Dr. Xiaoyu Wang

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Summary

- Extensive technical expertise in power electronics, power system and controls and data analysis.
  - 10+ year hands-on experience on electrical and control of renewable energy (wind, solar).
  - Technical expert of power electronics, power quality, modeling, control and software.
  - Experienced in software architecture and development. Passionate and result-driven.
- Broad technical knowledge and active learner.
  - Prognosis with AI and big data. Passionate in non-linear network and complex system behavior.
  - Curious and open-minded to fields beyond major technical expertise.
- Demonstrated ability to quickly synergize technologies in system level.

Specialties

- People and business management. Leadership in new technologies development. Sig sigma, DFSS.
- Wind turbine (DFIG. DD). Solar power. Power quality. Substation (transformer. switchgear). Micro-grid
- Power electronics (Motor control, Grid integration control). Analysis and design of power converter.
- Power system (Wind farm/sub-synchronous stability. Grid code compliance. EMS)
- Modeling and simulation (Software-in-loop, Hardware-in-loop, Saber, PSS/E, DIgSILENT).
- Data analysis and smart algorithm(Matlab, Artificial neural network, SVM, Pattern Recognition, Fault tree)
- Software development(C/C++, C#, Ruby, Aim). Control system (PLC, Fieldbus, SCADA, DSP, FPGA).

Working Experience (2007~2017)

2010.01 ~ Now	Envision Energy	
2014~2016	Deputy Director Product Manager	Intelligent control and big data analysis • Digital performance model based on SCADA data • Converter as virtual sensing to prognosis generator bearing failure • Smart electric system to improve energy yield • Next-generation control platform based on IPC Wind farm and grid integration • Developed wind turbine for distribution grid and micro-grid • Collection line fault localization software. Prefabricated substation • Lead university cooperation and Sino-Danish RED Programme
2010~2013	R&D Manager System engineer	Development of power converters and wind turbine electrical system • 1.5MW,2MW air-cooling DFIG • 2.5MW,4MW water-cool full power conversion • Lead converter control and grid integration
2007 ~ 2009	GE Global Research Center	
2007.06 ~ 2009.12	Lead Research Engineer	• GE's 250kW solar photovoltaic(PV) power converter • Control and pumpback test of GE's 10MW high-speed electric drive for oil/gas compressor

Education (1997~2007)

- Ph. D. in Power Electronics, 2007, Xi'an Jiaotong University, China
  Dissertation: *General Expression and Comparison of the Control Schemes for Parallel Active Power Filter*
- M.S. in Control Theory and Engineering, 2004, Xi'an Jiaotong University
  Thesis: *Research and Development of a Digital Controlled Series Power Quality Controller*
- B.S. in Electrical Engineering, second degree in Business Administration, 2001, Xi'an Jiaotong Univ.
  Thesis: *The Application of Fieldbus in DC Power System Monitor Model*

Experience/ Envision Energy(2010~Now)

Lead R&D activities of power converter, turbine control, and substation for last 7 years.

1. Smart control and industrial data mining

Diagnosis and prognosis with artificial intelligence and big data (2013.11 ~ Now)

Develop algorithms of smart control and data analysis, leveraging big data and artificial intelligence
Accomplishments:
- Developed digital performance model with SCADA data based on ANFIS (Adaptive neuro fuzzy inference system). Inaccurate rate < 2%, much accurate than traditional power curve fitting
- Simulation with trained and verified digital model to prognosis wind farm energy output
- Developed virtual sensing model in converter to prognosis early failure of generator bearing based on voltage and current, verified with Envision CMS.

Next-generation control platform to integrated converter, pitch and turbine control (2012.10~2014.12)

Accomplishments:
- Developed new control platform based on open architecture (IPC and Ethernet) instead of proprietary PLC. Verified in 4MW offshore turbine.
- All the control of power converter, pitch, and turbine runs in single industrial PC, which improved the performance and easy to maintain and diagnostic.
- C code is auto-generated from Matlab Simulink, which improved development efficiency.
- Built hardware-in-loop (HIL) real-time test platform for converter, turbine and farm controller.

Power electronics enabled smart turbine electrical system (2014~Now)

Employ more power electronics to enable smarter control to reduce turbine cost and improve efficiency
Accomplishments:
- Developed dual-mode smart turbine that automatically switch between DFIG and full-power conversion which increased annual energy production (AEP) of DFIG by 0.5%~2%.
- Dynamic boost turbine power based on dynamic life estimation and real-time limits estimation
- Developed smart transformer integrated to power converter with dynamic capacity boundary
- Developed dynamic voltage and VAR optimization to reduce wind farm loss, which increased annual energy production (AEP) by 0.5%.

2. Power electronics and turbine electric system

1.5MW, 2.5MW DFIG power converter (2011~2013), 2.5MW, 4MW full power converter (2014~2017)

Lead the R&D activities of Envision in-house power converter

Accomplishments:
- Developed in-house power converter (1.5MW, 2.5MW DFIG, 2.5MW, 4MW full power converter)
- Already in mass production of over 3,000 units (~2 billion RMB).
- Better performance and higher reliability than outsourcing converter
- System optimization with turbine design with higher efficiency, and dynamic performance
- Enabled broad intelligent control of generator control, smart transformer, virtual sensor etc.

Modeling and simulation platform (2010.2~2013.12)

Developed the electromagnetic model, electromechanical model and hardware-in-the-loop simulation platform to verify products and meet grid code of China and international grid code.

Accomplishments:
- Developed high-fidelity co-simulation platform with Bladed (Mechanical and load model) and Matlab (electrical model), accepted by CEPRI as standard approach for LVRT certification.
- Delivered model: Saber, DIgSILENT, PSS/E, BPA, etc. Simulation results meet FGW requirement.
- Hardware –in-loop (HIL) simulation platform simulate power converter, turbine controller and farm controller in real-time.

3. Wind farm and grid integration

Grid integration analysis and advanced grid package development (2015.11~Now)

Accomplishments:
- Developed advanced grid package for international market, including frequency control, voltage control, virtual inertia control etc.
- Analyzed and resolved the subsequence resonance problem in high penetration wind area.
- Actively participated in grid code development, expert invited by China CEPRI and IEC SC8A.

Distributed wind turbine (2013.11~2015.1)

Responsible for Envision wind turbine development for distribution grid and micro-grid power system

Accomplishments:
- Identified special challenge of distributed wind and designed the technical specification
- Developed voltage control and power control to maximize wind penetration to distribution grid
- Deployed in Huaneng project for 2 years. Performance and stability recognized by customers

Prefabricated substation (2015.11~Now)

Accomplishments:
- Designed prefabricated modulator substation to standardize substation from project to product
- Developed collection line fault location and smart diagnostic software. Wind turbines work as virtual sensors to improve accuracy of location estimation.

Sino-Danish RED Programme: Demonstration of Microgrid with Wind, PV, Storage and Industrial Loads

Engineering management, from project proposal, management and delivery

Accomplishments:
- Lead co-research with Tsinghua University and Technical University of Denmark (DTU)
- Developed Envision microgrid management system, and successful delivered the microgrid project

Working Experience/GE Global Research Center (2007 ~ 2009)

GE's 250kW solar photovoltaic(PV) power converter(2007~2008)
- ➢ Retrofitted from GE's wind power converter to synergize GE's competitive advantages in Wind Energy and leverage sourcing, manufacturing, reliability learning and utility grid interconnection functionalities.
- ➢ Led key technical efforts across global team, especially focusing on control algorithms, embedded control software development, system simulation with Saber and full power test in the lab.
- ➢ Designed the control algorithms and implemented the embedded software; Built the product-code-based simulation platform; Redesigned the grid harmonic filter; Designed a PV emulator to run full power lab test; Provided interface to SCADA and farm management system.

GE's 10MW high-speed electric drive for oil/gas compressor (2009)
- ➢ Proposed a low-cost power test method with full power circulates inner the power converter.
- ➢ Developed the control methods, analysis and design of experiments, verified in hardware-in-loop simulations and scaled-down prototype.

Selected Patents

[1] **Xiaoyu Wang**, etc. Power generation performance evaluation method and apparatus for power generator set, US-2016-0223600-A1. Published on: 2016.08.04.

[2] **Xiaoyu Wang**, etc. Wind generating set and work pattern switch method thereof. CN103138669A:2013.06.05。

[3] **Xiaoyu Wang,** etc. A performance evaluation method and apparent for generating set. CN104915747A. 2015.02.03

[4] **Xiaoyu Wang**, etc. A test bench and test method of power converter. CN103616584B. 2013.11.15

Selected Publications - 1 SCI Indexed, 20+ EI Indexed

Please refer Google scholar for more details. http://scholar.google.cn/scholar?start=10&q=wang+xiaoyu+liu+jinjun

[1] **WANG Xiaoyu**, LIU Jinjun, HU Jinku, MENG Yuji, YUAN Chang. Frequency Characteristics of the Synchronous-Frame Based D-Q Methods for Active Power Filters[J]. Journal of Power Electronics.   Vol.8 No.1, 2008. 1. pp. 91-100. (SCI).

[2] **WANG Xiaoyu**, LIU Jinjun, YUAN Chang, WANG Zhaoan. "A Family of Control Methods for Parallel Active Power Filters Based on Current Detection," in *Applied Power Electronics Conference, APEC 2007 - Twenty Second Annual IEEE, Anaheim, California, USA, Feb. 25 – Mar. 1, 2007*, pp. 675-681. (EI)

[3] **WANG Xiaoyu**, LIU Jinjun, YUAN Chang, WANG Zhaoan, "Generalized Control Approach for Active Power Filters," in *Power Electronics and Motion Control Conference, 2006.IPEMC '06.CES/IEEE 5th International*, Shanghai, China, August 13-16, 1 ed 2006, pp. 714-718. (EI)

Honors/Awards

- GE "China Select" Award (2009) for top employees.
- Microsoft Most Valuable Professional (MVP) (2003 ~ 2008).

Professional activities

- IEEE membership since 2004.
- PMI membership since 2012. Certificated Project Management Professional (PMP).
- IEC SC8A expert