



POWID
Symposium2018



Welcome to Knoxville!

University of Tennessee Conference Center, Knoxville, TN USA
Training: 25 June • Conference: 26–28 June

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Message From the General Chair

Welcome the 2018 Power Industry Division (POWID) Symposium!

The **ISA POWID Symposium** is one of the industry's leading instrumentation, control, (I&C) and automation conferences, and this year is no exception. John Sorge of Southern Company has done a great job of putting together another fantastic technical program. There are the traditional tracks for nuclear, fossil, and renewable/distributed generation, as well as several special sessions for monitoring and diagnostics, cybersecurity, and emerging technologies.

We have a great line-up of keynote speakers some of which include: Dr. Wes Hines, Department Head of Nuclear Engineering at the University of Tennessee and Dr. Peter Martin, VP and Fellow at Schneider Electric Company. They will outline industry trend—current research and development activities, as well as look at the future of power generation. We will have a roundtable session after the keynotes to allow for Q&A with these experts.

Also be sure to enjoy the vibrant atmosphere of downtown Knoxville and the Market Square area. Knoxville is home to the head-

quarters for the Tennessee Valley Authority (TVA), which has an operating capacity of approximately 20 GW, consisting of nearly 10 different forms of power generation. In addition, the University of Tennessee and Oak Ridge National Laboratory are in close proximity and are at the forefront for energy research and innovation.

Whether you are a regular at the Symposium or if you have never attended one before, we feel this year's event has something for everyone, and will be one of the best powergen networking opportunities of the year!

Finally, I would like to thank all of the authors for contributing to the technical content of the conference. Your participation is what continues to make the ISA POWID Symposium a success. I look forward to listening to your presentations.

Chad Kiger,

2018 POWID Conference General Chair
AMS Corporation



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Meet Our Keynote Speakers

Tuesday, 26 June

Keynote Speakers



Dr. J. Wesley Hines

*Nuclear Engineering Department,
University of Tennessee*

Dr. J. Wesley Hines is Head of the Nuclear Engineering Department at the University of Tennessee. Dr. Hines received his BS in Electrical Engineering from Ohio University in 1985, and then served as a nuclear-qualified submarine officer in the US Navy. He later received both an MBA and an MS in Nuclear Engineering from Ohio State University in 1992, and a Ph.D. in Nuclear Engineering from Ohio State University in 1994. He has served the University of Tennessee for over 22 years.



Dr. Peter G. Martin

*Vice President of Innovation and Marketing,
Schneider Electric*

Dr. Martin has over 37 years in industrial control and automation. He has authored numerous articles, technical papers, and books. He also holds multiple patents. *Fortune* named Dr. Martin a Hero of U.S. Manufacturing. He was also named as one of the 50 Most Influential Innovators of All Time by *InTech* and received the Life Achievement Award by the International Society of Automation (ISA). In 2013, Dr. Martin was elected to the Process Automation Hall of Fame, and was selected as a Fellow of the International Society of Automation. In 2017, he was named as one of the 30 Internet of Things Executives Whose Names You Should Know by CRN. In 2018, he was named to the Measurement, Control and Automation Hall of Fame. He holds BA and MS degrees in Mathematics, an MA degree in Administration and Management, a PhD in Industrial Engineering, and a Master and a PhD in Biblical Studies.



Bradley J. Adams

*Engineering Vice President,
Southern Nuclear Operating Company*

Brad joined SNC in 2011 after twenty-eight years with Exelon Corp. in Illinois. He began his nuclear career in 1983 as a design engineer for Commonwealth Edison's nuclear fuel services group and progressed to design group leader. Brad transferred to Byron Station in 1995, and held managerial positions in regulatory assurance, system engineering and work management before being named Byron's Site Engineering Director. In 2007, Adams transferred to Quad Cities Nuclear Station as the Site Engineering Director. He returned to Byron Station in 2008 as plant manager, a position he held until joining Southern Nuclear in 2011 as Fleet Operations Support Vice President. In December 2013, Adams assumed his current position as the SNC Fleet Engineering Vice President.

Awards Luncheon Speaker



Ray Smith

*Oak Ridge Historian, Y-12 Historian (retired), Author,
Newspaper Columnist, Film Producer and Photographer*

With over 47 years living and working in Oak Ridge, TN, Ray Smith has developed an extensive understanding and appreciation of the heritage of Oak Ridge's history, especially the Manhattan Project era and resulting technological advances during ensuing years. He serves as the Historian for the City of Oak Ridge, TN.

Wednesday, 27 June

Keynote Speakers



Gary Brinkworth

*Director of Enterprise Research & Technology
Innovation, TVA*

Gary Brinkworth has over 34 years of utility industry experience in generation and transmission planning, forecasting, and demand-side management evaluation. He joined TVA in March 2009 where he managed the development of long-term capacity plans, resource portfolio evaluations, and capacity optimization studies. In that role, Gary led the analytical team that developed TVA's Integrated Resource Plan that was published in March 2011. In July 2013 he left the system planning group to become the project manager for the 2015 IRP study. Following the successful completion of that project, he took on a new role at TVA as Director of Enterprise Research & Technology Innovation, where he leads the team responsible for coordinating the company's R&D efforts.



Dr. Stacy Prowell

*Chief Cyber Security Scientist,
Oak Ridge National Laboratory*

Dr. Stacy Prowell serves as the Chief Cyber Security Research Scientist and is the Program Manager for the lab's Cybersecurity for Energy Delivery Systems program. Dr. Prowell's research focuses on exploiting physical sensors and properties to detect and prevent intrusion, on deep semantic analysis of compiled software, and on the security of safety critical systems. Dr. Prowell's work on a system for deep analysis of compiled software led to the Hyperion system, which received a 2015 R&D 100 award and two awards for technology transfer. Previously, Dr. Prowell worked in the CERT Program of the Software Engineering Institute on automated analysis of malware. Dr. Prowell is an IEEE Distinguished Lecturer for the Transportation Electrification Community. In his spare time, Dr. Prowell is an Associate Professor of Electrical Engineering and Computer Science at the University of Tennessee, an Associate Professor of Computer Science at Tennessee Technological University, a member of Sigma Xi, and a Senior member of IEEE.

Conference Program

Conference program subject to change.

Monday, 25 June

8:00 a.m. – 5:00 p.m.

ISA77 Committee Meeting

Location: Room 413A

8:00 a.m. – 4:00 p.m.

ISA Technical Training

Introduction to Boiler Control Systems (ES15C)

Location: Room 400A

CyberSensors: Advancements in Automation (IC87C) CyberPhysical Security

Location: Room 403

1:00 p.m. – 5:00 p.m.

Conference Registration

Location: Fourth Floor Atrium

12:00 p.m. – 1:00 p.m.

Training Lunch

Location: Room 404A

1:00 p.m. – 4:00 p.m.

Exhibitor Setup

Location: Fourth Floor Atrium

6:00 p.m. – 8:00 p.m.

Offsite Networking Kick-off Activity (TBD)

(Optional, pay on own)

Location: TBD

Tuesday, 26 June

7:00 a.m. – 8:00 a.m.

Breakfast/Networking/Exhibits

Location: Fourth Floor Atrium

7:00 a.m. – 5:00 p.m.

Registration

Location: Fourth Floor Atrium

8:00 a.m. – 12:00 p.m.

Keynote Speakers and Panel Session:

Dr. Wes Hines, University of Tennessee; Dr. Peter Martin, Schneider Electric; Brad Adams, Southern Nuclear

Location: Room 406

12:00 p.m. – 1:30 p.m.

Honors and Awards Luncheon/Networking

Location: Room 404

Speaker: Ray Smith (Oak Ridge Historian)



Take a Cyber Sweep

ISA offers attendees valuable exposure to the importance of cybersecurity in the process automation landscape through its Division Symposia activities. **Be sure to check out the critical cybersecurity sessions as part of our POWID 2018 Program!**

1:30 p.m. – 5:00 p.m.

Session 2A – Fleet I

Location: Room 413A

Track Chairs/Session Developers: Aaron Hussey, Integral Analytics; Robert Murphy, GE

POW18-11: Using APR Software for Predictive Analytics: A Practitioner's Perspective

Ed Abbott, WSC Inc

POW18-38: Time Synchronous Averaging (TSA) With and Without a Tachometer

Alan Armstead, National Instruments

POW18-66: Grounding vs. Grounding—What's the Difference? Man & Machine vs. Automation

Terence Coleran, Air Liquide Large Industries US

POW18-19: A Novel Framework for Control System Safety Interlock Design and Implementation

K. Michelle Baldwin, Oak Ridge National Lab

Session 2B – Nuclear I

Location: Room 413B

Track Chair/Session Developer: Michael Taylor, EPRI

POW18-02: Benefits of FPGA Technology in I&C Systems in Nuclear Power Plants

Mark Burzunski, SunPort SA

POW18-03: Minimizing Equipment Modifications Using EMI/RFI Mapping Techniques

Zachary Crane, AMS Corporation

POW18-67: Methods of Achieving Required Diversity in Digital Safety Systems

Robert Ammon, Curtiss-Wright

POW18-48: Wireless Sensor Systems for Real-time Manual Valve Position Monitoring

Vivek Agarwal, Idaho National Laboratory

Session 2C – Fossil I

Location: Room 413C

Track Chairs/Session Developers: Cyrus Taft and Don Parker, Provecta Process Automation; Steve Seachman, EPRI

POW18-30: Boiler Lower Load Operation for Coal-Fired Power Plants

Majid Chaudry, GE Power

POW18-34: Wireless HART Instrumentation and DCS Integration at the Kemper County IGCC Project

Vinson Anderson, Mississippi Power

POW18-58: An Evaluation of Control Loop Performance Monitoring Software

Jacques Smuts, OptiControls

POW18-60: Wet Flue Gas Desulfurizer SO2 Control Enhancements for Wide Load Ramping—Design, Testing and Challenges

Donald Parker, Provecta Process Automation LLC

POW18-54: SO3 and the Impact of Hydrated Lime
Charles Lockert, Mississippi Lime Company

Session 2D – Emerging I

Location: Room 400A

Track Chair/Session Developer: Benjamin Chorpeneing,
U.S. Dept. of Energy – NETL

POW18-10: Benefits of Simulation on the Kemper County IGCC Project
Matthew Nelson, Southern Company

POW18-13: Advanced Continuous Skin Temperature Monitoring at the Kemper County IGCC Project
Chuck Wright, Southern Company

POW18-17: Neuroevolution of an Advanced Power Plant Controller
Shauharda Khadka, Oregon State University

POW18-27: Open-Source, Distributed Version Control Considerations for SCADA Systems
Alan Barker, Oak Ridge National Laboratory

POW18-40: Data Management Considerations for Wireless Technology
Matthew Bollom, National Instruments

5:00 p.m. – 6:00 p.m.

Student Career Development Forum: Trends in the Power Industry/Preparing for the Challenges

Location: Room 413B

5:00 p.m. – 7:00 p.m.

Networking Reception/Vendor Exhibits and Tour of UTK Electrical Engineering Department

Location: Fourth Floor Atrium and UTK Campus

Sign up for tour at ISA onsite registration desk

Wednesday, 27 June

7:00 a.m. – 8:00 a.m.

Breakfast/Networking/Exhibits

Location: Fourth Floor Atrium

7:00 a.m. – 5:00 p.m.

Registration

Location: Fourth Floor Atrium

8:00 a.m. – 9:30 a.m.

Keynote Speakers and Panel Discussion:

Dr. Joe Hoagland, TVA; Dr. Stacy Prowell, Oak Ridge National Laboratory
Location: Room 406

10:00 a.m. – 12:00 p.m.

Session 3A – Fleet II

Location: Room 413A

Track Chairs/Session Developers: Aaron Hussey, Integral Analytics; Robert Murphy, GE

POW18-55: Enhancing Monitoring & Diagnostics with the Digital Twin
Bobby Noble, EPRI

POW18-26: Duke Energy Nuclear M&D Center
Wayne Lee, Duke Energy

POW18-74: Synching Operations and Maintenance Using Predictive Analytics in Fleet Management Applications
Nagi Gebraeel, Georgia Tech

POW18-18: Low Cost Time Synchronization for Remote Measurement Systems
R. Wes Wysor, Oak Ridge National Laboratory

Session 3B – Nuclear II

Location: Room 413B

Track Chairs/Session Developers: Michael Taylor, EPRI; Jamie Coble, University of Tennessee

POW18-06: Modern Heat Trace Control Systems
Bob Queenan, Curtiss-Wright

POW18-22: Experience with ISA84 at DOE Non-Reactor Nuclear Plants
Josiah Long, Bechtel

POW18-62: Exploring Molten-Salt Reactor Dynamic Behavior and Control Strategies
Vikram Singh, University of Tennessee

POW18-07: Simulation-based Testing Environment for NPP Safety-Critical Software
Sang Hun Lee, Rensselaer Polytechnic Institute

Session 3C – Fossil II

Location: Room 413C

Track Chairs/Session Developers: Cyrus Taft; Jacques Smuts, Opticontrols Inc.

POW18-20: Advanced Steam Temperature Control Strategies for Combined Cycle Units
Mircea Lupu, Emerson Automation Solutions

POW18-57: Steam Attemperators—A Process Control Framework to Protect Against Saturation-Related Plant Damage in HRSGs
Neil Ronan, Provecta Process Automation LLC

POW18-25: HRSG Damage Reduction through Improved Controls: Spray Nozzle Characterization
Charles Boohaker, Southern Company

POW18-61: Furnace Water-wall Water Cannon Disturbance Compensation
Donald Parker, Provecta Process Automation LLC

Onsite Program

12:00 p.m. – 1:30 p.m.

Lunch/Vendor Exhibits/Networking

Location: Room 404

1:30 p.m. – 5:00 p.m.

Session 4A – Emerging II

Location: Room 413A

Track Chair/Session Developer: Benjamin Chorpene, U.S. Dept. of Energy – NETL

POW18-23: Smart Monitoring—IloT and Big Data Technology Sneak Peak

Eric Bradley, National Instruments

POW18-31: Versatility of Programmable Process Controls

Wesley Weaver, SCS Engineering

POW18-32: Distributed High-Temperature Measurements Using Coaxial Cable Sensors

Hai Xiao, Clemson University

POW18-37: Ultrasonic Wave-based All-optical Fiber Sensor System for High Temperature Monitoring in a Boiler

Jingcheng Zhou, UMass Lowell

POW18-68: Progress Toward Multipoint High Temperature Sensing with Sapphire Optical Fiber for Power Generation

Benjamin Chorpene, U.S. Dept. of Energy – NETL

POW18-70: Process Anomaly Detection Using Electric Signals: 3 Case Studies

Andy Pascoe, Siga Sec Global

Session 4B – Nuclear III

Location: Room 413B

Track Chairs/Session Developers: Michael Taylor, EPRI; Jamie Coble, University of Tennessee

POW18-43: A Radiation Source Discrimination by Using the Neural Network Algorithm

Inyong Kwon, KAERI

POW18-44: Plan to Develop Virtual Plant for Pressurized Water Reactor

Seung-Hwan Seong, KAERI

POW18-46: Development of a Leak Detection Method by Using Time-Frequency Analysis

Doo Byung Yoon, KAERI

POW18-50: Integrated Surveillance and Worker Assistance System for Severe Accident Mitigation in the Multi-Unit Nuclear Power Plant

Hyun-Chul Lee, KAERI

POW18-51: Development of an Autonomous Control Using by Artificial Intelligent Technology for Heat-up Operation in PWR Plants

Chang Hwoi Kim, KAERI

POW18-63: AI Diagnoser for NPP Severe Accidents

Young Do Koo, Chosun University

Session 4C – Cybersecurity I



Location: Room 413C

Track Chairs/Session Developers: Michael Firstenberg, Waterfall Security Solutions; Josh Long, Bechtel Group

POW18-73: Cybersecurity Compliance—It's More Than Check Boxes

Josh Long, Bechtel Group

POW18-14: Efficacy and Measurement of Automated Response

Rita Foster, Idaho National Labs

POW18-71: The Gap in ICS Cyber Security and Safety—Level 0,1 Devices

Joe Weiss, Applied Control Solutions

POW18-47: Enhancing Industrial Control System Network Security Monitoring Using a Security Information Event Manager

Erika Poole, Bechtel

POW18-72: DCS & Control Systems Passive Network Anomaly Detection

Michael Muzik, Southern Company

POW18-15: Exploit, Malware and Vulnerability Prioritization

Rita Foster, Idaho National Laboratory

POW18-16: Applying Data-driven Models for False Data Injection Attack Detection in Industrial Control System

Fan Zhang, University of Tennessee

Session 4D – Renewables and Distributed I

Location: Room 406

Track Chair/Session Developer: Teja Kuruganti, Oak Ridge National Lab

POW18-4: Whales Optimization Algorithm-Based Intelligent Power Controller for an Autonomous Microgrid

Sajid Hussain Qazi, Universiti Teknologi Malaysia

POW18-5: A Clear Connection Between Maintenance and Arc Flash Hazards

Thomas Northcott, Jacobs Technology Inc

POW18-9: Sizing and Evaluation of the Integration of Battery Energy Storage in a Photovoltaic System

Paulo Alberto Viana Vieira, Universidade Federal de Itajubá

POW18-35: Real-Time Implementation of Type-3 Wind Turbine System

Bailu Xiu, on behalf of Maximiliano Ferrari, ORNL

POW18-69: Smart Neighborhood: Integration of Advanced Control Systems into a Community-scale Microgrid

James Leverette, Southern Company

5:00 p.m. – 6:00 p.m.

Student Career Development Forum: Time Management and Career Planning

Location: AMS Corporation, 9119 Cross Park Dr., Knoxville, TN 37923

6:00 p.m. – 9:00 p.m.

Reception/Dinner and Tour of Analysis and Measurement Services (AMS) Corporation

Location: AMS Corporation, 9119 Cross Park Dr., Knoxville, TN 37923

See ISA registration desk for transportation options.

Thursday, 28 June

7:00 a.m. – 8:00 a.m.

Breakfast/Networking/Exhibits

Location: Fourth Floor Atrium

7:00 a.m. – 12:00 p.m.

Registration

Location: Fourth Floor Atrium

8:00 a.m. – 5:00 p.m.

ISA67 Committee Meeting

Location: Room 400A

8:00 a.m. – 12:00 p.m.

Session 5A – Renewables and Distributed II

Location: Room 413A

Track Chair/Session Developer: Teja Kuruganti, Oak Ridge National Lab

POW18-41: Frequency Domain Identification-Based Feedforward-Feedback Controller for Coordinated Power Control of Wind and Gas Joint Power Generation

Xiaofeng Li, Electric Power Research Institute of Guangdong Power Group Co.

POW18-56: Autonomous Battery Identification and Health Parameterization

Mitchell Smith, Oak Ridge National Laboratory

POW18-65: Georgia Power Smart Neighborhood

Justin Hill, Southern Company

POW18-59: Optimal Scheduling of Building On/Off HVAC Systems to Enable High Penetration of PV in Residential Neighborhoods

Jin Dong, Oak Ridge National Laboratory

POW18-12: Design and Evaluation of a Battery Energy Storage System Using Conti-Varlet Technique

Paulo Alberto Viana Vieira, Universidade Federal de Itajubá

Session 5B – Nuclear IV

Location: Room 413B

Track Chairs/Session Developers: Michael Taylor, EPRI; Jorge Caraval, Westinghouse Electric Company

POW18-24: Evaluating Distributed Antenna Systems for Nuclear Power Plants

David Jackson, AMS Corporation

POW18-29: Wireless Transmission for a Gas Voids Monitoring System

Jeffrey Arndt, Westinghouse Corporation

POW18-42: EPRI's Continuous On-Line Monitoring Quick Guides—Methodology, Usage, and Benefits for Transforming Your Maintenance Strategy from Time-Based to Condition-Based

Michael Taylor, EPRI

POW18-49: Using the Cognitive Radio System for Supporting the Wireless Technology Implementation at Nine Mile Point

Chris Lowe, AMS Corporation

POW18-64: Regulatory Compliant Wireless Sensor Network for Nuclear Power Plant Applications

Don Chase, Curtiss-Wright

Session 5C – Cybersecurity II

Location: Room 413C



Track Chairs/Session Developers: Michael Firstenberg, Waterfall Security Solutions; Jason Hollern, EPRI

POW18-76: Resiliency vs. Traditional Cybersecurity

William Vesely, Consolidated Edison Company of New York

POW18-45: Risk and Reward for ICS Cybersecurity

Mark Heard, Mandiant

POW18-08: Cybersecurity Certification Programs have Matured

Ted Stewart, exida

POW18-52: Interactive Hardware-Based Secure Remote Access Solution: Proof-of-Concept

Jason Hollern, EPRI

POW18-21: Machine to Machine Automated Threat Response Core Concepts

Rita Foster, Idaho National Laboratory

12:00 p.m. – 1:30 p.m.

Lunch/Networking/Exhibits

Location: Room 404

1:00 p.m. – 3:00 p.m.

Exhibitor Teardown

Location: Room 404

12:00 p.m. – 3:00 p.m.

DOE/EPRI/ORNL I&C Interest Group Meeting

(Lunch Provided)

Location: Room 413B

The Electric Power Research Institute (EPRI) and the Department of Energy's National Energy Technology Laboratory (NETL) and Oak Ridge National Laboratory (ORNL) will be co-hosting an Instrumentation and Controls Development and Application session. This session will highlight research and development needs, efforts, and applications of emerging I&C technology for the power industry.

3:00 p.m. – 5:00 p.m.

POWID EXCOM Meeting

(Committee Members Only)

Location: Room 413A

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