

ALI T. AL-AWAMI

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EDUCATION

Ph.D. in Electrical Engineering, December 2010

University of Washington (UW), Seattle, WA

Research Topic: Optimizing grid operations with high penetration of wind power

Academic Advisor: Professor Mohamed El-Sharkawi

M.Sc. in Electrical Engineering, GPA: 3.81/4.0, June 2004

King Fahd University of Petroleum & Minerals (KFUPM), Dhahran, Saudi Arabia

Thesis Title: Design of Robust PSS and FACTS-Based Controllers for Stability

Enhancement of Power Systems

B.Sc. in Electrical Engineering, First Honors, GPA: 3.96/4.0, June 2000

King Fahd University of Petroleum & Minerals (KFUPM), Dhahran, Saudi Arabia

RESEARCH INTERESTS

Stochastic operation for power grids with high penetration of wind power, integration of renewable energy sources, electric vehicles, and storage media into the smart grid, power system operations, control, and stability, optimization techniques, and artificial intelligence.

TEACHING EXPERIENCE

Assistant Professor, April 2011-present

King Fahd University of Petroleum & Minerals, Department of Electrical Engineering, Dhahran, Saudi Arabia

Teaching Assistant, 2008-2010

University of Washington, Department of Electrical Engineering

- Assisted in teaching the course of Fundamentals of Power and Energy Systems.
- Duties included teaching laboratory sessions, grading students' work, and occasionally, teaching lectures in the absence of the head professor.

Lecturer, 2002-2006

King Fahd University of Petroleum & Minerals, Department of Electrical Engineering

COURSE DEVELOPMENT EXPERIENCE

As an Assistant Professor, Spring Term, 2016

KFUPM, Department of Electrical Engineering, Dhahran, Saudi Arabia

- Developed new senior-level course titled "**Power System Planning and operation (EE467)**".

As a Visiting Scholar, Summer 2012

University of Washington, Department of Electrical Engineering, Seattle, WA, USA

- Developed a graduate-level online course titled "**Smart Grid Planning**" – Developed a series of 40 lectures (audio and video) covering generation planning, transmission planning, distribution and microgrid planning.

As an Assistant Professor, 2011-2012

KFUPM, Department of Electrical Engineering, Dhahran, Saudi Arabia

- Developed the Power Systems part of the undergraduate-level course titled **“Introduction to Electrical Engineering and Computation (EE206)”**.

AWARDS

Best Paper Award – First Place: IEEE Clemson University’s Power System’s Conference (PSC’16), Clemson, SC, USA, Mar. 8-11, 2016.

Paper title: Optimal Demand Response Bidding and Pricing Mechanism with Fuzzy Optimization: Application for a Virtual Power Plant

Best Paper Award – Second Place: Saudi Arabia Smart Grid Conference (SASG2013), Jeddah, Saudi Arabia, Nov. 24-27, 2013.

Paper title: Coordinated trading of solar and thermal energy including V2G services

Third Place Winner: Graduate Student Poster Contest, IEEE PES 2010 General Meeting, 2010

Poster title: Combining Wind and Thermal Bids in Short-Term Electricity Market

First Place Winner: Electrical Engineering Industrial Consortium (EEIC) Poster Contest, University of Washington, 2010

Poster title: Combining Wind and Thermal Bids in Short-Term Electricity Market

Second Place Winner: Electrical Engineering Industrial Consortium (EEIC) Poster Contest, University of Washington, 2009

Poster title: Stochastic Dispatch for a Power Grid with High Penetration of Wind Power

Best Research Project Award for academic Year 2006-2007

King Fahd University of Petroleum & Minerals, Dhahran, Saudi Arabia

Project title: Power System Stability Enhancement Using Unified Power Flow Controllers

Ph.D. Scholarship to study at University of Washington, 2006-2010

Offered by Ministry of Higher Education, Saudi Arabia

Certificate of recognition for academic achievement, 2000

Advanced Electronics Co., (AEC) in association with IEEE-Saudi Arabia

Dean's List of Honors ten semesters, 1995-2000

King Fahd University of Petroleum & Minerals

Prince Mohammed bin Fahd Al-Saud Awards for academic achievement for both elementary and secondary schools, 1989 & 1995

WORK EXPERIENCE

Visiting Faculty Consultant, Summer 2011

Consulting Services Department, Saudi Aramco, Dhahran, Saudi Arabia

- Assisted in issues related to smart grid and renewable energy sources as they relate to Saudi Aramco (SA) strategic plan.
- Developed a collaboration plan between SA and KFUPM. Some parts of the plan had already been implemented during the summer assignment time.

Wind Integration Intern, Summer 2009

Bonneville Power Administration, Vancouver, WA

- Gained experience with Pacific Northwest power market structure and challenges associated with integration of high penetration of wind, both in transmission operation and planning.
- Was involved in BPA's initiatives to facilitate wind integration.

- Analyzed and compared uncertainty levels associated with wind facilities' schedules.
- Proposed a demand response algorithm to help mitigate wind scheduling inaccuracy.

Process Control Visiting Researcher, Summer 2006

Process Control Systems Department, Saudi Aramco, Dhahran, Saudi Arabia

- Got exposed to the application of model predictive control (MPC) in operation control of oil refineries.
- Developed a robust controller for a refinery process using simultaneous stabilization.

Power System Control Engineer, October 2000 - April 2002

System Operation Department, Saudi Electricity Co., Dammam, Saudi Arabia

- Gained experience with Saudi grid's operation and maintenance.
- Particularly, gained experience in power system stability, economic dispatch, load flow, optimal power flow, switching and restoration procedures, load forecasting, load shedding, voltage profile enhancement, and SCADA systems.
- Attended commissioning of the largest steam plant in the Kingdom (Ghazlan Power Plant II, 4x625 MW capacity).

Power Engineering Intern, June - Aug 1999

Ghazlan Power Plant, Saudi Electricity Co., Dammam, Saudi Arabia

MEMBERSHIPS

- Institute of Electrical and Electronic Engineers (IEEE), Power Engineering Society (PES)
- Saudi Scientific Society of Electrical Engineers (SSSEE)

PROJECTS

Funding Agency	Project
NSTIP	Communication-Free Charging Management of Electric Vehicles. A. T. Al-Awami (PI), M. A. Abido (Co-I), and E. Sortomme (Ext. Consultant), and Joao A. Pecas Lopes (Ext Consultant), Project # 14-ENE360-04-R, Approved budget SR 1,789,040, Dec. 2015 – Nov. 2017.
NSTIP	A Market-based Planning Tool for the Utilization of Energy Storage and Electric Vehicles in a Smart Energy Grid. A. T. Al-Awami (PI), Z. Al-Hamouz (Co-I), and E. Sortomme (Ext. Consultant) Project # 14-ENE2897-04, SR811,381, Sep. 2015 – Aug. 2017.
NSTIP	Reducing Diesel Demand in Saudi Arabian Farming Sector using Solar PV System. S. A. Said (PI), A. T. Al-Awami , and I. M. El-Amin, Project # 13-ENE1727-04, SR749,428, Sep. 2015 – Aug. 2017.
KFUPM	Optimal Dispatch of Electric Vehicles Performing Vehicle-to-Grid, A.T. Al-Awami (PI), M. A. Abido (Co-I), and E. Sortomme (Ext. Consultant) Project # RG1404-1 & RG1404-2, Dec. 2014 – Nov. 2016. <i>The optimization problem to be formulated will aim to achieve the aggregator's obligations in the ancillary service markets by following the system operator's reference signals at the minimum dispatch cost.</i>
KFUPM	A New Approach to Demand Side Management using Electric Springs. M. A. Abido (PI), A.T. Al-Awami (Co-I), Project # RG1407-1 & RG1407-2, Sep. 2015 – Aug. 2017.
KFUPM	Electric Vehicle Charge Control in a Smart Energy Grid. A. T. Al-Awami (PI) and M. A. Abido. Project # RG1318-1 and RG1318-2, Jun. 2013 – May 2015. <i>Two charging strategies for EV are proposed. The first strategy is meant to be used by an aggregator whose objective is to devise fuzzy-based charge scheduling using V2G services to enhance profitability. The second strategy relies on distributed controllers that modulate the charging rates of the EVs according to the local voltages at the charging points.</i>
KFUPM	Adaptive Channel Equalization Using Particle Swarm Optimization. A. Zeguine (PI), A. T. Al-Awami , and A. Al-Shaikhi. Project # RG1216-1 & RG1216-2. <i>The objective is to develop a new PSO algorithm for adaptive channel equalization, that can achieve a satisfactory steady state error but with a reduced number of operations.</i>
KFUPM	Stochastic Charging of Electric Vehicle. A. T. Al-Awami (PI). Project # IN111045. <i>A study to develop new tools for managing charging of electric vehicles considering the uncertainties associated with the EVs and the electricity markets.</i>
KFUPM	Tools for Integrating Wind Energy in Power Grid Operations. A.T. Al-Awami (PI). Project # JF111001. <i>A study to develop new tools for</i>

integrating wind energy resources in the operation of the power grid, taking into account the stochastic nature of this renewable resource.

KFUPM

Power System Stability Enhancement Using Unified Power Flow Controllers. M.A. Abido (PI), Y. L. Abdel-Magid, and **A. T. Al-Awami.** Project # FT/2000-25. *A study to investigate the potential of unified power flow controllers in damping low frequency oscillations using a simultaneous stabilization technique.*

LIST OF PUBLICATIONS

PATENTS

- A. H. Abdulhafiz, O. Hammi, A. Zerguine, and A. T. Al-Awami, 'Memory Polynomial Based Digital Predistorter,' Issued by USPO on Oct 13, 2015, patent # US14/284362.
- A. T. Al-Awami and G. M. A. Akhtar, 'Communication-free charging management of electric vehicles under distribution grid constraints,' US14/641249, Patent Pending, Mar. 6, 2015.
- M. A. Ansari, A. T. Al-Awami, and M. A. Abido, 'Coordinated Bidding of Ancillary Services for Vehicle-to-Grid using Fuzzy Optimization,' US14/543823, Patent Pending, Nov. 17, 2014.
- Samy Faddel, A. T. Al-Awami, E. Sortomme, and M. A. Abido, 'A Voltage-Based Controller for an Electric Vehicle Charger,' Under commercialization analysis at Innovation Center.

BOOK CHAPTERS

- **Ali T. Al-Awami**, M. A. El-Sharkawi, 'Stochastic Dispatch of Power Grids with High Penetration of Wind Power Using Pareto Optimization', *Wind Power Systems: Applications of Computational Intelligence*, Edited by Lingfeng Wang, Chanan Singh, and Andrew Kusiak, Springer, 2010
- M. Sarfraz and **Ali T. Al-Awami**, 'Object Recognition using Particle Swarm Optimization on Moment Descriptors,' *Applications in Soft Computing – Advances in Intelligent and Soft computing*, Edited by J. Mehnen, M. Koppen, A. Saad, and A. Tiwari, Springer, 2009
- **Ali T. Al-Awami**, M. A. Abido, Y. L. Abdel-Magid, 'Application of PSO to Design UPFC-Based Stabilizers,' *Swarm Intelligence: Focus on Ant and Particle Swarm Optimization*, Edited by F. T. S. Chan and M. K. Tiwari, I-TECH Education and Publishing, 2007
- M. Sarfraz and **Ali T. Al-Awami**, 'Object Recognition using Particle Swarm Optimization on Fourier Descriptors,' *Soft computing in Industrial Applications – Recent Trends*, Edited by A. Saad, K. Dahal, M. Sarfraz, and R. Roy, Springer, 2007

JOURNAL PUBLICATIONS

- **Ali T. Al-Awami** and E. Sortomme, G. M. Asim Akhtar, and S. Gamal, "Communication-Free Electric Vehicle Charging Management Using Voltage Feedback Control," IEEE Transactions on Vehicular Technologies, 2015 [Accepted]
- **Ali T. Al-Awami**, M. A. H. Ansari, and B. J. Bennett, "A New Stochastic Dynamic Economic Dispatch for Grids with Significant Wind Using Mixed Gaussian Distribution," Arabian Journal of Science and Engineering, 2015 [Accepted]
- M. Ansari, **A. T. Al-Awami**, E. Sortomme, and M. A. Abido, "Coordinated Bidding of Ancillary Services for Vehicle-to-Grid Using Fuzzy Optimization," IEEE Transactions on Smart Grid, vol.6, no.1, pp.261-270, Jan. 2015
- A. H. Abdelhafiz, O. Hammi, A. Zerguine, **A. T. Al-Awami**, and F. M. Ghannouchi, "A PSO Based Memory Polynomial Predistorter With Embedded Dimension Estimation," IEEE Transactions on Broadcasting, vol.59, no.4, pp.665,673, Dec. 2013

- **Ali T. Al-Awami**, E. Sortomme, 'Coordinating Vehicle-to-Grid Services with Energy Trading,' IEEE Transactions on Smart Grid – Special Issue on Transportation Electrification and Vehicle-to-Grid Applications, vol.3, no.1, March 2012, pp.453-462.
- **Ali T. Al-Awami**, M. A. El-Sharkawi, 'Coordinated Trading of Wind and Thermal Energy,' IEEE Transactions on Sustainable Energy, vol. 2, no. 3, July 2011, pp 277-287
- **A. T. Al-Awami**, A. Zerguine, L. Cheded, A. Zidori, and W. Saif, 'A New Modified Particle Swarm optimization Algorithm for Adaptive Equalization,' Digital Signal Processing, vol. 21, no. 2, March 2011, pp. 195-207
- **Ali T. Al-Awami**, Y. L. Abdel-Magid, M. A. Abido, 'A Particle-Swarm-Based Approach of Power System Stability Enhancement with Unified Power Flow Controller,' International Journal of Electrical Power & Energy Systems, Vol. 29, Issue 3, March 2007, pp. 251-259
- **Ali T. Al-Awami**, Y. L. Abdel-Magid, M. A. Abido, 'Simultaneous Stabilization of Power System Using UPFC-Based Controllers,' Electric Power Components and Systems, Sept 2006, Vol. 34, No. 9, pp. 941 – 959
- **Ali T. Al-Awami**, M. A. Abido, Y. L. Abdel-Magid, 'A Comparative Study on the Effectiveness of Robust FACTS Stabilizers for power System Stability Enhancement,' The Arabian Journal for Science and Engineering, Oct 2008, Vol. 33, No. 2B, pp. 519 – 526

CONFERENCE PUBLICATIONS

- Nemer Amleh and **Ali T. Al-Awami**, "Optimal Demand Response Bidding and Pricing Mechanism with Fuzzy Optimization: Application for a Virtual Power Plant," Clemson University's power Systems conference 2016, held in Clemson, SC, USA, March 8-11, 2016. [\[Won Best Paper Award\]](#)
- Gussan Maaz Mufti, Mohsin Jamil, Danial Naeem, Muhammad Usman Mukhtiar, and **Ali T. Al-Awami**, " Performance Analysis of Parabolic Trough Collectors for Pakistan Using Mathematical and Computational Models," Clemson University's power Systems conference 2016, held in Clemson, SC, USA, March 8-11, 2016.
- Samy Faddel, **Ali T. Al-Awami**, and M. A. Abido, "Real Time Digital Simulation of Voltage-Based Controller for Electric Vehicle Charging," Clemson University's power Systems conference 2016, held in Clemson, SC, USA, March 8-11, 2016.
- M. Ijaz, M. F. Sahito, and **A. T. Al-Awami**, "Energy bidding in a day-ahead electricity market using fuzzy optimization," 2015 IEEE International Conference on Industrial Technology (ICIT), pp.2388-2393, Seville, Spain, 17-19 March 2015
- M. Shafiullah and **A. T. Al-Awami**, "Maximizing the profit of a load aggregator by optimal scheduling of day ahead load with EVs," 2015 IEEE International Conference on Industrial Technology (ICIT), pp.1342-1347, Seville, Spain, 17-19 March 2015

- A. Al-Deek and **Ali T. Al-Awami**, “Optimal Storage Sizing for Profit Maximization in a Market Environment,” Saudi Arabia Smart Grid Conference and Exhibition, Jeddah, Saudi Arabia, December 2014.
- W. Khamphanchai, M. Pipattanasomporn, S. Rahman, and **A. T. Al-Awami**, “Impact of Electric Vehicles on Household Voltage Profiles and Possible Mitigation Approach,” Innovative Smart Grid Technologies – Europe conference, Istanbul, Turkey, November 2014
- G. M. Asim Akhtar, **Ali T. Al-Awami**, E. Sortomme, M. A. abido, and M. W. Ahmed, “Autonomous Electric Vehicle Charging Management over Real Time Digital Simulator”, IEEE PES General Meeting, National Harbor, MD, USA, July 2014.
- M.M. Atiqur Rahman, **Ali T. Al-Awami**, and A.H.M.A. Rahim, "Hydro-PV-Wind-Battery-Diesel Based Stand-Alone Hybrid Power System," International Conference on Electrical Engineering and Information & Communication Technology, April 2014.
- M. A. H. Ansari, **Ali T. Al-Awami**, and E. Sortomme, “Optimal Charging Strategies for Unidirectional Vehicle-to-grid using Fuzzy Uncertainties,” IEEE PES Transmission and Distribution Conference and Exposition, Chicago, IL, USA, 14-17 April 2014.
- M. W. Khalid and **Ali T. Al-Awami**, “Coordinated trading of solar and thermal energy including V2G services,” Saudi Arabia Smart Grid Conference and Exhibition, Jeddah, Saudi Arabia, 24-27 November 2013.
[Won Best Paper Award]
- M. A. H. Ansari and **Ali T. Al-Awami**, “Wind Thermal Generation Scheduling with Fuzzy Genetic Optimization,” Saudi Arabia Smart Grid Conference and Exhibition, Jeddah, Saudi Arabia, 24-27 November 2013.
- M. W. Khalid, **Ali T. Al-Awami**, and E. Sortomme, “Stochastic Programming based Bidding Strategy for V2G services”, IEEE Innovative Smart Grid Technologies – Europe 2013, Copenhagen, Denmark, 6-9 October 2013.
- **Ali T. Al-Awami** and E. Sortomme, “Electric Vehicle Charging Modulation Using Voltage Feedback Control”, IEEE PES General Meeting, Vancouver, Canada, July 2013.
- M. W. Khalid, **Ali T. Al-Awami**, “Coordinated trading of solar and thermal energy including Vehicle-to-Grid services,” 24th IASTED Modeling and Simulation Conference, Banff, Canada, 17- 19 July 2013.
- G. M. Asim Akhtar and **Ali T. Al-Awami**, "Emission-aware energy trading by coordinating thermal & wind power generation," 2013 Fourth International Conference on Power Engineering, Energy and Electrical Drives (POWERENG), Istanbul, Turkey, 13-17 May 2013.
- G. M. A. Akhtar, **Ali T. Al-Awami**, M. W. Khalid, “Coordinating Emission-aware Energy Trading with V2G Services”, IEEE EUROCON 2013, Zagreb, Croatia, 1-4 July 2013.
- S.H. Arastu, A. Zerguine, M. O. Bin Saeed, **A. T. Al-Awami**, "Cooperative parameter estimation using PSO in ad-hoc WSN," 2012 Proceedings of the 20th European Signal Processing Conference (EUSIPCO), 27-31 Aug. 2012.

- S. Ghannam, B. Al-Shahrani, A. Essa, F. Al-Dubaikel, **A.T. Al-Awami**, 'On Saudi Aramco's Efforts in Renewable Energy Sources and the Smart Grid', Innovative Smart Grid Technologies - Middle East 2011, Jeddah, Saudi Arabia, December 2011.
- **E. Sortomme, A. T. Al-Awami**, M. A. El-Sharkawi, 'Multi-Objective Optimization for Wind Energy Integration,' IEEE Transmission and Distribution Conference, April 2010
- **A. T. Al-Awami**, M. A. El-Sharkawi, 'Statistical Characterization of Wind Power Output for a Given Wind Power Forecast,' North American Power Symposium, October 2009
- **A. T. Al-Awami**, E. Sortomme, M. A. El-Sharkawi, 'Optimizing Economic/Environmental Dispatch with Wind and Thermal Units,' IEEE Power Engineering Society General Meeting, July 2009
- **Ali T. Al-Awami**, M. A. El-Sharkawi, 'Feedback-Control-Based Optimal Power Flow for Real-Time Operation,' IEEE Power System Conference and Exposition 2009 (PSCE2009), Seattle, March 2009
- **A. T. Al-Awami**, W. Saif, A. Zerguine, A. Zidori, and L. Cheded , 'A New Modified Particle Swarm Optimization Algorithm for Linear and Nonlinear Adaptive Equalization,' International Symposium on Signal Processing and its Applications, Sharjah, U.A.E., Feb. 2007.
- M. Sarfraz and **Ali T. Al-Awami**, 'Arabic Character Recognition Using Particle Swarm Optimization with Selected and Weighted Moment Invariants,' International Symposium on Signal Processing and its Applications, Sharjah, U.A.E., Feb. 2007.
- M. Sarfraz and **Ali T. Al-Awami**, 'Object Recognition using Particle Swarm Optimization on Fourier Descriptors,' 11th Online World Conference on Soft Computing in Industrial Applications WSC11, Sept 11-Oct 6, 2006
- M. A. Abido, **A. T. Al-Awami**, Y. L. Abdel-Magid, 'Analysis and Design of UPFC Damping Stabilizers for Power System Stability Enhancement,' IEEE Symposium on Industrial Electronics, Montreal, Canada, Vol. 3, July, 2006, pp. 2040-2045
- M. A. Abido, **Ali T. Al-Awami**, Y. L. Abdel-Magid, 'Power System Stability Enhancement Using Simultaneous Design of Damping Controllers and Internal Controllers of a Unified Power Flow Controller,' 2006 IEEE PES General Meeting, Montreal, Canada, June 2006, pages: 8
- **Ali T. Al-Awami**, M. A. Abido, Y. L. Abdel-Magid, 'Power System Stability Enhancement Using Unified Power Flow Controllers,' 3rd Industrial Electrical and Electronics GCC Conference, IEEE-GCC3, Manama, Bahrain, March 2006
- **Ali T. Al-Awami**, Y. L. Abdel-Magid, M. A. Abido, 'Simultaneous Stabilization of Power Systems Equipped with Unified Power Flow Controller Using Particle Swarm,' 15th Power Systems Computation Conference, PSCC'05, Liège, Belgium, Aug. 2005.
- **Ali T. Al-Awami**, Y. L. Abdel-Magid, M. A. Abido, 'Particle-Swarm-Based Robust Coordinated Design of PSS and SVC-Based Stabilizer,' Proceedings of 2nd IEEE-GCC Industrial Electrical and Electronics Conference, Manama, Bahrain, Nov, 2004, pp 55-60.

- **Ali T. Al-Awami**, Youssef. L. Abdel-Magid, M. A. Abido, 'Particle-Swarm-Based Robust Coordinated Design of PSS and SVC-Based Stabilizer,' 2nd IEEE-GCC Industrial Electrical and Electronics Conference, Manama, Bahrain, Nov 2004, pp 55-60

INVITED TALKS

- "Demand response: A valuable asset for a smarter electric grid". KAUST Human-Machine Networks and Intelligent Infrastructure conference, Oct 5-7, 2015, organized by and held at King Abdullah University of Science and Technology (KAUST), Saudi Arabia.
- "Smart grid means demand response - Electric Vehicles as an example". KAUST-NSF Research Conference on Electronic materials, Devices and SyHuman-Machine Networks and Intelligent Infrastrutems for a Sustainable Future, Mar 14-16, 2016, organized by and held at King Abdullah University of Science and Technology (KAUST), Saudi Arabia.

REFEREE FOR

- IEEE Transactions on Power Systems
- IEEE Transactions on Smart Grid
- IEEE Transactions on Sustainable Energy
- IEEE Transactions on Industrial Electronics
- IEEE Transactions on Computational Intelligence
- International Journal of Power and Energy Systems
- Energy Conversion and Management
- Arabian Journal of Science and Engineering
- ISA Transactions
- IEEE Power Systems Conference and Exposition (PSCE2009), March 2009
- IEEE Power Engineering Society General Meeting, July 2009
- ISGT-Middle East, December 2011 (as a member of the Technical Committee)
- Saudi Arabian Smart Grid Conference and Expo, 2012 (as a member of the Technical Committee)
- Saudi Technical Exchange Meeting, December 2012 (as a member of the Technical Committee)
- Saudi Arabian Smart Grid Conference and Expo, 2013 (as a member of the Technical Committee)
- Saudi Arabian Smart Grid Conference and Expo, 2014 (as a member of the Technical Committee)
- Saudi Arabian Smart Grid Conference and Expo, 2015 (as a member of the Technical Committee)