.
89. "The Causes Behind the Most Significant Blackouts in History," presentation, University of Waterloo, Summer Series Lectures, IEEE Waterloo Student Branch, May 16, 2007.
90. "Power System Stability and Blackouts," presentation, Tercer Congreso Internacional de Ingenierías Eléctrica y Electrónica (3CIIE E), Bogotá, Colombia, March 15-17, 2007.
91. "Simulation, Modeling and Analysis of FACTS Controllers," keynote speech, Tercer Congreso Internacional de Ingenierías Eléctrica y Electrónica (3CIIE E), Bogotá, Colombia, March 15, 2007.
92. "Power System Stability and Blackouts," presentation, University of Seville, Seville, Spain, February 27, 2007.
93. "FACTS," seminar, University of Seville, Seville, Spain, February 12 and 19, 2007.
94. "Power System Stability and Blackouts," presentation, University of Castilla la Mancha, Ciudad Real, Spain, January 11, 2007.
95. "Power System Stability and Blackouts," seminar, Jornadas Ing. Eléctrica y Electrónica (JIEE), Quito, Ecuador, November 22-24, 2006.
96. "Voltage Stability," seminar, University of Tehran, November 14, 2006.
97. "A Detailed Analysis of Blackouts," seminar, International Power System Conference, Tehran, Iran, November 14, 2006.
98. "The 2003 North American North-East and Italian Blackouts," keynote speech, International Power System Conference, Tehran, Iran, November 13, 2006.
99. "Pricing Power System Controllers in Competitive Electricity Markets," presentation, University of Ljubljana, Slovenia, October 4, 2006.
100. "Pricing Power System Controllers in Competitive Electricity Markets," presentation, ABB Corporate Research, Baden, Switzerland, September 29, 2006.
101. "Power System Stability II," seminar, Escuela Politécnica Nacional, Quito, Ecuador, July 17-22, 2006.
102. "Optimal Energy Management Considering Uncertain Energy Price Forecasts," presentation, Advancing Energy Sustainability in Ontario and Beyond, University of Waterloo, May 9, 2006.
103. "Power System Stability I," seminar, Escuela Politécnica Nacional, Quito, Ecuador, April 17-22, 2006.

104. "Reactive Power Dispatch in Electricity Markets," presentation, New England ISO, Holyoke, MA, USA, February 14, 2006.
105. "New NLP problems for Power System Analysis and Operation in Competitive Electricity Markets," presentation with K. Bhattacharya, Fields Industrial Optimization Seminars, The Fields Institute, University of Toronto, Ontario, Canada, February 7, 2006.
106. "Reactive Power Markets," presentation, IESO of Ontario, Mississauga, Ontario, November 7, 2005.
107. "System Stability and Security in Electricity Markets," presentation, University of Western Ontario, Electrical and Computer Engineering, London, Ontario, June 6, 2005.
108. "Pricing Security and Controls in Competitive Electricity Markets," presentation, University of Seville, Electrical Engineering, April 21, 2005.
109. "Frequency and Voltage Stability in Power Systems," seminar, University of Castilla-La Mancha, Electrical Engineering, April 18-20, 2005.
110. "Reactive Power Markets," presentation, IESO of Ontario, Mississauga, Ontario, April 7, 2005.
111. "Optimization Problems for Reactive Power Dispatch in Electricity Markets," presentation, McMaster University, Hamilton, ON, Canada, March 21, 2005.
112. "Power Engineering Research at Waterloo," presentation, ABB US Corporate Research, Raleigh, NC, USA, March 15, 2005.
113. "The August 2003 North-east Blackout," keynote speech, PEO Niagara Chapter Meeting, St. Catharines, Ontario, February 8, 2005.
114. "Understanding Demand Response," presentation, Demand Response Workshop, Power Save Series, Government of Ontario and Hamilton Hydro, McMaster University, November 29, 2004.
115. "Innovation, Knowledge Transfer and Entrepreneurship in Information & Communications Technology @ Waterloo," presentation, SMAU-2004, Milan, Italy, October 22, 2004.
116. "Demand Response and Energy Generation, Storage & Management in Electricity Markets," presentation, UW-NRGen Workshop: An Overview of Power Markets Research, University of Waterloo, October 14, 2004.
117. "Power Research at Waterloo," presentation, An Overview of Power Markets Research, UW-NRGen Workshop: An Overview of Power Markets Research, Waterloo, October 14, 2004.
118. "The August 2003 North-east Blackout," keynote speech, PEO Georgian Bay Chapter Meeting, Kincardine, Ontario, October 13, 2004.
119. "Pricing Power System Stability," presentation, UMIST, Manchester, UK, September 15, 2004.
120. "The August 2003 North-east Blackout," presentation, E&CE BRAG Seminar Series, University of Waterloo, July 8, 2004.
121. "Pricing Power System Stability," presentation, IEEE Sweden, Chalmers University, Gothenburg, Sweden, June 3, 2004.
122. "Pricing Power System Stability," presentation, Royal Institute of Technology, Stockholm, Sweden, June 1, 2004.
123. "Pricing Power System Stability," presentation, Asian Institute of Technology, Bangkok, Thailand, January 12, 2004.
124. "Nonlinear Systems Theory Applied to Power Systems," seminar, Politecnico di Milano, Dipartimento di Elettrotecnica, Milan, Italy, October 6-8, 2003.

125. "The Cost of Voltage Stability," presentation, Voltage Stability Focus Group, 2003 IEEE-PES General Meeting, Toronto, July 15, 2003.
126. "FACTS in Stability Control," presentation, CENACE (ISO), Quito, Ecuador, June 6, 2002.
127. "Cost of Security in Electricity Markets," seminar, IEEE-Ecuador, Quito, Ecuador, May 30-31, 2002.
128. "Applied Nonlinear Systems Theory," seminar, Politecnico di Milano, Dipartimento di Elettrotecnica, Milan, Italy, November 7-9, 2001.
129. "Pricing System Security in Electricity Markets," presentation, Instituto de Energía Eléctrica, Universidad de San Juan, Argentina, August 2, 2001.
130. "Electrical Engineering at Waterloo," presentation, Instituto de Energía Eléctrica, Universidad de San Juan, Argentina, August 2, 2001.
131. "FACTS in Stability Control," seminar, Instituto de Energía Eléctrica, Universidad de San Juan, Argentina, July 7-August 2, 2001.
132. "Electrical Engineering Education in Canada," keynote speech, Int. Symposium in Electric Power Engineering at the Beginning of the Third Millennium, Capri, Italy, May 15, 2000.
133. "Optimization Techniques to Determine Costs of Voltage Security," presentation, University of Castilla-La Mancha, Electrical Engineering, Ciudad Real, Spain, May 3, 2000.
134. "Optimization Techniques to Determine Costs of Voltage Security," presentation, University of Sevilla, Department of Electrical Engineering, Seville, Spain, April 27, 2000.
135. "The Electrical Energy Market," seminar with Prof. G. Gross, Politecnico di Milano, Dipartimento di Elettrotecnica, Milan, Italy, April 10-14, 2000.
136. "The University System in North America," presentation, Escuela Politécnica Nacional, Quito, Ecuador, June 9, 1999.
137. "Time Dependence of Corrective Measures to Avoid Voltage Collapse," presentation, ENEL, Milan, Italy, July 9, 1999.
138. "Voltage Security in an Open Access Power System," seminar, Universidad de Chile, Santiago, Chile, May 17-19, 1999.
139. "Practical Use of Symbolic Computation Tools," presentation, Task Force on Symbolic Computations, IEEE-PES Winter Meeting, New York, NY, February 1, 1999.
140. "Applications of Optimization to Voltage Collapse Analysis," presentation, Panel Session on Optimization Techniques in Voltage Collapse Analysis, IEEE-PES Summer Meeting, San Diego, CA, July 14, 1998.
141. "Voltage Stability Indices," seminar, Voltage Stability Special Tutorial, IEEE-PES Summer Meeting, San Diego, CA, July 13, 1998.
142. "Voltage Stability: Past, Present and Future," presentation, Power Systems Stability Subcommittee, IEEE-PES Summer Meeting, Berlin, Germany, July 23, 1997.
143. "Fast Voltage Collapse Computations Using Tangent Vectors," presentation, Power System Stability Subcommittee, IEEE-PES Winter Meeting, New York, NY, USA, February 5, 1997.
144. "Evaluating Computer-based Resources for Teaching," presentation, Learning Technologies Innovation Showcase, University of Waterloo, December 10, 1996.

145. "FACTS devices and Optimal Compensation to Increase Loadability Margins," presentation, Voltage Stability and Long-term Stability, Working Group IEEE-PES Winter Meeting, Baltimore, MA, USA, January 23, 1995.
146. "New Voltage Stability Indices," presentation, Voltage Stability and Long-term Stability Working Group, IEEE-PES Summer Meeting, Portland, OR, USA, July 25, 1995.
147. "Bifurcations and Voltage Stability," presentation, Voltage Stability and Long-term Stability Working Group, IEEE-PES Winter Meeting, New York, NY, USA, January 31, 1995.
148. "Modern Techniques for Power System Analysis II," seminar, CIEEPI, Quito, Ecuador, May 25-29, 1993.
149. "Novell Networks," seminar, Escuela Politécnica Nacional, Quito, Ecuador, March 11-17, 1993.
150. "Modern Techniques for Power System Analysis I," seminar, CIEEPI, Quito, Ecuador, February 15-19, 1993.
151. "Bifurcation and Energy Function Analysis of AC/DC Systems," presentation, University of Waterloo, Canada, December 2, 1992.
152. "HVDC Systems," seminar, Jornadas de Ingeniería Eléctrica y Electrónica (JIEE), Escuela Politécnica Nacional, Quito, Ecuador, July 2-3, 1992.
153. "UNIX," seminar, Escuela Politécnica Nacional, Quito, Ecuador, November 18-29, 1991.
154. "Voltage Collapse and Transient Energy Functions in AC/DC Systems," presentation, CEPTEL, Rio de Janeiro, Brazil, December 13, 1990.
155. "Transient Energy Functions," presentation, Escuela Politécnica Nacional, Quito, Ecuador, December 3, 1990.
156. "Voltage Collapse," presentation, Escuela Politécnica Nacional, Quito, Ecuador, December 2, 1990.

f. Others:

- Continuously upgrading the program UWPFLOW, a continuation power flow for voltage collapse studies in power systems including HVDC and FACTS controllers. This program is freely distributed for research purposes throughout the world through the web. Older versions of the program and/or some of its parts have been licensed to various companies.
- Co-leader on the design and set up of Waterloo Institute for Sustainable Energy (WISE) at the University of Waterloo; November 2004-today. Member of its advisory board since September 2008.
- Co-leader on the design and set up of successful the Ontario Research Chair (ORC) Program in Environmental Policy and Renewable Energy at the University of Waterloo, a program worth over \$450,000/year; July 2005-May 2006.
- Waterloo Approved Doctoral Dissertation Supervisor (or LIARS) since January 1996.

3. TEACHING

a. Courses Taught:

COURSE	TERM'	AVG. EVAL/100	QUAL.	LEVEL	COMMENTS
ECE 761: Applied Nonlinear Systems Theory	Winter'02 Fall'97 Fall'94 Fall'93	NA NA NA NA		Grad	Course for the Power and Control Groups. Formerly taught as ECE 788 and ECE 764. Covers various aspects of nonlinear systems such as equilibrium points, stability regions and boundaries, Lyapunov stability, bifurcations and chaos.
ECE 664: Power System Components and Modeling	Fall'15 Winter'11	NA NA		Grad	Covers the basic structure, functional characteristics, protection schemes as well as detailed and approximate (phasor) models of the main components that make up a powers system, in particular generators, transformers, transmission lines, cables, loads, HVDC and FACTS controllers.
ECE 664: Power System Computer Applications	Winter'10 Fall'07 Spring'06 Winter'05 Winter'04 Winter'03 Winter'02 Winter'01 Fall'98 Winter'96 Winter'95	74.4 NA 80.8 NA NA NA NA NA NA NA NA	75 94	Grad	Covers various issues associated with stability modeling, simulation and analysis of power systems. Various commercial-grade computational tools are introduced.
ECE 662: Power System Analysis and Control	Fall'16 Fall'14 Fall'12	78.8 76.8 78.5	82 79 86	Grad	Covers various advanced issues on powers system analysis and control: power flow, short circuits, and voltage, angle and frequency stability and control.
ECE 6613PD: Power System Analysis	Fall'16 Fall'14 Fall'13 Fall'12 Fall'11 Fall'09	82.3 62.1 78.0 75.9 NA NA	75 63 81 79	Grad	Course for on-line M.Eng. Power Engineering program (http://www.ece.uwaterloo.ca/Graduate/PowerMEng/). Advance course on all aspects of power system analysis, from power flows and short circuits to stability studies and control.

ECE 6601PD: Power System Components and Modeling	Winter'16 Winter'15 Winter'13 Fall'10	75.8 NA NA NA	69	Grad	Course for on-line M.Eng. Power Engineering program (http://www.ece.uwaterloo.ca/Graduate/PowerMEng/). Covers the basic structure, functional characteristics, protection schemes as well as detailed and approximate (phasor) models of the main components that make up a powers system, in particular generators, transformers, transmission lines, cables, loads, HVDC and FACTS controllers.
ECE 6601PD: Power System Modeling and Stability Analysis	Fall'08 Spring'07 Fall'03	NA NA NA		Grad	Course for on-line M.Eng. Power Engineering program (http://www.ece.uwaterloo.ca/Graduate/PowerMEng/). Covers diverse aspects of detailed and phasor modeling of power system elements, and the concepts, analysis techniques, tools, controls and protections associated with angle, voltage and frequency stability of power systems.
ECE 467: Power Systems Analysis, Operations and Markets	Winter'16 Winter'12	74.9 74.8	68 76	Undergrad	Basic course on analysis, operation and management of power systems considering main technical and economic issues.
ECE 465: Computer Simulation of Power Systems	Winter'03 Winter'02 Winter'01 Winter'99 Winter'98 Winter'97 Winter'94	88.9 93.4 71.7 86.7 75.4 61.8 63.4	91 96 75 88 69 50 29	Undergrad	Basic power system analysis course, where several computer tools for power system analysis are studied and applied. Formerly: "Power Systems"
ECE 463: Design and Applications of Power Electronic Converters	Spring'96	84.7	89	Undergrad	This is a basic power electronics course discussing the basics of various power electronic switches and converters. Helped in the development of new labs and curriculum. Formerly: "Power Electronics"
ECE 390: Engineering Design, Economics, and Impact on Society	Winter'15 Winter'13	68.6 72.6	55 70	Undergrad	The course discusses various concepts and tools in engineering economics, design, project management, and the impact of engineering projects on the environment and society.

ECE 362: Modeling and Control of Electric Drives.	Winter'99 Fall'98 Winter'98 Winter'97 Fall'95	81.3 69.1 76.7 61.6 76.6	79 58 71 51 72	Undergrad	A basic course in electric machines and associated controls. Introduced computer simulation of drives. New labs and curriculum were implemented. Formerly: "Energy Systems and Components 2"
ME 269: Electromechanical Devices and Power Processing	Fall'95 Fall'94	67.3 60.3	59 47	Undergrad	Service course for Mechanical Engineering on electric machine and associated controls. Students were introduced to several computer tools.
ECE 140: Linear Circuits	Fall'10 Fall'09	68.44 79.4	67 82	Undergrad	Introductory course in basic linear circuits for Electrical and Computer Engineering students. Helped to implement and develop the course for the first time.
GENE/ME 123: Electrical Engineering	Spring'01 Winter'99 Winter'97 Spring'96 Winter'96 Winter'95	80.7 74.7 48.7 66.7 47.9 70.2	79 68 34 62 38 64	Undergrad	Service course for Mechanical, Civil and Chemical Engineering in basic electrostatics, electromagnetism and linear circuits. Curricula and textbooks were changed several times.
ECE 100: Fundamentals of Electrical Engineering	Winter'09 Winter'08 Spring'07 Winter'06 Spring'05 Spring'04	72.7 74.1 71.9 76.6 85.1 76.0	71 73 70 76 90 68	Undergrad	Introductory course in electrostatics, electromagnetism, linear circuits and electronic devices for Electrical and Computer Engineering students.

Before joining the University of Waterloo: two years of teaching experience after PhD graduation at the Escuela Politécnica Nacional in Quito, Ecuador, where undergraduate Electric Machines and Power Systems courses, including labs, were completely restructured.

b. Graduate Student Supervision: In most cases, I have been the *main research supervisor*, considering the role of the Second supervisors and/or funding arrangements (see paper authorship).

No.	Name	Degree	Dates	Comments
51	William Mendieta	MASc	May'17-today	<ul style="list-style-type: none"> • Research: TBD. • Ecuadorian scholar.
50	Baheej Al-Gamdi	PhD	May'17-today	<ul style="list-style-type: none"> • Research: Grid of microgrids. • South Arabian scholar.
49	Enrique Vera	PhD	May'17-today	<ul style="list-style-type: none"> • Research: Grid of microgrids. • Ecuadorian scholar.
48	Chioma Anierobi	PhD	Sept.'16-today	<ul style="list-style-type: none"> • Research: Compressed Air Energy Storage (CAES) storage economic and market issues. • Second supervisor: K. Bhattacharya.
47	Noela Sofía Guzmán	PhD	Sept.'16-today	<ul style="list-style-type: none"> • Research: Energy storage. • Second supervisor: K. Bhattacharya.
46	Leonardo Gacitua	PhD	Mar.'16-today	<ul style="list-style-type: none"> • Research: Operation and control of power systems with energy storage systems. • Co-supervisor: D. Olivares, Pontific Catholic University, Santiago, Chile. • Chilean Scholar.
45	Ivan Calero	PhD	Jan.'15-today	<ul style="list-style-type: none"> • Research: Compressed Air Energy Storage (CAES) systems dynamic modeling, and frequency and voltage stability and control impact and applications. • Second supervisor: K. Bhattacharya. • Ecuadorian scholar.
44	Fabian Calero	PhD	Jan.'15-today	<ul style="list-style-type: none"> • Research: Modeling, impact and application to transmission systems of distributed energy storage systems (ESS). • Second supervisor: K. Bhattacharya. • Ecuadorian scholar.
43	Dario Peralta	MASc	Jan.'15-today	<ul style="list-style-type: none"> • Research: Modeling and applications of flywheels and battery and thermal storage systems for grid balancing services (frequency control and economics). • Second supervisor: K. Bhattacharya. • Ecuadorian scholar.
42	Bharat Solanki	PhD	Jan.'14-today	<ul style="list-style-type: none"> • Research: Microgrid EMS and demand side management. • Co-supervisor: K. Bhattacharya.

41	Behnam Tamimi	PhD	Jan.'13-today	<ul style="list-style-type: none"> • Research: Hybrid Power Flow Controller (HPFC) modelling and applications. • OGS scholar.
40	Mauricio Restrepo	PhD	Sept.'12-May'17	<ul style="list-style-type: none"> • Thesis: "Smart Operation of Four-Quadrant Electric Vehicle Chargers in Distribution Grids." • Second supervisor: M. Kazerani.
39	Mostafa Farrokhbadi	PhD	May'12-Jan.'17	<ul style="list-style-type: none"> • Thesis: "Primary and Secondary Frequency Control Techniques for Isolated Microgrids." • Amit and Meena Chakma Award for Exceptional Teaching by a Student, 2015. • Second supervisor: K. Bhattacharya.
38	Abolfazl (Amir) Mosaddegh	PhD	May'12-Dec.'16	<ul style="list-style-type: none"> • Thesis: "Optimal Operation of Power Distribution Feeders with Smart Loads." • Second supervisor: K. Bhattacharya.
37	Nafeesa Mehboob	PhD	Sept.'10-Apr.'16	<ul style="list-style-type: none"> • Thesis: "Smart Charging of Plug-in Electric Vehicles in Distribution Systems Considering Uncertainties." • OGS scholar. • IEEE-PES PowerTech A. Papadias Best Student Paper Award, 2015. • Co-supervisor: C. Rosenberg. • Engineer at Kinetrics, ON, Canada
36	Jefferson Fabricio Ordoñez	MASc	Sept.'13-Aug.'15	<ul style="list-style-type: none"> • Thesis: "Optimal Load Management Application for Industrial Customers." • Ecuadorian scholar. • Project Manager CELEC, Ecuador.
35	Mariano Arriaga	PhD	Jan.'11-May'15	<ul style="list-style-type: none"> • Thesis: "Long-Term Renewable Generation Planning for Off-grid Remote Communities." • NSERC scholar. • Second supervisor: M. Kazerani. • PDF at Waterloo.
34	Alfredo Vaccaro	PhD	Jan.'14-Apr.'15	<ul style="list-style-type: none"> • Thesis: "Affine Arithmetic for Power and Optimal Power Flow Analyses in the Presence of Uncertainties." • Professor at the University of Sannio, Benevento, Italy.
33	Jordan Morris	MASc	Sept.'12-Jan.'15	<ul style="list-style-type: none"> • Thesis: "Design and Testing of a Bidirectional Smart Charger Prototype". • Second supervisor: M. Kazerani. • Engineer at Tesla, California.

32	Jose Daniel Lara	MASc	Sept.'12-Sept.'14	<ul style="list-style-type: none"> • Thesis: “Robust Energy Management Systems for Isolated Microgrids Under Uncertainty.” • Costa Rican scholar. • Second supervisor: K. Bhattacharya. • PhD student at Berkeley.
31	Indrajit Das	PhD	May'10-Aug.'14	<ul style="list-style-type: none"> • Thesis: “Investment Planning Models and Optimal Incentive Design for System Planners and Investors to Integrate Renewables.” • Principal supervisor: K. Bhattacharya. • PDF at Waterloo.
30	Isha Sharma	PhD	Sept.'09-Aug.'14	<ul style="list-style-type: none"> • Thesis: “Operation of Distribution Systems with PEVs and Smart Loads.” • Co-supervisor: K. Bhattacharya. • Researcher at Oak Ridge National Laboratory, US.
29	Akash Raghurajan	MASc	May'13-July'14	<ul style="list-style-type: none"> • Thesis: “Optimal Demand Response of Controllable Loads in Isolated Microgrids.” • Principal supervisor: K. Bhattacharya. • Engineer at GE, Montreal.
28	Ehsan Nasr	PhD	Sept.'09-May'14	<ul style="list-style-type: none"> • Thesis: “Modeling, stability analysis and control of DG in the context of microgrids.” • Project Manager at Canadian Solar, Guelph.
27	Daniel Olivares	PhD	Sept.'09-Jan.'14	<ul style="list-style-type: none"> • Thesis: “An Energy Management System for Isolated Microgrids Considering Uncertainty.” • Chilean scholar. • Second supervisor: M. Kazerani. • Professor at the Catholic University, Santiago, Chile.
26	Juan Carlos Muñoz	PhD	Sept.'09-Dec.'13	<ul style="list-style-type: none"> • Thesis: “An Arithmetic Based Methods for Power Systems Analysis Considering Intermittent Sources of Power.” • Venezuelan scholar. • Second supervisor: K. Bhattacharya. • Professor at the University of the Andes, Merida, Venezuela.
25	Felipe Ramos	MASc	Sept.'11-Sept.'13	<ul style="list-style-type: none"> • Thesis: “Modeling and Analysis of Demand Responsive Loads in the Operation of Smart Grids.” • Chilean scholar • Second supervisor: K. Bhattacharya. • Engineer at CONECTA, Santiago, Chile.

24	Brian Le	MASc	May'11-Sept.'13	<ul style="list-style-type: none"> • Research: "Incentive Design of Conservation Voltage Reduction Planning for Industrial Loads in Ontario." • Second supervisor: K. Bhattacharya. • Engineer at IESO, ON.
23	Adarsh Madhavan	MASc	May'11-May'13	<ul style="list-style-type: none"> • Thesis: "An Integrated Voltage Optimization Approach For Industrial Loads." • Co-supervisor: K. Bhattacharya • Engineer at ENMAX, Calgary, AB.
22	Rajib Kundu	MASc	Sept.'11-Apr.'13	<ul style="list-style-type: none"> • Thesis: "Smart Operation of Centralized Temperature Control System in Multi-Unit Residential Buildings." • Principal supervisor: K. Bhattacharya. • Engineer at company in ON.
21	Rupali Jain	MASc	Sept.'11-Jan.'13	<ul style="list-style-type: none"> • Thesis: "Optimal Operation of Climate Control Systems of Indoor Ice Rinks." • Principal supervisor: K. Bhattacharya. • Engineer at METSCO Energy Solutions, Mississauga, ON.
20	Sumit Paudyal	PhD	Sept.'08-Aug.'12'	<ul style="list-style-type: none"> • Thesis: "Optimal Energy Management of Distribution Systems and Industrial Energy Hubs in Smart Grids." • OGS scholar. • Co-supervisor: K. Bhattacharya. • Professor at Michigan Tech, Houghton, MI.
19	Mohammad Chehrehgani	PhD	Sept.'07-Aug.'11	<ul style="list-style-type: none"> • Thesis: "Optimal Operation of Energy Hubs in the Context of Smart Grids." • MPRIME "Best Novel Use of Mathematics in Technology Transfer Award," 2011. • The Sandford Fleming Foundation TA Excellence Award, 2009. • Second supervisor: K. Bhattacharya. • Engineer at NEC, Santa Clara, CA.
18	Wajid Muneer	MASc	Sept.'09-April'11	<ul style="list-style-type: none"> • Thesis: "Large-scale Solar PV Investment Planning Studies." • Co-supervisor: K. Bhattacharya. • Engineer at CANMET Energy, NRCAN, Varennes, QC.
17	Syed Ahsan Hashmi	MASc	May'09-Sept.'10	<ul style="list-style-type: none"> • Thesis: "Evaluation and Improvement of the Residential Energy Hub Management System." • Second supervisor: K. Bhattacharya. • Engineer at GENIVAR, Elizabethtown, ON.

16	Hussin Hassen	MASc	Jan.'09-Apr.'10	<ul style="list-style-type: none"> • Thesis: "Implementation of Energy Hub Management System for Residential Sector." • Second supervisor: K. Bhattacharya. • Engineer at ABB, Montreal, QC.
15	Amirhossein Hajimiragha	PhD	Jan.'06-Apr.'10	<ul style="list-style-type: none"> • Thesis: "Sustainable Convergence of Electricity and Transport Sectors in the Context of Integrated Energy Systems." • Winning poster at Sharing Discovery, University of Waterloo graduate student research conference, April 30, 2010. • MITACS "Best Novel Use of Mathematics in Technology Transfer Award," 2009. • E&CE TA Award, Winter and Spring 2007 terms, and U.W. Instructor Award, 2008. • Second supervisor: M. Fowler (Chem. Eng.). • Director BBS, Singapore.
14	Ismael El-Samahy	PhD	Sept.'04-May'08	<ul style="list-style-type: none"> • Thesis: "Secure Provision of Reactive Power Ancillary Services in Competitive Electricity Markets." • OGST and OGS scholar. • MITACS "Best Novel Use of Mathematics in Technology Transfer Award," 2008. • E&CE TA Award, Winter 2006 term. • Co-supervisor: K. Bhattacharya. • Engineer at IESO, ON.
13	José Rafael Avalos-Muñoz	PhD	Sept.'04-May'08	<ul style="list-style-type: none"> • Thesis: "Analysis and Application of Optimization Techniques to Power System Security and Electricity Markets." • Mexican CONACYT scholar. • Second supervisor: M. Anjos (Manag. Sc.). • Engineer at California ISO, US.
12	Hamid Zareipour	PhD	Jan.'03-Dec.'06	<ul style="list-style-type: none"> • Thesis: "Price Forecasting and Optimal Operation of Wholesale Customers in a Competitive Electricity Market." • Iranian scholar. • Co-supervisor: K. Bhattacharya. • Professor at University of Calgary, AB.

11	Hassan Ghasemi	PhD	Jan.'02-May'06	<ul style="list-style-type: none"> • Thesis: "On-line Monitoring and Oscillatory Stability Margin Prediction in Power Systems Based on System Identification." • OGST scholar. • Former professor at the Univ. Tehran, Iran, now senior Eng. at the IESO, Ontario.
10	Sameh Kodsi	PhD	Sept.'01-Dec.'05	<ul style="list-style-type: none"> • Thesis: "Accounting for the Effect of Power System Controllers and Stability on Power Dispatch and Electricity Market Prices." • Engineer at Teshmont Consultants LP, Winnipeg, MB.
9	Warren King	MASc	Sep.'02-Mar.'04	<ul style="list-style-type: none"> • Thesis: "A Probabilistic Approach to Security Costs in Competitive Electricity Markets." • Engineer at Alberta Electric System Operator (ASO), Calgary, AB.
8	Hong Chen	PhD	Sept.'98-Dec.'02	<ul style="list-style-type: none"> • Thesis: "Security Cost Analysis in Electricity Markets Based on Voltage Security Criteria and Web-based Implementation." • Second supervisor: A. Singh. • Best Student Poster Paper Award at the IEEE-PES Winter Meeting, Columbus, Ohio, January 2001. • Engineer at PJM, US.
7	Nadarajah Mithulananthan	PhD	Sept.'98-May'02	<ul style="list-style-type: none"> • Thesis: "Hopf Bifurcation Control and Indices for Power Systems with Interacting Generator and FACTS Controllers." • OGS scholar. • Second Best Student Paper Award at NAPS, Waterloo, Ontario, October 2000. • E&CE TA Award, September 2000. • Second supervisor: J. Reeve (deceased). • Professor at University of Queensland, Australia..
6	Edvina Uzunovic	PhD	Sept.'95-Aug.'01	<ul style="list-style-type: none"> • Thesis: "EMTP, Transient Stability and Power Flow Models and Controls of VSC Based FACTS Controllers." • Part time student Oct.98-Aug.01. • Best Student Poster Paper Award at the IEEE-PES Summer Meeting, Edmonton, Alberta, July 1999. • Second supervisor: J. Reeve (deceased). • Instructor at Worcester Polytechnic Institute, MA, US.

5	William Rosehart	PhD	Sept.'97-Dec.'00	<ul style="list-style-type: none"> • Thesis: "Optimization of Power Systems with Voltage Security Constraints." • NSERC scholar. • Best Student Poster Paper Award at the IEEE-PES Summer Meeting, San Diego, California, July 1998. • U.W. Sandford Fleming TA Award, 1997, and U.W. Instructor Award, 1999. • Second supervisor: V. H. Quintana (retired). • IEEE-PES Technical Council GOLD Award, July 2007. • Professor and Dean of Eng. at the University of Calgary AB.
4	Li Kang	MASc	Sept.'97-Aug.'99	<ul style="list-style-type: none"> • Thesis: "Comparison of Simulation Programs for Modeling of FACTS Controllers in Power Systems." • Second supervisor: J. Vlach (deceased). • Project Manager at Pacific Technology Co., Ltd., Guangdong, China.
3	William Rosehart	MASc	May'96-Sept.'97	<ul style="list-style-type: none"> • Thesis: "Stability Analysis of Detailed Power System Models." • NSERC scholar. • Professor and Dean of Eng. at the University of Calgary AB.
2	Zeno Faur	MASc	Jan.'94-Jan.'96	<ul style="list-style-type: none"> • Thesis: "Effect of FACTS Devices on Static Voltage Collapse Phenomena." • Project Manager at SAF Drives, Kitchener.
1	Antonio Z. de Souza	PhD	Sept.'93-July'95	<ul style="list-style-type: none"> • Thesis: "New Techniques to Efficiently Determine Proximity to Static Voltage Collapse." • Brazilian scholar. • Second supervisor: V. H. Quintana (retired). • Professor at the Federal Engineering School of Itajuba, Brazil.

c. Research Fellow Supervision:

No.	Name	Status	Dates	Comments
66	Mostafa Farrokhbabadi	PDF	May'17-Aug.'17	<ul style="list-style-type: none"> • Research: Microgrid stability definitions and modeling.

65	Indrajit Das	PDF	Apr.'17- May'17	<ul style="list-style-type: none"> • Research: Feasibility study of deployment of variable speed generators in remote communities in the Canadian Arctic.
64	Mostafa Farrokhabadi	Research Associate	Feb.'17- Apr.'17	<ul style="list-style-type: none"> • Research: Energy storage system modeling and control, and microgrid stability. • Second supervisor: K, Bhattacharya
63	Abolfazl (Amir) Mosaddegh	Research Associate	Feb.'17- Apr.'17	<ul style="list-style-type: none"> • Research: Optimal operation of distribution feeders. • Second supervisor: K, Bhattacharya
62	Mariano Arriaga	PDF	June'16- May'17	<ul style="list-style-type: none"> • Research: Energy storage systems electricity market opportunities.
61	David Romero	IVGS	May'16- Apr.'17	<ul style="list-style-type: none"> • Research: Affine Arithmetic Microgrid EMS • Universidad Nacional de Colombia, Bogota, scholar.
60	Indrajit Das	PDF	Sept.'15- Jan.'17	<ul style="list-style-type: none"> • Research: Feasibility study of deployment of renewable energy sources in remote communities in the Canadian Arctic.
59	Edson Geraldi	IVGS	May'16- Oct.'16	<ul style="list-style-type: none"> • Research: "Development of a simplified model for the representation of distributed generation systems" • University of Sao Paulo (USP), Brazil, scholar.
58	Daniel Remón	IVGS	Aug.'15- June'16	<ul style="list-style-type: none"> • Research: Solar PV generation synthetic inertia studies for bulk power systems. • Technical University of Catalonia, Spain, scholar.
57	Andrés Arias-Londoño	IVGS	Sept.'15- Mar.'16	<ul style="list-style-type: none"> • Research: EV optimal control in distribution feeders. • Technical University of Pereira, Colombia, scholar.
56	Araz Ashouri	PDF	Mar.'16- Apr.'16	<ul style="list-style-type: none"> • Research: Energy storage systems.
55	Douglas Fyfe	Research Associate	Feb.'13- Mar.'16	<ul style="list-style-type: none"> • Project Manager for 2 research projects: OCE's EHMS and NRCAN's Microgrid Controller. • Private consultant.

54	Nico Meyer-Huebner	IVGS	Dec.'15	<ul style="list-style-type: none"> • Research: Multi-period OPF with energy storage and ramping constraints for large power systems. • Second supervisor: K. Bhattacharya • Karlsruhe Institute of Technology (KIT), Germany, scholar.
53	Patrick Sauter	IVGS	Nov.'15	<ul style="list-style-type: none"> • Research: Microgrid EMS including thermal loads and generation. • Second supervisor: K. Bhattacharya • Karlsruhe Institute of Technology (KIT), Germany, scholar.
52	Sebastian Koeing	IVGS	Oct.'15	<ul style="list-style-type: none"> • Research: Impact of Energy Storage Systems on microgrid stability and control. • Second supervisor: K. Bhattacharya • Karlsruhe Institute of Technology (KIT), Germany, scholar.
51	Francisco García López	IVGS	July-Sept.'15	<ul style="list-style-type: none"> • Research: UPFC and HPFC applications to distribution feeders. • University of Seville, Spain, scholar.
50	Mariano Arriaga	PDF	May-Aug.'15	<ul style="list-style-type: none"> • Research: Database management and analysis for NRCAN-Hatch microgrid controller project. • PDF at Waterloo..
49	Juan Carlos Muñoz	PDF	June'14-June'15	<ul style="list-style-type: none"> • Research: EHMS implementation and voltage control for industrial customers. • Professor at the University of the Andes, Merida, Venezuela.
48	Felipe Valencia	Visiting Scholar (PDF)	Sept.-Dec.'14	<ul style="list-style-type: none"> • Research: Microgrid optimal load-frequency control. • PDF at University of Chile, Santiago.
47	Jose Daniel Lara	Research Associate	Sept.-Dec.'14	<ul style="list-style-type: none"> • Research: Microgrid EMS implementation. • Second supervisor: K. Bhattacharya. • PhD student at Berkeley.
46	Doris Saez	Visiting Prof.	Sept.'14	<ul style="list-style-type: none"> • Research: Microgrid control. • Professor at University of Chile, Santiago.
45	Ehsan Nasr	Research Associate	May-Aug.'14	<ul style="list-style-type: none"> • Research: DG stability. • Second supervisor: K. Bhattacharya. • Project Manager at Canadian Solar, Guelph.

44	Andy Wu Xiaoyu	Research Associate	Oct-Dec.'13	<ul style="list-style-type: none"> • Research: Survey of remote microgrids in Canada. • MEng student at the University of Waterloo.
43	Claudia Battistelli	PDF	Jan.-Dec.'13	<ul style="list-style-type: none"> • Research: Application of the HPFC FACTS technology to Ontario's grid. • PDF at Imperial College, London, UK.
42	Adarsh Madhavan	Research Associate	June-Sept.'13	<ul style="list-style-type: none"> • Research: Survey of remote microgrids in Canada. • Engineer at ENMAX, Calgary.
41	Blanca Hernandez	Visiting Scholar (PhD)	July-Sept.'13	<ul style="list-style-type: none"> • Research: Optimal and distributed secondary voltage controls. • Mexican Scholar (CINVESTAV, Guadalajara, Mexico). • Professor at Tech. Univ. Manzanillo, Mexico.
40	Fernanda Avila	Visiting Scholar (MSc)	May-July'2013	<ul style="list-style-type: none"> • Research: Microgrid demand side management. • University of Chile, Santiago, scholar. • Engineer at company in Santiago, Chile.
39	Edris Pouresmaeil	PDF	June'12-Sept.'13	<ul style="list-style-type: none"> • Research: Residential energy hub simulator. • Second supervisor: K. Bhattacharya • Researcher at INESC-ID, Instituto Superior Técnico (IST), University of Lisbon, Lisbon, Portugal.
38	Victor Gutierrez	PDF	Jan.'12-Sept.'13	<ul style="list-style-type: none"> • Research: Energy hub management system • Second supervisor: K. Bhattacharya • Professor at Tech. Inst. Morelia, Mexico.
37	Behnam Tamimi	PDF	Dec.'11-Dec.'12	<ul style="list-style-type: none"> • Research: Application of the HPFC FACTS technology to Ontario's grid. • PhD student at Waterloo.
36	Blanca Hernandez	Visiting Scholar (PhD)	Sept.'11-Aug.'12	<ul style="list-style-type: none"> • Research: Wide area controls. • Mexican Scholar (CINVESTAV, Guadalajara, Mexico). • Professor at Tech. Univ. Manzanillo, Mexico.
35	Doris Saez	Visiting Prof.	May-July'12	<ul style="list-style-type: none"> • Research: Microgrid control and forecast. • Professor at University of Chile, Santiago.

34	Juan Miguel Gonzalez	PDF	May'11- April'12	<ul style="list-style-type: none"> • Research: Residential house energy simulator. • Second supervisor: K. Bhattacharya. • Professor at Tech. Univ. Manzanillo, Mexico.
33	Wajid Muneer	Research Associate	May'11- April'12	<ul style="list-style-type: none"> • Research: Energy hub management system residential model implementation. • Second supervisor: K. Bhattacharya. • Project Manager at CANMET Energy, NRCAN, Varennes, QC.
32	Behnam Tamimi	PDF	Sept.09- Nov.'11	<ul style="list-style-type: none"> • Research: Stability and operational aspects of power grids with large penetration of solar power. • Second supervisor: K. Bhattacharya. • PhD student at Waterloo.
31	Alfredo Vaccaro	Visiting Prof.	Sept.- Oct.'11	<ul style="list-style-type: none"> • Research: Power systems' security using probabilistic analysis techniques. • Professor at the University of Sannio, Benevento, Italy.
30	Yulong Huang	Visiting Scholar (PhD)	Sept.'10- Aug.'11	<ul style="list-style-type: none"> • Chinese Scholar (China Scholarship Council grant). • Research: Stability constrained OPFs.
29	Syed Ahsan Hashmi	Research Associate	Sept.'10- July'11	<ul style="list-style-type: none"> • Research: Energy Hub Management System. • Second supervisor: K. Bhattacharya. • Engineer at GENIVAR, Elizabethtown, ON.
28	Amirhossein Hajimiragha	PDF	May'10- Aug.'10	<ul style="list-style-type: none"> • Research: Plug-in Electric Vehicle (PEV) grid impact studies. • Director BBS, Singapore.
27	Guilherme Lage	Visiting Scholar (PhD)	Sept.'09- Aug.'10	<ul style="list-style-type: none"> • Brazilian Scholar (CAPES). • Research: Voltage-stability-constrained optimal power flows.
26	Bo Hu	Visiting Scholar (PhD)	Sept.'08- Sept.'09	<ul style="list-style-type: none"> • Chinese Scholar (China Scholarship Council grant). • Research: Optimal reactive power and voltage management and control.
25	Geraldo Torres	Visiting Prof.	Sept.'08- Aug.'09	<ul style="list-style-type: none"> • Research: Optimal power flows. • Professor at the Federal University of Pernambuco, Recife, Brazil.

24	Gustavo Araujo	Visiting Scholar (PhD)	Sept.'08-Apr.'09	<ul style="list-style-type: none"> • Venezuelan Scholar (Universidad Nacional Experimental Politécnica Antonio José de Sucre, Barquisimeto, Venezuela). • Research: On-line detection of voltage instabilities.
23	Alfredo Vaccaro	Visiting Prof.	Sept.'08-Feb.'09	<ul style="list-style-type: none"> • Research: Power systems' security using probabilistic analysis techniques. • Professor at the University of Sannio, Benevento, Italy.
22	Claudia Battistelli	Visiting Scholar (PhD)	May'08-Apr.'09	<ul style="list-style-type: none"> • Italian Scholar (University of Naples Federico II Scholarship). • Research: Practical implementation of stability-constrained optimal power flows. • PDF at Waterloo.
21	Hossein Haghghat	PDF	Oct.'07-Jan.'09	<ul style="list-style-type: none"> • Research: Reactive power markets. • Second supervisor: K. Bhattacharya. • Professor at a univ. in Iran.
20	Behnam Tamimi	Visiting Scholar (PhD)	Mar.'08-Nov.'08	<ul style="list-style-type: none"> • Iranian Scholar (University of Tehran Scholarship) • Research: OPF application in voltage stability and reactive power control.
19	Tarek El-Fouly	PDF	Dec.'07-Nov.'08	<ul style="list-style-type: none"> • Research: Price forecasting and CDM. • Second supervisor: K. Bhattacharya. • Project Manager at CANMET Energy, NRCAN, Varennes, QC.
18	José Rafael Avalos-Muñoz	PDF	June'08-Oct.'08	<ul style="list-style-type: none"> • Research: Conservation and Demand Management (CDM). • Second supervisor: K. Bhattacharya. • Engineer at California ISO, US.
17	Juan Miguel Gonzalez	Visiting Scholar (PhD)	Jan.'08-Oct.'08	<ul style="list-style-type: none"> • Mexican Scholar (CONACYT Scholarship) • Research: FACTS matrix converter modeling, simulation, analysis and control. • Professor at a Tech. Univ. Manzanillo, Mexico.
16	Xianqi Li	Visiting Scholar (PhD)	Oct.'07-Sept.'08	<ul style="list-style-type: none"> • Chinese Scholar (China Scholarship Council grant). • Research: Stability analysis of power system with significant DG generation.

15	Victor Gutierrez	Visiting Scholar (PhD)	June'07-May'08	<ul style="list-style-type: none"> • Mexican Scholar (CONACYT Scholarship). • Research: Estimating power system stability regions using ANNs. • Professor at Tech. Inst. Morelia, Mexico.
14	Gregor Taljan	Visiting Scholar (PhD)	Apr.'07-Mar.'08	<ul style="list-style-type: none"> • Slovenian Scholar (Ad-Futura and University of Ljubljana Scholarship). • Research: Wind power in multi-energy systems. • Second supervisor: M. Fowler. • Engineer at a company in Austria.
13	Heresh Seyedi	Visiting Scholar (PhD)	May'07-Oct.'07	<ul style="list-style-type: none"> • Iranian Scholar (University of Tehran Scholarship). • Research: Protection and control schemes based on on-line stability indices. • Professor at University of Tabriz, Iran.
12	Mingbo Liu	Visiting Prof.	Mar.'06-Feb.'07	<ul style="list-style-type: none"> • Chinese Scholar (China Scholarship Council grant). • Research: Stability constrained optimization techniques. • Professor at the South China University of Technology.
11	Xueping Gu	Visiting Prof.	July'05-June'06	<ul style="list-style-type: none"> • Chinese Scholar (China Scholarship Council grant). • Research: AI methods applied to oscillation proximity indices. • Professor at North China Electric Power University.
10	Dengjun Yan	Visiting Prof.	July'05-June'06	<ul style="list-style-type: none"> • Chinese Scholar (China Scholarship Council grant). • Research: Effect of Hopf bifurcations in stability regions of power systems. • Engineer at ABB, Edmonton, AB.
9	Gregor Verbic	PDF	Feb.'05-Jan.'06	<ul style="list-style-type: none"> • NSERC-NATO Science Fellow. • Research: Pricing stability and security in electricity markets. • Professor at the University of Sydney, Australia.

8	Alejandro Marano-Marcolini	Visiting Scholar (PhD)	June-Aug.'04	<ul style="list-style-type: none"> Spanish scholar from the Electrical Engineering Department, Engineering School, University of Seville, Spain. Research: Management of ancillary services in deregulated power systems.
7	Hong Chen	PDF	Jan.-June'03	<ul style="list-style-type: none"> Research: Energy storage, distributed generation and price forecasting in electricity markets. Worked on contract with NRGGen. Engineer at PJM, New England, USA.
6	Valery Knyazkin	Visiting Scholar (PhD)	Oct.'02-Apr.'03	<ul style="list-style-type: none"> Swedish scholar from the Royal Institute of Technology, Stockholm. Research: Distributed generation control and modeling. Engineer at ABB, Sweden.
5	Federico Milano	Visiting Scholar (PhD)	Sept.01-Dec.02	<ul style="list-style-type: none"> Italian scholar from the University of Genoa. Research: Pricing system security in electricity markets. Professor at University College, Dublin, Ireland. IEEE Fellow.
4	Claudio Cavallo	Visiting Scholar (MSc)	Apr.-Dec.'01	<ul style="list-style-type: none"> Italian scholar from the Polytechnic of Milan.. Research: Applications of FACTS controllers to the Italian power network. Engineer in Italy.
3	Alberto Del Rosso	Visiting Scholar (PhD)	Jan.-Oct.'00	<ul style="list-style-type: none"> Argentinean scholar on six month research visit. Research: Using FACTS for on-line dynamic security enhancement in electric power systems. Project Manager at EPRI, US.
2	Ruben Salas-Cabrera	Visiting Prof.	Mar.'99-Feb.'00 Oct.'01-Jan.'02	<ul style="list-style-type: none"> Visiting Professor from Instituto Tecnologico de Ciudad Madero, Mexico. Research: Stability analysis of motor drives. Formed part of the engineering staff of SAF Drives, Kitchener, Mar.00-Sept.01. Professor at Tech, Inst. Ciudad Madero, Mexico.

1	Andre Lerm	Visiting Scholar (PhD)	Sept.'97-Sept.'98	<ul style="list-style-type: none"> • Brazilian scholar on one year research visit. • Research: Direct methods for determination of Hopf bifurcation points. • Professor at the Catholic University of Pelotas, Brazil.
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d. Undergraduate Student Supervision:

No.	Names	Dates	Comments
29	Jonathan Li	Winter'12	<ul style="list-style-type: none"> • Second year co-op Research Assistant hired to work on an upgrade of UWPflow, a voltage stability analysis program developed at our lab, and update the Power & Energy Systems group's website.
24-28	Paul Fugere Diana Compagnone Sean Mahood Yi Ke Darren Lee	Winter'11 Spring'10	<ul style="list-style-type: none"> • ECE 492 design project: Develop a controlled electrical plug with Zigbee communication capabilities.
23	Mario Watson	Winter'10	<ul style="list-style-type: none"> • Second year co-op Research Assistant hired to work on an upgrade of UWPflow, a voltage stability analysis program developed at our lab, and update the Power & Energy Systems group's website.
22	James MacMahon	Fall'09	<ul style="list-style-type: none"> • Fourth year E&CE student hired to work as UG Research Assistant on an OCE project in Conservation and Demand Management (CDM). • Co supervisor: Gord Ellis (Energent).
21	Shuting He	Spring'09	<ul style="list-style-type: none"> • Third year E&CE student hired to work as UG Research Assistant on a price forecasting project with industry. • Co supervisor: Gord Ellis (Energent).
20	Philip McCarthy	Spring'09	<ul style="list-style-type: none"> • Third year E&CE student hired as UG Research Assistant to work on an OCE project in Conservation and Demand Management (CDM). • Co supervisor: Gord Ellis (Energent).
19	Erik Louie	Spring'09	<ul style="list-style-type: none"> • Third year CS student hired to work as UG Research Assistant on an OCE project in CDM. • Co supervisor: Gord Ellis (Energent).
18	Philip McCarthy	Winter'09	<ul style="list-style-type: none"> • Second year E&CE student co-op Research Assistant hired to work on an OCE project in Conservation and Demand Management (CDM). • Co supervisor: Gord Ellis (Energent).
17	Erik Louie	Winter'09	<ul style="list-style-type: none"> • Second year CS student co-op Research Assistant hired to work on an OCE project in CDM. • Co supervisor: Gord Ellis (Energent).

16	Jeff Wang	Fall'08	<ul style="list-style-type: none"> Second year co-op Research Assistant hired to work on an upgrade of UWPflow, a voltage stability analysis program developed at our lab, and update the Power & Energy Systems group's website.
14	Shu Zhang	Winter'06	<ul style="list-style-type: none"> Second year co-op Research Assistant hired to work on an upgrade of UWPflow, and update the Power & Energy Systems group's website.
13	Matt Soliguin	Winter'04	<ul style="list-style-type: none"> First year co-op Research Assistant hired to work on the Nanotechnology Program web pages.
12	David Lee	Spring'03	<ul style="list-style-type: none"> First year co-op Research Assistant hired to work on the Power Group web pages and create a GUI for a web-based program developed in our lab.
11	Jonathan Ford	Winter'01	<ul style="list-style-type: none"> Second year Undergraduate Research Assistant (URA) hired to work on the Power Group web pages as well as read basic material on nonlinear systems and bifurcation analysis.
10	Fernando Cañas	Fall'96' and Winter'97	<ul style="list-style-type: none"> Systems Design Engineering 4th year Workshop Project: Reduced voltage starter for large electrical motors.
7-9	Raman Gupta Kean Reardon Brad Schleihauf	Winter'97	<ul style="list-style-type: none"> SYDE 362 project: Ballistic linear accelerator for space transport.
6	Mike Patullo	Fall'96	<ul style="list-style-type: none"> ECE-499 project: Battery discharger design for solar car.
4-5	Art Twareck Fed Zirdung	Spring'96	<ul style="list-style-type: none"> ECE-499 project: Battery charger design for solar car.
3	William Rosehart	Spring'95	<ul style="list-style-type: none"> ECE-499, part time Research Assistant in the Fall 1995 term, and Undergraduate Research Assistant (URA) in the Winter 1996 term. Project: Bifurcation analysis of induction motors.
2	Sandeep Minocha	Spring'94	<ul style="list-style-type: none"> ECE-499 project: Bifurcation analysis of induction motors using MAPLE-V.
1	Steve Hranilovic	Winter'94	<ul style="list-style-type: none"> URA: Transcritical bifurcations in ac/dc systems using MAPLE-V and EES.

e. Examining Committees:

- External Examiner of PhD Thesis "Planning and Operation of Active Smart Grids" by Mohammad Ghasemi Damavandi, University of British Columbia, Vancouver, December 16, 2016.
- External Examiner of PhD Thesis "Modeling of Multi-terminal VSC-HVDC Links for Power Flows and Dynamic Simulations of AC/DC Power Networks" by Luis Miguel Castro, Tampere University of Technology, Tampere, Finland, December 5, 2016.
- Member of Comprehensive Background Examination Committee of Mehdi Parvizmosaed, E&CE, University of Waterloo, November 29, 2016.
- Member of the Examining Committee of Zuher Alnasir's PhD thesis "A Small-Scale Standalone Wind Energy Conversion System Featuring SCIG, CSI and a Novel Storage Integration Scheme," University of Waterloo, July 29, 2016.

- Member of the Examining Committee of Yousef Mahmoud's PhD thesis "Enhancing the Modeling and Efficiency of Photovoltaic Systems," University of Waterloo, July 22, 2016.
- External Examiner of PhD Thesis "Optimal Planning of Hybrid Microgrids" by Godfrey Moshi, Politecnico di Milano, Milan, Italy, January 5, 2016.
- Examiner of PhD proposal "Optimal Planning of Renewable Energy-based Microgrids for Remote Communities Considering the Operation Constraints" by Elham Karimi, University of Waterloo, August 7, 2015.
- Member of the Examining Committee of Omid Ardakanian's PhD thesis "On the Control of Active End-nodes in the Smart Grid," University of Waterloo, August 4, 2015.
- Examiner of PhD proposal "Protection Strategies for Low-voltage Direct Current Grids" by Khaled Saleh, University of Waterloo, June 24, 2015.
- Reader of MASC thesis "Optimal Planning and Scheduling of Battery Storage Systems for Isolated Microgrids" by Hisham Alharbi, University of Waterloo, April 2015.
- External Examiner of PhD Thesis "Voltage Control Based on a Decentralized Strategy" by Blanca Hernandez, CINVESTAV, Guadalajara, Mexico, April 30, 2015.
- External Examiner of PhD Thesis "Modeling, Design and Control of Dish-Stirling Solar Thermal Power Generating System" by Yang Li, Nanyang Technological University (NTU), Singapore, March 8, 2015.
- External Examiner of PhD Thesis "Coordination of Generator Protection and Control in the Over and Under Excited Regions" by Eli Pajuelo, University of Saskatchewan, Saskatoon, January 30, 2015.
- Member of the Examining Committee of Ali Hooshyar's PhD thesis "Protection of Renewable Energy Systems," University of Waterloo, November 5, 2014.
- Member of the Examining Committee of Ahmed Awad's PhD thesis "Application of Energy Storage Systems in Smart Grids," University of Waterloo, September 12, 2014.
- Re-examiner of PhD proposal "Mitigation of Power Losses in Partially Shaded PV Systems" by Yousef Mahmoud, University of Waterloo, August 8, 2014.
- External Examiner of PhD Thesis "Active Control of Power Flows in Distribution Grids" by Manuel Barragan, University of Seville, Spain, May 23, 2014.
- Examiner of PhD proposal "Mitigation of Power Losses in Partially Shaded PV Systems" by Yousef Mahmoud, University of Waterloo, May 5, 2014.
- Examiner of PhD proposal "Study of a Standalone Wind Energy Conversion System Based on Current-Source Inverter" by Zuher Alnasir, University of Waterloo, April 9, 2014.
- External Examiner of PhD Thesis "Control of Wind Energy Conversion Systems for Large-scale Integration with the Power System" by Omid Alizadeh, Western University, February 18, 2014.
- Member of the Examining Committee of Mehrdad Pirnias's PhD thesis "Stochastic Modeling and Analysis of Power Systems with Intermittent Energy Sources," University of Waterloo, January 20, 2014.
- External Examiner of PhD Thesis "Techno-economic Models for Integration of Wind Energy" by Chandrabhanu O. G. Kankanamalage, Ryerson University, May 7, 2013.

- Member of the Examining Committee of Prajna Dash's PhD thesis "Advances in Design and Control of Three-phase Grid-connected PV System based on Multilevel Current Source Inverter," University of Waterloo, February 6, 2013.
- Reader of MASc thesis "Design of a Two-stage Level-two Bidirectional On-Board Charger for Plugin Vehicles" by Noreen Wong, University of Waterloo, December 2012.
- Examiner of PhD proposal "Power Quality Measurement and Mitigation in the Context of Smart Grids" by Ali Hooshyar, University of Waterloo, December 13, 2012.
- Member of the Examining Committee of Moahme Hassan Ahmed's PhD thesis "Novel Wind Models for Power System Operations," University of Waterloo, May 30, 2012.
- Reader of MASc thesis "Operational Risk Assessment of Power Systems with Distributed Energy Sources Using Minimal Cut Set" by Badr Lami, University of Waterloo, January 2012.
- Reader of MASc thesis "Optimally-sized Design of a Wind/Diesel/Fuel Cell Hybrid System for a Remote Community" by Mehdi Vafaei, University of Waterloo, September 2011.
- Examiner of PhD proposal "Stochastic Modeling and Analysis of Power Systems with Intermittent Energy Sources" by Mehrdad Pirnia, University of Waterloo, December 2011.
- External Examiner of PhD thesis "Voltage Security Boundary-Constrained Optimal Power Flow" by Victor Javier Gutierrez, University of Michoacan, Morelia, Mexico, October 7, 2011.
- External Examiner of PhD thesis "Control Strategies for the Next Generation Microgrids" by Ali Mehrizi-Sani, University of Toronto, September 7, 2011.
- External Examiner of PhD thesis "On Predictive Control for Coordination in Multi-Carrier Energy Systems" by Michele Arnold, Swiss Institute of Technology (ETH), Zurich, Switzerland, May 27, 2011.
- Reader of MASc thesis "DFIG Based Wind Turbine Contribution to System Frequency Control" by Mansour J. Jalali, University of Waterloo, December 2010.
- External Examiner of PhD thesis "Impact of Wind Energy on the Operation of Power Systems" by Jose F. Restrepo-Hernandez, McGill University, December 2010.
- External Examiner of PhD thesis "Steady state and transient stability analysis of electrical grids with AC/AC based FACTS devices embedded" by Juan Miguel Gonzalez, CINVESTAV, Guadalajara, Mexico, June 11, 2010.
- Examiner of PhD proposal "The Impact of Wind Generation Penetration on Electricity Markets" by Mohamed Hassan Ahmed, University of Waterloo, April 14, 2010.
- External Examiner of PhD thesis "Improvement of Small-disturbance Stability by FACTS Devices" by Ilea Valentin, Politecnico di Milano, Italy, April 9, 2010.
- External Examiner of PhD thesis "Application of Bifurcation Theory to Electric Power Systems" by Gustavo Revel (in Spanish), Universidad Nacional del Sur, Bahia Blanca, Argentina, March 25, 2010.
- Member of the Examining Committee (Second supervisor) of Gregor Taljan's PhD thesis "The Use of Hydrogen in Electric Power Systems," University of Ljubljana, Ljubljana, Slovenia, December 17, 2009.
- External Examiner of PhD thesis "Distribution System Planning by Means of Evolutionary Techniques" by Guillermo Jiménez (in Spanish), University of Chile, Santiago, Chile, December 7, 2009.

- External Examiner of MEng thesis “Design and Implementation of Power System Stabilizers in Wind Farms” by Carlos Martinez, McGill University, Montreal, October 29, 2009.
- Member of the Examining Committee of Hemantkumar Barot’s PhD thesis “New Paradigms in Medium Term Operations and Planning of Power Systems Deregulation,” University of Waterloo, September 17, 2009.
- Member of the Examining Committee of Steven M. Wong’s PhD thesis “Some Aspects of Distribution System Planning in the Context of Investments in Distributed Generation,” University of Waterloo, August 20, 2009.
- Examiner of PhD proposal “Multidisciplinary Optimization of Battery Electric and Hybrid Electric Vehicles” by Brian Su-Ming Fan, University of Waterloo, July 21, 2009.
- Member of the Examining Committee of Seyed Masoud Barakati’s PhD thesis “Modeling and Controller Design of a Wind Energy Conversion System Including a Matrix Converter,” University of Waterloo, April 17, 2008.
- Examiner of PhD proposal “On Some Aspects of Medium-term Operations and Planning of Power Systems in Deregulated Environment” by Hemantkumar Barot, University of Waterloo, August 2007.
- Examiner of PhD proposal “Sustainable Distribution System Planning Amidst Deregulation” by Steven M. Wong, University of Waterloo, April 2007.
- External Examiner of PhD thesis “Determination of Transient Stability Boundary in Functional Form with Application in Optimal Power Flow and Security Control” by Bathiya Jayasekara, University of Manitoba, Winnipeg, December 1, 2006.
- External Examiner of PhD thesis “Use of FACTS Devices for Power Flow Control and Damping of Oscillations in Power Systems” by Rusejla Sadikovic, Swiss Institute of Technology (ETH), Zurich, Switzerland, July 7, 2006.
- External Examiner of PhD thesis “On-line Evaluation of Dynamic Security of Power Systems” by Juan Manuel Giménez (in Spanish), Universidad de San Juan, Argentina, April 2006.
- Examiner of PhD proposal “Control of Wind Turbine Generation System Based on Matrix Converter” by Seyed Masoud Barakati, University of Waterloo, May 18, 2005.
- Reader of MASc thesis “Market Design, Optimal Procurement and Pricing of Frequency Regulation 2003 and Spinning Reserve Services” by Haidan Zhao, University of Waterloo, July 2005.
- External Examiner (Opponent) of PhD Thesis by Adrian Andreoiu, Chalmers University of Technology, Gothenburg, Sweden, June 4, 2004.
- Member of the Examining Committee of Jianwei Liu’s PhD thesis “A Study of Distributed Energy Sources and RF Triggered HTS Current Switch,” University of Waterloo, January 23, 2004.
- Reader of MASc thesis “An Economic Analysis of a Competitive Electricity Market” by Feng Ding, University of Waterloo, October 2003.
- Member of the Examining Committee of Alberto Del Rosso’s PhD thesis “Strategies for the Improvement of Power System Dynamic Security” (in Spanish), Universidad de San Juan, Argentina, August 3, 2001.
- Reader of MASc thesis “Development of a High-performance Photovoltaic Grid-connected Inverter” by Ghodrattollah Esmaeili Rineh, University of Waterloo, May 2001.

- Member of the Examining Committee of Kannan Sreenivasachar's PhD thesis "Unified Power Flow Controller: Modeling, Stability Analysis, Control Strategy and Control System Design," University of Waterloo, April 27, 2001.
- Member of the Examining Committee of Ahmed Gaouda's PhD thesis "Wavelet-automated Recognition System for Power Quality Monitoring," University of Waterloo, April 27, 2001.
- Examiner of PhD proposal "Synchronous Real and Reactive Power Compensation with Superconducting Magnetic Energy Storage (SMES) for Voltage Sag Mitigation" by Jianwei Liu, University of Waterloo, April 18, 2001.
- External reviewer of MEng thesis "Stochastic Pool-based Power Market Simulator" by Cheon Wei Chua, McGill, Montreal, December 2000.
- Member of the Examining Committee of Marcelino Madrigal's PhD thesis "Optimization Models and Techniques for Implementation and Pricing of Electricity Markets," University of Waterloo, December 2000.
- Member of the Examining Committee of Eduardo Enrique's PhD thesis "Mathematical Models Based on Spline Functions for Industrial Applications," University of Waterloo, December 2000.
- External Reviewer of PhD thesis by Awad Ibraik Ibrahim, University of British Columbia, September 2000.
- External Reviewer of PhD thesis "Advanced Methods for Small Signal Stability Analysis and Control in Modern Power Systems" by Zhao Yang Dong, University of Sydney, Australia, December 1998.
- Examiner of PhD proposal "Resource Scheduling for Electricity Markets" by Marcelino Madrigal, University of Waterloo, December 1998.
- Member of the Examining Committee of Geraldo Torres' PhD thesis: "Nonlinear Optimal Power Flow by Interior and Non-interior Point Methods," University of Waterloo, November 1998.
- Examiner of PhD proposal "Approximation by Spline Functions for Industrial Processes: Modeling and Control" by Eduardo Enrique, University of Waterloo, April 1998.
- Member of the Examining Committee of Wael Abdel-Fattah Farag's PhD thesis: "Synthesis of Intelligent Hybrid Systems for Modeling and Control," University of Waterloo, April 1998.
- Examiner of PhD proposal "Approximation by Spline Functions for Industrial Processes: Modeling and Control" by Eduardo Enrique, University of Waterloo, April 1998.
- Examiner of PhD proposal "Automated Recognition System for Power Quality Monitoring" by Ahmned Gaouda, University of Waterloo, April 1998.
- Member of the Examining Committee of Xihui Yan's PhD thesis: "Infeasible Primal-dual Interior Point Algorithms for Solving Optimal Power Flow Problems," University of Waterloo, April 1997.
- Reader of MASc thesis "EMTP Modeling of Static Compensators for Voltage Sag Studies" by Ian J. McIntyre, University of Waterloo, April 1997.
- Member of the Examining Committee of Andre Plaisant's PhD thesis: "Active Filtering of AC Harmonics for HVDC Converters," University of Waterloo, December 1996.
- Reader of MASc thesis "PSpice Model of and Electric Vehicle" by Radu Ionele, University of Waterloo, December 1996.
- Reader of MASc thesis "Motor Optimization in a PV-array System Using PSpice Simulation" by Najeeb Bohio, University of Waterloo, August 1996.

- Examiner of PhD proposal “Dynamic Performance of a Unified Power Flow Controller—A Fuzzy Logic Based Approach” by Kannan Sreenivasachar, University of Waterloo, August 1996.
- Reader of MASc thesis “Digital Controller Representation in EMTP for FACTS Transient Studies” by Leon D. Voss, University of Waterloo, April 1996.
- Examiner of PhD proposal “Direct Solution of the Optimal Power Flow in Rectangular Form via a Logarithmic Barrier Interior Point Method” by Geraldo L. Torres, University of Waterloo, April 1996.
- Reader of MASc thesis “Aspects of Power Transfer Stability of DC Links Terminating at AC System Locations Having Low Short Circuit Capacities” by Edvina Uzunovic, University of Waterloo, June 1995.
- Reader of MASc thesis “Sensitivity Analysis for Compensator Placement in Power Systems” by Eduardo H. Enrique, University of Waterloo, 1994.
- Examiner of PhD proposal “Computer Simulation of Integrated AC Power Systems Including FACTS Devices” by Mansour R. Sultan, University of Waterloo, 1994.

f. Others:

- Leading the set up and implementation, with the financial support of Hydro One Inc. (\$500,000 for 7 years), of an on-line graduate program at the University of Waterloo for Power Engineering professionals and scholarships for undergraduate students considering power engineering courses and research; September 2003-August 2010.
- Collaboration on the restructuring of GENE-123 and ME-269 for the Mechanical Engineering Department.
- Introduction of several computational tools in all undergraduate and graduate courses taught.
- Introduction of computer delivered tutorials and simulations in ME-123, ME-269, E&CE-261 and E&CE-362.
- Worked in an overhaul of the Machines Lab. Applied and obtained funding from Faculty (Academic Development Funds), E&CE Department (Rockwell and Dept. funds) and students (WEEF) for an approximate total amount of \$58,000 CD to buy new equipment for this Lab.
- Class Prof. for the 2006-2011, 1994-1999 Electrical Engineering classes.

4. PROFESSIONAL ACTIVITIES AND SERVICES

a. Societies, Journals and Conferences:

- Fellow of the Canadian Academy of Engineering (CAE) since June 2013.
- Fellow of the Royal Society of Canada (RSC) since November 2012.
- IEEE Fellow since January 2007 “for contributions to voltage stability of power systems”. Senior member of the IEEE November 2000-December 2006. IEEE Member 1991-2000. IEEE Student Member 1986-1991.
- Registered Professional Engineer in the Province of Ontario since September 1, 1995.
- CIGRE Member since 1994. Contributor to Task Force 38.01.12 report on “Criteria and Countermeasures for Voltage Collapse,” and to Task Force 38.02.23 report “Coordinated Voltage Control in Transmission Networks”.
- Member of the IEEE Industrial Electronics Society Fellow Evaluation Committee, May 2017-today.
- Director of the RSC Academy of Science, January 2017-today.
- Chair of the IEEE-PES Power System Dynamics Committee, January 2017-today.
- Technical Program Chair of IEEE PES Innovative Smart Grid Technologies (ISGT) Latin America, September 2016-September 2017.
- Member of the IEEE PES New Product Development Committee, December 2016-today.
- Member of the Editorial Board of the IEEE Proceedings, January 2016-December 2018.
- Member of the New Fellow Selection Committee of the RSC Academy of Science, October 2015-December 2016.
- Member of the Research Steering Committee of the NSERC Energy Storage Technology (NEST) Network, September 2015-today.
- Co-Chair of IEEE-PES Task Force “Microgrid Stability Analysis and Modeling,” IEEE-PES Power System Stability Subcommittee, July 2014-today.
- Member of the Board of Directors of the International Institute for Research and Education in Power System Dynamics (IREP), Oct. 2007-today.
- Member of the Editorial Board of the European Transactions on Electrical Power (ETEP), March 2007-today.
- Member of the Editorial Advisory Board of the International Journal Electrical Engineering Education, August 2005-today.
- Associate Editor of IEEE-PES Transactions Letters, August 2004-today.
- Member of the Editorial Advisory Panel of the Electric Power Systems Research journal, August 2001-today.
- Member of the IEEE-PES Power System Dynamic Performance Committee, June 1998-today.
- Member of the IEEE-PES Power System Stability Subcommittee, January 1997-today.
- Member of the IEEE-PES Power System Stability Controls Subcommittee, January 1997-today.

- Member of the International Program Committee for the 2017 IEEE PowerTech Conference in Manchester, UK, August 2016-June 2017.
- Vice-Chair of the IEEE-PES Power System Dynamics Committee, January 2015-December 2016.
- Secretary of the IEEE-PES Power System Dynamics Committee, January 2013-December 2014.
- Associate Editor, IEEE Transactions on Smart Grid, February 2012-December 2014.
- Chair of IEEE-PES Task Force “Microgrid Control,” IEEE-PES Power System Stability Controls Subcommittee, June 2010-July 2014.
- Associate Editor, IEEE Transactions on Industrial Electronics, January 2011-Novemeber 2012.
- Member of the Technical Program Committee for the IEEE Innovative Smart Grid Technologies (ISGT) Conference, University of Manchester, Manchester, UK, March-December 2011.
- Member of the International Program Committee for the 2011 IEEE PowerTech Conference in Trondheim, Norway, January 2010-June 2011.
- Invited Editor for the IEEE Transactions on Industrial Electronics Special Issue on “Methods and Systems for Smart Grids Optimization”, November 2009-January 2011.
- Chair of the IEEE-PES Power Systems Stability Controls Subcommittee, July 2007-December 2011.
- Member of the Advisory Committee for the IEEE Innovative Smart Grid Technologies (ISGT) Conference, Chalmers University of Technology, Gothenburg, Sweden, April-October 2010.
- Member of Technical Committee of the 5th CIGRE Canada Conference, March-October 2010.
- Chair of IEEE-PES Task Force “Impact of Industry Restructuring on System Dynamic Performance,” Power System Stability Subcommittee, June 2005-July 2010.
- Member of Technical Committee of the 4th CIGRE Canada Conference, October 2008-October 2009.
- Member of the International Program Committee for the 2009 IEEE PowerTech Conference in Bucharest, Romania, Nov. 2007-June 2009.
- Associate Editor of the journal Optimization and Engineering (OPTE), May 2008-April 2009.
- Member of the Editorial Board of the International Journal of Emerging Electric Power Systems, December 2003-September 2007.
- Member of the Technical Programme Committee for the IREP’s 2007 VII Bulk Power Systems Dynamics and Control Symposium, Nov. 2006-August 2007.
- Secretary of the IEEE-PES Power Systems Stability Controls Subcommittee, July 2006-July 2007.
- Member of the International Program Committee for the 2005 IASTED Power and Energy Systems (PES) conference, January-October 2005.
- Member of the Technical Programme Committee for the 2005 Power System Computation Conference (PSCC), May 2003-July 2005.
- Member of the Technical Programme Committee for the IREP’s 2004 VI Bulk Power Systems Dynamics and Control Symposium, Nov. 2003-August 2004.
- Member of Advisory Committee for 2004 conference “Electric Supply Industry in Transition: Issues and Prospects for Asia,” Asian Institute of Technology (AIT), Bangkok, January 2004.

- Member of the IEEE/CIGRE Task Force on Power System Stability Terms, Definitions and Classifications, February 1998-December 2003.
- Member of the Technical Programme Committee for the 2002 Power System Computation Conference (PSCC), December 2000-July 2002.
- Chair of the Voltage Stability Focus Group of the IEEE-PES Power System Stability Subcommittee February 1997-January 2002. Organizer and Chair of several panel sessions at the IEEE-PES Summer and Winter Meetings.
- Sigma Xi Member 1991-2002.
- Chair of the North American Power Symposium (NAPS) 2000, University of Waterloo, October 1999-October 2000.
- Secretary of the IEEE-PES Voltage Stability and Long Term Stability Working Group, July 1994-January 1997.

b. Refereeing:

- Member of the College of Reviewers for MITACS/MPRIME, December 2007-today.
- Member of the College of Reviewers for CFI's Leaders Opportunity Fund (LOF), October 2005-today.
- Reviewer of grant proposals for the Qatar National Research Fund since 2007.
- Reviewer of grant proposals for the Italian Ministry for University and Research since 1998.
- Member of Review Panel for Mechatronic Systems Engineering Program, Simon Fraser University, March 8 -9, 2017.
- Member of the Ontario Research Fund (ORF) ICT Panel, June 2016.
- Member of International Scientific Committee reviewing the Department Electrical Engineering, University of Chile, Santiago, October 5-7, 2015.
- Member of Review Panel for Graduate Program, Electrical and Computer Engineering, Ryerson University, February 23-24, 2015.
- Member of Review Panel for BTech Energy Engineering Technology Degree Completion Program, McMaster University, March 27 -28, 2014.
- Member of NSERC IRC Review Panel, Ecole Polytechnique, Montreal, February 5-6, 2014.
- Member of an NSF Review Panel, Washington, DC, US, October 22-23, 2007.
- Member of an NSF Review Panel, Washington, DC, US, May 22-23, 2006.
- Chair of the Ontario Graduate Scholarship (OGS) panel 17, 2005.
- Member of the Ontario Graduate Scholarship (OGS) panel 13, 2004.
- Member of the Ontario Graduate Scholarship (OGS) panel 8, 1998.
- Chair of the Ontario Graduate Scholarship (OGS) panel 6, 1997.
- Reviewer of grant proposals for NSERC since 1996.
- Referee of promotions and tenure cases from various universities around the world.
- Regular reviewer for various journals and conferences, notably: IEEE Transactions on Power Systems, Power Delivery and Circuits and Systems; IET Journal (formerly IEE Proceedings) Generation,

Transmission & Distribution; International Journal of Electrical Power & Energy Systems; Electric Power Research; Power System Computation Conference (PSCC); IEEE Conference on Decision and Control (CDC); North American Power Symposium (NAPS); Intelligent System Application to Power Systems Conference (ISAP); Power Industry Computer Applications (PICA); International Symposium on Circuits and Systems (ISCAS); IEEE Power Tech conference.

c. Department Service:

- E&CE Rep to EFC, January 2016-December 2017.
- EFC Nominations Committee, January 2016-December 2017.
- Associate Chair for Research, Department of Electrical and Computer Engineering (E&CE), September 2015-August 2016.
- Member of the Department Tenure and Promotions Committee (DTPC), June 2012-April 2016.
- Member of Annual Merit Committee, January 2015, 2016.
- Member of DACA II, October 2008-July 2015.
- Member of Dept. Administrative Officer Hiring Committee, December 2011-May 2012.
- Member of Dept. Merit Addendum Review Task Force, September-November 2011.
- Member of the Vision 2015 Research Committee, December 2010-July 2011.
- Member of the Restructuring Task Force, October 2008-April 2009.
- Member of Annual Merit Committee, January 2009.
- Member of the ATC MEng Power Program Steering Committee, October 2004-August 2006.
- Graduate Studies Committee: Member, October 2005-August 2006, September 1995-August 1999; Chair, September 2000-January 2003; Ex-officio February 2003-August 2004.
- Acting Chair, July 2004-August 2004.
- Member of the Nanotech Program Committee, February 2003-August 2004. Organizer of a special Nanotech workshop in May 2003 with high profile invited speakers, as well as taking charge of the proposed program website.
- Member of Department hiring committee (DACA), February 2003-August 2004.
- Member of the Department Program Committee (DPC), September 2000-August 2004.
- Member of the Resource Committee, June 1998-August 1999, September 2000-August 2004.
- Member of the Merit Committee, January 2001-August 2004.
- Deputy Chair, February 2003-June 2004.
- Associate Chair of Graduate Studies, September 2000-January 2003.
- Member of the Lecturer hiring committee (Lecturer DACA), September 2000-August 2002.
- Member of the Chair Selection Committee, October 2000-January 2001.
- Secretary of CSC hiring committee (DACA), February-August 1999.
- Co-organizer and co-chair of E&CE Retreat, February-April 1999.
- Secretary of the Power Systems Research Group, September 1995-August 1999.

- Member of the Tenure Committee, July 1998-August 1999.
- Member of the Program Management Task Force, February-March 1998.
- Member of the Future Directions Task Committee (FDTC), July-August 1997.
- Secretary of the hiring committee (DACA D) for the Power Electronics area, February 1996-April 1997.

d. University and Faculty Service:

- Senator, May 2017-April 2020.
- University Program Internal Review Committee, June 2011-today.
- Associated Director of the Waterloo Institute for Sustainable Energy (WISE), September 2008-August 2015.
- Faculty Nominations Committee, January 2009- December 2010.
- E&CE Representative to the Engineering Faculty Council, January 1996-December 1997, and January 2002-December 2003, January 2009- December 2010.
- FOE Graduate Studies Committee member, September 2000-January 2003.
- Member of the Faculty of Engineering Dean Selection Committee, April 2002-September 2002.
- Member of FOE Graduate Task Force, November 2000-January 2001.
- Member of the Engineering PhD Admission Subcommittee A, September 1996-December 1997.
- Member of the Engineering First Year Council, September 1996-August 1999.
- Mentor for TA Workshop, September 1995.
- Member of the Advisory Committee for the students' CCSE conference at Waterloo, January 1996.
- Judge for Sandford Fleming Debates since January 1995.
- Power Systems Department Chair, Escuela Politécnica Nacional, Quito-Ecuador, January 1993-August 1993.

e. Community Volunteer Service:

- Member of the Board of Advisors of NRGGen Inc., Toronto, Canada, June 2003-November 2005.
- Timer for the Region of Waterloo swimming meets September 1996-June 2002.
- Coach for the Waterloo Minor Soccer League: May 1994-August 1997.