

Wei Tian, Ph. D.

CONTACT: Robert W. Galvin Center for Electricity Innovation
10 W 35th Street, Suite 16D8-1 Chicago, IL, 60616

Phone: 1(312)-659-6259
Email: tw@hawk.iit.edu

SUMMARY

- Over 10 years' experience in power system research and 3 years' software development experience in financial company. As lead research scientist, participation in multiple projects of which the total funding amount exceeds 15 million dollar.
- Expertise in applying optimization algorithms to solve secure and economical operation of power systems, congestion analysis, transmission expansion planning, renewable energy integration analysis, microgrid study, etc.
- Expertise in large-scale system/data calculation and analysis (over 50,000 bus power system of the Eastern Interconnection of U.S.A, over 8 million user financial data of China Construction Bank Shaanxi Branch at year 2007, etc).
- Expertise in user interface (UI) design/development, especially using geographic information system (GIS) for Power Generation and Transmission Services.
- IEEE Senior Member (2015~).
- Certified system analyst in China (2007, senior engineer level).

EDUCATION

- **Illinois Institute of Technology**, Chicago, IL 08/2007-08/2011
PhD in Electrical Engineering, August 2011
Dissertation Title: Large-Scale Simulation of Electric Power System for Wind Integration
Advisor: Prof. Mohammad Shahidehpour, IEEE Fellow
- **Xi'an Jiaotong University**, Xi'an, Shaanxi, China 09/2001-07/2004
M.S. in System Engineering, July 2004
Dissertation Title: The Optimization Methods for Power Generation Scheduling and System Implementation
Advisor: Prof. Xiaohong Guan, IEEE Fellow
- **Shandong University**, Jinan, Shandong, China 09/1997-07/2001
B.S in Computational Mathematics, July 2001
Dissertation Title: Realization of Fast Fourier Transform based on MMX Instruction Set

WORK EXPERIENCE

- **Robert W. Galvin Center for Electricity Innovation** of Illinois Institute of Technology, 09/2011-Present
Research Scientist
- **China Construction Bank**, Xi'an, Shaanxi, China, 07/2004-08/2007
System Analyst in Department of Information Technology Management

CERTIFICATION

- Certified System Analyst, China, 05/2007
- Certified Software Designer, China, 11/2004.

PUBLICATIONS

- [18] X. Liu, M. Shahidehpour, X. Liu, Z. Li, Y. Cao, and **W. Tian**, "Protection Scheme for Loop-based Microgrids", accept and to be present at IEEE Trans. on Smart Grid, 2016
- [17] Y. Sun, J. Zhong, Z. Li, **W. Tian**, and M. Shahidehpour, "Stochastic Battery-Based Energy Storage Transportation Scheduling in Electric Power Systems", accept and to be present at IEEE Trans. on Sustainable Energy, 2016
- [16] Z. Suai, S. Mo, J. Wang, Z. John Shen, **W. Tian**, and Y. Feng, "Droop control method for load share and voltage regulation in high-voltage microgrids", J. Mod. Power Syst. Clean Energy, 4(1):76–86, 2016
- [15] Z. Shuai, Y. Sun, Z. J. Shen, **W. Tian**, C. Tu, Y. Li, and X. Yin, "Microgrid Stability: Classification and a Review", Renewable & Sustainable Energy Reviews, Vol. 58, Pages 167–179, May 2016
- [14] Y. Sun, R. Mao, **W. Tian**, and Z. Li, "Constant Jacobian Matrix Based Stochastic Galerkin Method for Probabilistic Power Load Flow," Energies 9(3), 153, 2016
- [13] Y. Sun, Z. Li, **W. Tian**, and M. Shahidehpour, "A Lagrangian Decomposition Approach to Energy Storage Transportation Scheduling in Power System," IEEE Trans. on Power Systems, accept and available online, 2016
- [12] Y. Fu, C. Wang, **W. Tian**, and M. Shahidehpour, "Integration of Large-Scale Offshore Wind Energy via VSC-HVDC in Day-ahead Scheduling," IEEE Trans. on Sustainable Energy, Vol: 7, no. 2, Apr., 2016
- [11] Z. Li, Y. Jiang, X. Zhang, and **W. Tian**, "Market-Based Optimal Control of Plug-In Hybrid Electric Vehicle Fleets and Economic Analysis," Journal of Energy Engineering (2015): 04015025. (Corresponding author)
- [10] X. Liu, M. Shahidehpour, Y. Cao, Z. Li, and **W. Tian**, "Risk Assessment in Extreme Events Considering the Reliability of Protection Systems," IEEE Trans. on Smart Grid, Vol: 6, no. 2 (2015): 1073-1081.
- [9] Y. Jiang, J. Liu, **W. Tian**, M. Shahidehpour, M. Krishnamurthy, "Energy Harvesting for the Electrification of Railway Stations: Getting a charge from the regenerative braking of trains," IEEE Electrification Magazine, Vol. 2, Issue 3, pp. 39 – 48, 2014.
- [8] H. Wu, M. Shahidehpour, Z. Li, **W. Tian**, "Chance-Constrained Day-Ahead Scheduling in Stochastic Power System Operation", IEEE Trans. on Power Syst., Vol. 29, pp. 1583-1591, Jul., 2014
- [7] **W. Tian**, Y. Jiang, M. Shahidehpour, M. Krishnamurthy "Vehicle Charging Stations with Solar Canopy: A Realistic Case Study within a Smart Grid Environment," in Proc. 2014 IEEE Transportation Electrification Conference & Expo, June 15-18, Dearborn, Michigan, 2014
- [6] **W. Tian**, M. Shahidehpour, and Z. Li, "Renewable Energy Procurement in Illinois," The Electricity Journal, Vol. 27, pp. 43-51, 2014
- [5] J. Liu, Y. Liu, **W. Tian**, "Influence of Wind Power Absorption Level by CCGT on Power System Operational Index", Electric Power Automation Equipment, Vol. 33, No. 9, pp. 1-6, Sept. 2013

- [4] P. Zhang, Peng, J. Liu, and **W. Tian**. "Demand-side emission reduction based energy-saving dispatch and the improved NSGA-II method." *Power System Protection and Control* Vol. 40, No. 16, pp. 42-48, 2012
- [3] **W. Tian**, M. Shahidehpour, and Z. Li, "Analysis of 2030 Large-scale Wind Energy Integration in the Eastern Interconnection using WINS," *The Electricity Journal*, Vol. 24, pp. 71-87, 2011
- [2] **W. Tian**, Z. Li, and M. Shahidehpour, "Transmission Congestion Analysis in the Eastern Interconnection using POMS," in *Proc. IEEE Power Eng. Soc. General Meeting*, Minneapolis, July 26-29, 2010
- [1] **W. Tian**, Q. Zhai, X. Guan, "Power Generation Scheduling Based on Mixed-Integer Linear Programming", *Power System Technology*, 2003 supplement, in Chinese

PATENT

- SYSTEM OF POWER SYSTEMS OPTIMAL SCHEDULING BASED ON LAGRANGIAN METHOD V1.0
X. Guan, F. Gao, Q. Zhai, L. Wu, **W. Tian**, L. Sun, Y. Guo, L. Shao, and X. Fan, Institute of Systems Engineering, XJTU, China, 2003.

INVITED TALK

- Congestion analysis and renewable Energy Integration in Large-Scale Power System
Hebei University of Technology & Tianjin University, Tianjin, China, Dec. 31, 2013
- Large-scale renewable energy integration and research on smart grid
2015 Silk Road Symposium for Distinguished Young Scholars at Xi'an Jiaotong University, Xi'an, China, Dec. 22, 2015
- Large-scale renewable energy integration and research on smart grid
Tianjin University, Tianjin, China, Dec. 30, 2015

SELECTED PROJECT EXPERIENCE IN POWER SYSTEM

- Illinois State Planning Roadmap, (\$300,000), DOE, 2015-2016
 - Provided technical support at IIT, developed model and software for simulation and analysis
- Research, Development, and Testing of a Master Controller with Applications to the Bronzeville Community Microgrid System, (\$1,200,000), DOE, 2014-2016
 - Design and developed master controller algorithm and software for automation and optimization of the community microgrid
- The perfect power prototype for Illinois Institute of Technology, \$12,000,000, Funded by DOE, 2008-Present
 - Applied OSIsoft PI System in supervisory control and data acquisition (SCADA) development for the microgrid at Illinois Institute of Technology, designed and developed one-line diagram using OSIsoft PI Process Book
 - Developed Data Acquisition (DAQ) software for Perfect Power Systems, Designed and developed an web-based online monitoring system to display and monitor the real-time information data of wind turbine, generator, PMU, Solar Panel, etc., smart grid appliances installed at IIT main campus
 - Developed master controller algorithm and software for automation and optimization of the campus microgrid

- Application of the Energy Zones Mapping Tool, \$100,000, Funded by National Association of Regulatory Utility Commissioners (NARUC), 2014
 - Performed and analyzed the test cases and prepare the final white paper.
- Large Scale Wind Energy Integration Analysis in the U.S. Eastern Integration, \$750,000, Funded by DOE, 2009-2012
 - Large-scale System Simulation considering Wind Energy Integration
 - Generation Adequacy Analysis
 - Visualization of Simulation Results
 - Developed a Software Platform named as “Wind Integration Simulator” (WINS)
 - Large-Scale Offshore Wind Energy Integration at the Atlantic Area
 - Large-Scale Offshore Wind Energy Integration at the Great Lake Area
- Illinois Electricity Procurement Plan, Illinois Power Agency, 2011-2012
 - Provided technical support at IIT for simulation and analysis of the power system in Illinois.
- Atlantic Wind Connection Project, 2010-2011
 - Provided technical support at IIT for studying the impact of large scale off-shore wind integration on the Eastern Interconnection, especially on PJM and MAAC area.
 - Developed a analysis software for calculating economic metrics of large-scale power system.
- Simulation and Analysis of Electric Power Systems in Illinois, Illinois Power Agency, 05/2011-07/2011
 - Provided technical support at IIT for studying the impact of load, carbon tax, fuel price, and 30MW solar energy integration.
 - System simulation, result analysis and writing technical report.
- International Collaboration Program for the Expansion of Distributed Energy Resources in Electricity Markets, ADICA LLC, 02/2011-05/2011
 - Provided technical support at IIT for Price Elasticity and Demand Response Analysis in Korea for 2010 using EMCAS.
 - System simulation, result analysis and writing technical report.
- Transmission Congestion Analysis in the U.S. Eastern Interconnection, 2008-2009
 - Large-scale System Simulation
 - Transmission Congestion Analysis
 - Visualization of Congestion Analysis Results using GIS Data
- Power Market Simulation and Forecast System for Shandong Electric Power Company, China, 12/2002-03/2004
 - B/S Architecture
 - Calculate unit commitment and dispatch results in electricity market.
 - Principal Software Developer for GUI and Power System Optimization Module
- Web-based Power Market Simulation Platform, funded by 863 Plan, Xi'an China, 09/2001-12/2002
 - B/S Architecture
 - Market Price Forecast, Unit Commitment and Power Market Simulation
 - Principal Software Developer for GUI and Power System Optimization Module

SELECTED PROJECT EXPERIENCE IN FINANCIAL SYSTEM

Lead Engineer and Principal Software Developer for the following projects

- Historical Data Management of CCB, China, 06/2005-08/2007
 - System development, Deployment and Maintenance
 - Requirement Analysis and Data Mining
 - Related technical skill: Hp-Unix, C, Informix
- Bill Discounting Management System, China, 06/2005-09/2005
 - Technical Director
 - System Deployment and Maintenance
 - Provide technical training for all the sub-branches in Shaanxi Province (over 100 employees)
- Data Center Consolidation (DCC) of China Construction Bank, China, 07/2004-05/2005
 - Data Definition, Transform and Load
 - Transfer system and data from Unisys A environment to Unix environment
 - Transfer Data Center from Xi'an to Beijing

OTHER PROJECTS/DESIGN AND DEVELOP EXPERIENCE

- Designer and developer of The third IEEE PES Conference on Innovative Smart Grid Technologies (ISGT2012) website (<http://www.ieee-isgt.org>, now transfer to <http://www.iitmicrogrid.net/isgt2012/>)
- Designer and developer of The 2012-2014(2nd-4th) Annual Great Lakes Symposium on Smart Grid and the New Energy Economy website (<http://www.greatlakessymposium.org>)
- Designer and developer of The Robert W. Galvin Center at IIT website (<http://www.iitmicrogrid.org>)

TECHNICAL SKILLS

- OS/soft PI System, LabView
- Languages: C, C++, SQL, C#, Html, JavaScript, Asp.net
- Databases: MS SQL Server, ORACLE, MS Access, Informix
- Operating Systems: Windows, Unix

PREPARED TECHNICAL REPORTS

- White Paper: Applications of the Energy Zones Mapping Tool, NARUC, 11/2014
- Hourly AWC Study for the Year 2021, Atlantic Wind Connection 11/2011
- Simulation and Analysis of the Illinois Electricity System with 30MW Solar Energy Integration, Illinois Power Agency 08/2011
- Simulation and Analysis of Illinois's Power System for 2011 using EMCAS, Illinois Power Agency 06/2011
- 2011 Generation Portfolio Analyses in Illinois, Illinois Power Agency 05/2011
- Price Elasticity and Demand Response Analysis in Korea for 2010 using EMCAS, ADICA LLC 05/2011

SELECTED TRAINING

- Visualizing PI System Data, Houston, USA, 05/2014
- Database Development and Application based on Oracle, Beijing, China, Apr. 08/2007
- Collection, Integration and Transformation of Large Volumes of Data using IBM DataStage, Xi'an, China, 10/2006

- Business Intelligence Development and Application based on Cognos, Xiamen, China, Dec. 2005 (Cognos belong to IBM since 2007)

PROFESSIONAL ACTIVITIES

- Technical Program Committee, 5th IEEE International Conference on Smart Grid Communications, Venice, Italy, Nov., 2014
- Technical Program Committee, 2015 International Symposium on Intelligent Systems Technologies and Applications (ISTA'15), August 10-13, Kochi, India, 2015.
- Technical Program Committee, 2016 International Symposium on Intelligent Systems Technologies and Applications (ISTA'16), September 21-24, Jaipur, India, 2016.
- Refereed Journals
 - Reviewer, IEEE Transactions on Power Systems
 - Reviewer, IEEE Transactions on Smart Grid
 - Reviewer, IEEE Transactions on Power Delivery
 - Reviewer, IEEE Power Engineering Letters
 - Reviewer, Computers and Industrial Engineering
 - Reviewer, Environmental Science & Technology
 - Reviewer, Renewable Energy
 - Reviewer, Energy Systems
 - Reviewer, International Journal of Modeling, Identification and Control
 - Reviewer, Journal of Energy Engineering
 - Reviewer, IET Generation, Transmission & Distribution
 - Reviewer, Applied Energy
 - Reviewer, International Journal of Industrial and Systems Engineering
 - Reviewer, Renewable & Sustainable Energy Reviews
- Refereed Conferences
 - Reviewer, 39th Annual Conference of IEEE Industrial Electronics Society 2013
 - Reviewer, IEEE Bucharest PowerTech Conference 2009
 - Reviewer, General Meeting of the IEEE Power and Energy Society 2010
 - Reviewer, General Meeting of the IEEE Power and Energy Society 2012
 - Reviewer, General Meeting of the IEEE Power and Energy Society 2013
 - Reviewer, IEEE PES Conference on Innovative Smart Grid Technologies 2012

MEMBERSHIP

- Member, North American Chinese Power Professional Association (NACPPA)
- Senior Member, IEEE/ Power and Energy Society
- Marquis Who's Who in Science and Engineering, 2015