Stephan Ao, Ph.D.
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TEACHING EXPERIENCE

Visiting Scholar, SOOCHOW University, Sept. 2018 - Oct. 2018
Courses taught: Engineering Mechanics: Statics & Dynamics

Lecturer, NAIT, Aug. 2010 - Nov. 2010, Fixed-term Contract
Courses taught: Electric Circuits; Electric Power Technology
Labs instructed: Electric Machine; PLC

Lecturer, SAIT, Jan. 1997 - May 1997, Fixed-term Contract
Courses taught: Instrumentation; Digital Electronics

Teaching Assistant, **University of Alberta,** Sept. 1994 - Nov. 1996
Labs instructed: Control Systems; Power Lab

Teaching Assistant, **University of Saskatchewan,** Sept. 1991 - July 1994
Labs instructed: Power Electronics

PROFESSIONAL DEVELOPMENT FOR TEACHING

Taylor Institute for Teaching and Learning | University of Calgary, May 2020
Course taken: Philosophy Statements and Teaching Dossiers

Center for Teaching and Learning | Queen's University, May 2020
Course taken: Teaching and Learning in Higher Education Six Modules

WORK & RESEARCH EXPERIENCE

Principle R&D Engineer, **UGRID ENGINE INC, CANADA, Jan. 2020 - Present**

- Developed optimization algorithms for distribution networks & microgrids for achieving global optimum with GAMS solvers and/or SciPy libraries
- Explored Big Data and Spark computation framework for meter data analytics to show the 100 times faster computing power of the framework
- Investigated TensorFlow in KERAS and AutoML applications for utilities analytics: proving to be a more robust approach for developing utilities analytics
- Researched on parallel computing with Diakoptics to speed up convergence in load flow for large electric power systems: a problem existed for a long time

Senior Software Engineer, UGRID ENGINE INC, CANADA, Nov. 2013 - Aug. 2019

- Designed a data model of a microgrid for an Ontario power utility: a foundation for building control strategies and analytics for the microgrid
- Implemented the data model in Oracle DB and PostgreSQL that can be automatically migrated in Enterprise Architect and SQL Developer toolchain
- Developed ETL/ELT adaptors for power utility data migration to our data model
- Gained expert knowledge in simulations with tools: OpenDSS, OpenDSS-G, OpenDSSViewer, OpenDSSDirect, GridLAB-D, CYME, PSS/E, PQLF, ETAP, and ASPEN
- Experienced in programming: PIG Latin, HiveQL, Hadoop HDFS, SparkSQL, SparkStreaming, SparkML, and GraphX

Principal Applications Engineer, **ORACLE R&D, USA, Dec. 2010 - Oct. 2012**

- Contributed in development & maintenance of large distributed enterprise software suites for Power Utilities: OMS & DMS, and DERMS
- Gained rich experience in designing and developing enterprise critical applications in architecture, business logic, data stores, and presentation in C++/Java/Scripting
- Mastered practices in software development life cycle (SDLC) and QA control
- Further enhanced my root cause analytic skills in resolving network instability, disturbances, high penetration of intermittent DERs in Power Utilities
- Having supported Oracle integration projects for SDG&E, Xcel Energy, and China State Grid has further strengthened my practical problem-solving skills

CTO, SINGA DYNAMIC SYSTEMS CO., Ltd., CHINA, Apr. 2004 - Dec. 2009

- Executed leadership role in New Product Introduction (NPI)
- Multi-tasked in product & engineering management
- Gained people skills in team-building and collaboration-facilitating
- Learnt lessons from successes and setbacks in a startup environment

Regional Sales Manager & BD, GE Expat to ASIA, Jan. 2000 - Mar. 2003

- Engineered a penetration & expansion strategy into the Asian Power Utilities market
- Developed & trained a large sales network of GE Reps, distributors, SIs, and VARs in three years
- Organized localization of manuals, training modules, and sales materials, which accelerated a consecutive annual growth of more than 100% for next three years
- Establishing a local spare parts stocking and logistics of emergency services further increased customers' confidence in GE products & services
- Successfully sold many solutions in Asia earned me a GE stock option in 2002

Senior Design Engineer, GE R&D, CANADA, May 1997-Dec. 1999

- Solicited, designed, and built a hardware-in-the-loop (HIL) simulation lab consisted of:
  A RTDS simulator
  Doble Relay Testing Equipment
  MATLAB Simulink and Simscape
  PSCAD authoring software
- Developed an Automated Testing Framework (ATF) in LabVIEW for product development
  Authored six product-specific testing programs on ATF and constructed six testing rigs:
  Six sets of Manta Relay Testing Systems
  LabVIEW DAQs and I/O modules
  Waveform generators and current Amplifiers
- Communication Protocols employed in development and testing:
  RS-232/RS-485/RS-422
  Modbus (RTU/ASCII/TCP/IP)
  UCA2 (IEC61850), MMS, GOOSE, OPC
  DNP3, ICCP/TASE2
- Software and Hardware employed in development and testing:
  LabVIEW, DAQ, I/O modules, Waveform Generators
  MATLAB Simulink and Simscape
  PSCAD/EMTP-RV/EMTDC
  Digital Meters and Controls

EDUCATION

Sept. 1994 - Nov. 1996
Doctor of Philosophy (Ph.D.)
Dept of Electrical and Computer Engineering, UNIVERSITY OF ALBERTA, CANADA
Specialization: Power System Stability and Control
Dissertation: STABILITY ENHANCEMENT OF MULTI−MACHINE POWER SYSTEMS BY HYBRID NEURAL FUZZY−LOGIC CONTROL

Sept. 1991 - May 1994
Master of Science (M.Sc.)
Dept of Electrical and Computer Engineering, UNIVERSITY OF SASKATCHEWAN, CANADA
Specialization: Power System Modeling and Protection
Thesis: A COMPREHENSIVE STABILITY INVESTIGATION OF THE ATHABASCA-POINTS NORTH POWER SYSTEM

Sept. 1982 - Dec. 1984
Master of Engineering (M.Eng.)
Dept of Electrical and Electronic Engineering, NORTHERN CHINA ELECTRIC POWER UNIVERSITY, CHINA
Specialization: Operations Research as Applied to Power System Optimization
Thesis: Optimal Operations of Thermal-Hydro Power Systems by Lagrange Multipliers

Sept. 1978 - July 1982
Bachelor of engineering (B.Eng.)
Dept of Electrical and Electronic Engineering, HUNAN UNIVERSITY, CHINA
Specialization: Power System and Its Automation

CERTIFICATIONS

- Data Science & DevOps Training Camp, SEATTLE, Sept. 2019 - Oct. 2019
- Linux Foundation S171x: Blockchain for Business, Feb. 2018 - Mar. 2018
- Big Data Six Courses Specialization, Sept. 2015 - Mar. 2016:
  Introduction to Big Data; Graph Analytics for Big Data;
  Machine Learning with Big Data; Big Data Analytics;
  Hadoop Platform and Application Framework
- Machine Learning by Andrew Ng, Feb. 2017 - May 2017
- Deep Learning by Andrew Ng of DeepLearning.AI, June 2017 - Oct. 2017
- Cryptography I by Professor Dan Boneh, Nov. 2017 - Dec. 2017

LANGUAGES

Fluent: English and Chinese
Reading (with dictionary): French
Basic: Spanish and Russian

OPEN SOURCE (on GITHUB.COM)

R&D at Graduate Schools:
Transient Stability Simulation Package (TSSP)
Transient Stability Simulation Package (TSSP) in MATLAB/OCTAVE
Power flow, Short circuit

PhD Dissertation
STABILITY ENHANCEMENT OF MULTI−MACHINE POWER SYSTEMS
BY HYBRID NEURAL FUZZY−LOGIC CONTROL

MSc Thesis
A COMPREHENSIVE STABILITY INVESTIGATION OF THE ATHABASCA-POINTS NORTH POWER SYSTEM

R&D at Work with Non-Disclosure Agreements:
UGrid Engine Inc (Canada): As Consultant in DMS and MICROGRID
Singa Dynamic Systems Inc, Ltd (China) [Smart Devices: digital relays; Substation software]
Oracle Inc (USA) [Power Utilities Enterprise Applications: OMS/DMS/MICROGRID]
GE Inc (Canada) [Smart Devices: digital relays, digital controllers, and digital meters]
Smart Grid Data Structure and Modeling (UML, DDL, and SQL)

TECHNOLOGIES

System and Architect:
Enterprise Architect – A modeling and design tool (UML, Class Diagrams)
Operating Systems:
Microsoft Windows, Mac OSX, Unix, Linux, Ubuntu, Debian
Integrated Development Environments:
JDeveloper, NetBeans, Eclipse, PyCharm, Visual Studio Code
Database Developments:
Oracle SQL Developer, Oracle Data Modeler, MySQL Workbench, ERWIN data Modeler
Databases:
Oracle DB, MySQL, PostgreSQL, SQL Server
Interactive:
IPython, Jupiter Notebook
Cloud Native Development:
AWS DevOps, CodePipeline, ECS, EKS, CloudFormation, CDK, Big Data and ML
Docker, containerization, virtualization, Kubernetes/istio/App Mesh
Oracle Hudson/Jenkins, CI/CD
Big Data:
Oracle Big Data Analytics
Cloudera Platform
AWS Big Data
Apache Spark + modules (Custom Big Data)
Programming languages:
C/C++, JAVA, Python, Bash Scripting; Node.js, Web3.js

PUBLICATIONS

Williams, B.; Ao, S., Oracle Utilities, Oracle Corp., Redwood City, CA, USA, “Advanced Distribution Management Can Bridge the Chasm on the Road to Grid Modernization”, CICED, 5th International Conference on Distribution, September 5-6, 2012, SHANGHAI

Williams, B.; Ao, S., Oracle Utilities, Oracle Corp., Redwood City, CA, USA, “Distributed Systems to Optimize Power Distribution and Support Microgrids”, CICED, 5th International Conference on Distribution, September 5-6, 2012, SHANGHAI

S. Z. Ao, T. S. Sidhu and R. J. Fleming, "Stability Investigation of a Longitudinal Power System and Its Stabilization", **IEEE Trans. On Energy Conversion** vol. 9, no.3, September 1994, pp. 466-474.

S. Z. Ao, K. E. Bollinger, “Adaptive Control of a Synchronous Generator", Canadian Conference on Electrical and Computer Engineering, May 26-29, 1996, Calgary, Canada. The paper is published in the Conference proceedings, pp. 582-585.

T. S. Sidhu, S. Z. Ao, "Online Evaluation of Capacity and Energy Losses in Power Transmission Systems", **IEEE Trans. On Power Delivery**, Vol. 10, No. 4, October 1995, pp.1913-1919. (Financed by T. S. Sidhu)

K. E. Bollinger, S. Z. Ao, "PSS Performance as Affected by Its Output Limiter", **IEEE Trans. On Energy Conversion** vol. 11, no. 1, March 1996, pp. 118-124. (Project financed by K. E. Bollinger)

S. Z. Ao, R. J. Fleming and T. S. Sidhu, "A Transient Stability Simulation Package (TSSP)", **IEEE Trans. on Power Systems** vol. 10, no. 1, February 1995, pp. 11-17.

RECENT PUBLISHED (By Stephan Ao, PhD)

A Big Data Based Architecture for DERMS, May 2021
A Big Data & AI Based Monitoring & Analytic System for Darlington Nuclear PP, September 2021
Emerging Control Strategies for Microgrids, October, 2021
The Future of V2G Technology, October 2021
A Data Lake Architecture for ADAS Development, October, 2021