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Upcoming Events
April 27-29 2020 ISA Analysis Division Conference (AD)
Long Beach, CA, USA
May 5-7 Fundamentals of Industrial Automation, Instrumentation, and Control
Birmingham, AL, USA
May 12-15 IFAC European Control Conference
Saint Petersburg, Russia
Aug 5-6 Energy & Water Automation Conference (EWAC)
San Antonio, TX, USA

Division Officers
DIRECTOR
Chad Kiger
AMS Corporation
Chad@ams-corp.com

PAST DIRECTOR
Xinsheng Lou
General Electric
xinsheng.lou@ge.com

NEWSLETTER ADVISOR
Dale Evely
Southern Company (Retired)
dpe247@charter.net

NEWSLETTER EDITOR
Beth Clarkin
Southern Company
epclarki@southernco.com

POWID HONORS & AWARDS COORDINATOR
Don Labbe
Schneider Electric
Donald.Labbe@schneider-electric.com

POWID WEB PAGE COORDINATOR
Cyrus Taft
Taft Engineering
cwtaft@taftengineering.com

Division Representatives for ISA Energy & Water Automation Conference
Co-CHAIR
Josh Long
Bechtel
jalong@bechtel.com

PROGRAM CHAIR
John Sorge
Southern Company (Retired)
jsorge@gmail.com

POWID Membership Recognition
Directors Message
By Chad Kiger, AMS Cooperation

Welcome to 2020. I hope you are seeing clearly in the new year. We will need to hit the ground running this year as we begin preparations for this year’s conference event which will be the 2020 Energy & Water Automation Conference (EWAC). This will be the second joint event between POWID and the Water and Wastewater Industries Division (WWID). The event is being held in San Antonio, TX from August 5-6, 2020. The focus will be on the areas common to our two industries which include instrumentation and control, cyber security, and safety, among others. Josh Long will once again serve as the Coordinator for this event from the POWID division. He did a great job last year and we know he will do another great job this year. Please visit the event site for more information.

Please consider attending, and also submitting, an abstract to make a presentation. This will be a great opportunity to share your experiences as well as gain insight from others. It is an excellent networking opportunity, particularly to gain a different perspective regarding how other industries may be addressing similar problems. If you would like to have a role in the event and/or have recommendations for making the event successful, then please let us know. We hope to have a great line-up of speakers and event topics that should be of interest to the POWID community.

As we look forward to the next year, I ask for your help in volunteering to take on a role within the POWID division to help make contributions to the newsletter, participate in our industry conference, serve as a division leader, or provide suggestions for how we can better serve your needs. We continuously try to improve our programming and outreach to better support the industry. Please do not sit back idle. Jump in and help volunteer, whether at a local section event or in helping to organize the program for the next conference. Without your help, we cannot make a difference. We are looking to provide long-range planning of the division and cannot do that without volunteers who are willing to step-in and assume roles and responsibilities. It does not take a large time commitment but will greatly help our division. We currently have several vacant leadership positions and need your help.

We are still planning on several webinars over the coming year for the POWID community. Our first speaker will be Aaron Hussey discussing Fleet Monitoring and Diagnostics planned for 2020. As soon as we have further information and details, we will be sure to pass the information along to you. We have several other planned webinars including Dan Lee, Josh Long, and myself. We hope that you can find time to view these webinars and engage the speakers in productive dialogue to make use of their expertise for the implementation of the concepts and ideas that are presented. Again, if you have suggestions for future topics or would be interested in presenting then please let us know.

Editor’s Message
By Beth Clarkin, Southern Company

Let me start by saying, thank you to those of you who contributed to the last edition of our newsletter. Your efforts strengthen our division and inform our members! If you have not contributed before, please consider doing so. We are primarily looking for technical content related to the automation side of the power industry. However, historical and general technical items are also welcome. Please keep your articles non-commercial. We will not print heavy sales pitches. Please send these articles to epclarki@southernco.com. I am unable to receive attachments over 5MB. If you send an article and do not get a thank you response, I probably did not receive it.

Another great way to get your name out is to present at the Energy & Water Automation Conference (EWAC) in August. Whether you present or not, attending this event provides great opportunities to learn about current issues, solutions and technology for automation in the utility industry, and to connect peers that may be able to offer advice later. If you are looking for all of that plus a chance to practice some leadership skills, Josh Long is looking for volunteers to join the planning team. You can reach Josh at jalong@bechtel.com.
POWID Goals Update
By Chad Kiger, AMS Cooperation

Our goals for the upcoming year remain the same and center around increased participation from the POWID community. The reason for combining the POWID symposium with the Water/Wastewater Automation Conference was to promote collaboration across multiple industries to leverage knowledge and expertise. We look forward to continuing to work with ISA staff to identify additional methods of reaching a wider audience whether through events, social media, or other activities. In addition, we are beginning a series of webinars meant to address emerging technologies in the power industry. There is currently an ISA effort, and we would also like to make this a POWID effort, to engage young professionals in the power industry. They will be the leaders of tomorrow that will have to help shepherd POWID forward into the future. Without their help, we will not be able to flourish as a division and community. Therefore, this is a call to all young (and old) professionals to step up and take an active role. We hope to continue our Student Forum at the conference events to allow students to engage with seasoned industry professionals who can impart their knowledge on the next generation of power industry professionals.

We have been successful in the past several months in recruiting additional participation in these volunteer leadership positions. Let us once again congratulate and thank Josh Long. He was nominated as the Director-Elect of POWID and graciously accepted the nomination. He has done a great job stepping in as one of the coordinators for the EWAC conference and made sure that it remained a relevant event for our industry. I know he will continue the same as he assumes the leadership role within POWID. On another positive note, we have added two new members to the POWID Executive Committee (EXCOM). Please congratulate Chet Acharya and Mohamed Sayed Ibrahim as the newest members of the committee. We look forward to their energy, enthusiasm and ideas to help guide POWID forward into the future. We are also currently in need of volunteers to step up and accept leadership positions within POWID continue to grow and to develop relevant methods to reach the power community through conferences and other avenues. Please contact me if you are interested in volunteering.

We would like to help get you engaged in the division activities. As we begin to make plans for next year’s conference, please make it a point to engage your management to allow you to attend the event, make a presentation, walk the exhibitor floor, and learn the latest trends within the industry. If you have any suggestions for additional ways to reach existing and potentially new members of the division then please let us know. We look forward to growing with your help.

Energy & Water Automation Conference Announcement

Again in 2020, like 2019, the POWID Symposium will be co-hosted with the Water and Wastewater Industries Division (WWID), under the Energy & Water Automation Conference (EWAC). This event will be held August 5 – 6, in San Antonio, Texas at the La Cantera Conference Center, La Cantera Resort & Spa. Currently, training is planned for August 4 (the sessions will be announced later). Last year, the training was both topical and of depth enough that the material could be immediately applied. The preliminary website is currently available.

Like last year, the focus is more on presentations rather than papers, but we in POWID are continuing to suggest papers if you have the time. Again, we are really looking for case studies about automation in both water and power projects. Although it is currently not shown on the website, we will be favoring presentations addressing:

- Modernization (Upgrades and Obsolescence)
- Asset Management
- Alarm Management
- Functional Safety

As well as the topics indicated on the preliminary website:
- Leveraging Data Analytics to Drive Results
- Navigating IIoT with Safety and Cybersecurity in Mind
- Applying the Insights of Smart Cities Initiatives to Improve Operations
- Leveraging Solutions in Multiple Industries, Including Oil and Gas, Refining, Power Generation, Wind and Solar Energy, and Water Handling

For more on the presentation resources and to submit an abstract, click here.

2020 EWAC Planning Committee meetings have already begun. The team is looking for a couple of POWID members to get engaged. If you are interested to join the team, contact me at jalong@bechtel.com.

Sponsorship opportunities for 2020 EWAC are available. Please review EWAC exhibitor information for more.
All-Optical Fiber Diagnostics System Using Optically Generated Ultrasonic Waves

By Jingcheng Zhou

Abstract of a dissertation submitted to the faculty of the Department of Biomedical Engineering and Biotechnology in partial fulfillment of the requirements for the degree of Doctor of Philosophy Biomedical Engineering and Biotechnology University of Massachusetts Lowell
February 2020
Dissertation Supervisor: Xingwei Wang, Ph.D.
Professor, Department of Electrical and Computer Engineering, Department of Biomedical Engineering and Biotechnology

ABSTRACT

Ultrasonic diagnostics technologies have been widely used in medical and industrial areas. In some applications, ultrasonic sensors are required which are wide bandwidth, high frequency, compact size, immune to electromagnetic interference, durable in harsh environments, and have remote sensing capability and multiplexing capability. Traditional electric ultrasonic sensors, which are broadly used in various ultrasound applications nowadays, are being challenged by these requirements. In order to overcome these requirements, the fiber optic ultrasonic transducer has been studied for years to overcome challenges brought by the most advanced ultrasound applications.

This dissertation presents an all-optical fiber ultrasonic diagnostics system for biomedical imaging and temperature monitoring. This system includes a fiber optic ultrasonic generator as a signal generator and a Fabry-Perot (FP) fiber sensor receiver as a signal receiver. This system featured compact size, non-contact approach, immunity to electromagnetic interference and survived in a harsh environment.

The dissertation first discusses the characterization of the fiber optic ultrasonic generator and the FP fiber sensor receiver. Then, a study of a fiber optic phased array system is presented with the demonstration of the capability of the ultrasonic signal steering and focus. The test results agree well with the theoretical calculations. Next, a study of the biomedical imaging is conducted. Chicken wing and pork tissue slice are used as the test samples. Finally, a study of temperature monitoring by using this system is presented. A water temperature test, a bovine liver temperature test, a boiler high temperature test, a furnace high temperature test and a 2D temperature reconstruction test are discussed in this section. The concluding chapter discusses the research contribution and future work.

The fossil power application of the all-optical fiber ultrasonic diagnostics system was funded by US DOE under contract No. DE-FE0023031.
Book Review

By Dale Evely, P.E.
ISA Life Fellow

“Carbon IRA & YouTility” by Jason Makansi

I just finished reading Jason Makansi’s latest book “Carbon IRA & YouTility”. The book is a quick read, it took me about 3 hours I think, and raises some interesting points. There are some political statements in the book that I don’t agree with, but the book is meant to be a sort of addendum to Jason’s book from years back entitled “Lights Out”, which I am sure many of you remember.

For those who are convinced that irreparable harm is being done to the planet due to climate change and action must be taken quickly, the book proposes two things that can be done to address it.

For socially minded companies, the first thing would be to setup Carbon IRAs to allow people to monetize their carbon reducing actions (like bicycling to work or driving electric vehicles) into Independent Retirement Accounts (IRAs). This would also address the issue of a lack of retirement savings accounts being setup by young people, who are also struggling with student debt and the challenges of managing a household budget. I say this would be for socially minded companies because the company itself would have to provide the funding of the IRAs since there is currently no marketplace for carbon.

The second thing proposed is for individuals to setup their own home smart microgrid (the YouTility) using rooftop solar panels, battery storage, smart thermostats, efficient appliances and space conditioning, etcetera. This is not a new proposal, but the new twist Jason proposes, to make this happen much more quickly, is for Public Service Commissions to allow existing utility companies to own and maintain these assets and to earn a rate of return on them. This would not preclude individuals doing it themselves, but it would allow those without the financial wherewithal to do this to accomplish a low or no carbon footprint in a quick timeframe.

The book is around 140 pages in length and is available in paperback on Amazon for $14.00 ($8.99 on Kindle).

Testing of the All-Optical Fiber Ultrasonic Diagnostic System at a GE Facility.
Digital Demonstration Facility at Alabama Power’s Plant Barry

Background
As our power generation industry integrates advanced digital technologies, it is prudent to identify tangible and practical benefits before making sweeping investments. That requires properly representing power plant dynamics if you use traditional methods to ramp up technologies for full-scale deployment. With digital technologies, you have another consideration; ensuring the underlying infrastructure can handle the traffic of data management, algorithms and information exchange so that inputs and outputs can be automated.

Typical large-scale power plants have existing data collection, data management and process control systems, generating large amounts of operational data. Manual data collection via operator rounds is also captured and eventually entered electronically. This is made even more inefficient when you factor in the use of email, phone, text, fax, radio and paper. Disconnected data sources require substantial time to assemble and aggregate. The integration of data sources is a baseline need to support any size effort in advanced analysis, digitization and artificial intelligence.

The Electric Power Research Institute (EPRI), working with industry partners, is developing detailed visions of tomorrow’s power plant. The “cyber-physical system” seamlessly integrates data, autonomous communication of information and corresponding response.

There are several pieces you need to dynamically optimize a plant:

- Collect and aggregate data
- Produce real-time information
- Embed and distribute adaptive intelligence that supports decision-making
- Identify actions and responses to account for risk, reward and uncertainty

At the root of this collaboration is a common understanding of the complex implementation challenges associated with integrating emerging technologies for the entire plant system. The full digitalization of a plant encompasses many technologies:

- Monitoring and control hardware
- Computational algorithms supporting process control, diagnostics and prognostics
- Data management and analytic platforms supporting advanced analysis of large data sets
- Digitizing procedures, drawings, plant equipment and components
- Mobility and digital worker technologies
- Advanced simulation platforms to evaluate and verify integrated process control solutions over future time scales representative of process dynamics

Objectives
EPRI and Southern Company are engaging with others in the power industry to establish and operate a comprehensive Digital Demonstration Facility (DDF) dedicated to evaluating the following plant digitization technology areas:

- Wireless sensors with new sensing capabilities and lower deployment cost (wireless)
- Digital worker
- Advanced control, automation and optimization
- Enhanced monitoring, diagnostics and prognostics
- Data analytics and visualization

While ongoing EPRI work demonstrates utility benefits as mentioned previously, the promise of these technologies will not be realized until the technologies and synergies can be proven through integration at a single site.

The overarching objective of the DDF is to provide infrastructure for research activities and technology demonstrations in real-time conditions. Access to common equipment and resources will support a variety of research and development projects in plant digitization. The facility will provide access to components common to many utilities and provide the opportunity to realize the cumulative benefits of plant digitization. The processes and procedures required to implement these technologies at full scale are other key aspects to be studied.

The DDF intends to:

- Serve as the industry’s test bed, providing necessary infrastructure to reduce implementation time for demonstration of emerging technologies
- Integrate plant digitization and emerging technologies to demonstrate step-change benefits
- Assess challenges and benefits of technologies
- Accelerate adoption of beneficial technologies

The U.S. Department of Energy’s (DOE) Office of Fossil Energy and National Energy Technology Laboratory have selected three projects for demonstration at the DDF under the funding opportunity announcement (FOA) DE-FOA-0001989, Improving Efficiency, Reliability and Flexibility of Existing Coal-Based Power Plants. The three projects are:
1. **Test and Validate Distributed Coaxial Cable Sensors for In Situ Condition Monitoring of Coal-Fired Boiler Tubes** — Clemson University (Clemson, SC) will test and validate (through the planned field tests in an industrial-scale test facility and an operational utility plant) novel low-cost distributed high-temperature stainless-steel/ceramic coaxial cable sensors, installation methods, instrumentation and data analytics for in situ monitoring of the health status of boiler tubes in existing coal-fired power plants. The duration of the project is three years starting in 2020.

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2. **Boiler Health Monitoring Using a Hybrid First Principles-Artificial Intelligence Model** — West Virginia University Research Corporation (Morgantown, WV) seeks to develop methodologies and algorithms to accomplish a hybrid first-principles-AI model of the PC (pulverized coal) boiler; a physics-based approach to material damage informed by ex-service component evaluation; an online health-monitoring framework that synergistically leverages the hybrid models and plant measurements to provide the spatial and temporal profile of key transport variables and characteristic measures for plant health; and a field implementation and demonstration at Plant Barry. The duration of the project is three years starting in 2020.

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3. **Deep Analysis Net with Causal Embedding for Coal-Fired Power Plant Fault Detection and Diagnosis** — General Electric Company, GE Research (Niskayuna, NY) will develop deep analysis net with causal embedding for coal-fired power plant fault detection and diagnosis—a novel end-to-end trainable artificial intelligence-based multivariate time series learning system for flexible and scalable coal power plant fault detection and root cause analysis (i.e., diagnosis). The duration of the project is two years starting in 2020.

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**ISA67 Nuclear Power Plant Standards Committee Update**

ISA67 is organized to be the focal point in ISA for documenting through standards publications: criteria, standards, practices, and procedures related to instrumentation and controls in nuclear power generating stations and associated industries. The ISA67 committee is responsible for all ISA nuclear plant instrumentation and control standards.

- ISA-67.01.01 Transducer and Transmitter Installation for Nuclear Safety Applications - This standard will be sent out to the larger committee for review and comment.
- ISA-67.02.01 Nuclear Safety-Related Instrument Sensing Line Piping and Tubing Standard for Use in Nuclear Power Plants - This standard is being revised to include updates related to gas effluent probes.
- ANSI/ISA-67.04.01-2006 (R2011) - Setpoints for Nuclear Safety-Related Instrumentation - This standard was revised in December 2018. No current action on this standard.
- ISA-RP67.04.02-2010 Methodologies for the Determination of Setpoints for Nuclear Safety-Related Instrumentation - Several areas were identified for revision to reflect changes from the 67.04.01 standard as well as some improvements. Revision process will begin shortly.
- ISA-67.06.01-2002 Performance Monitoring for Nuclear Safety-Related Instrument Channels in Nuclear Power Plants – Comments have been received and will be sent out soon to the committee for review.

ISA 67 committee welcomes four new members; Eric Allen, Adam Gerth (Idaho National Laboratory alternate voting member), Thomas George, and Pradeep Ramuhalli (Oakridge).

We are always open to new ideas and input from those with a stake in Nuclear Power Plant Standards. Please consider getting involved today! More information about the ISA67 Committee and its activities can be found at the ISA67 committee website.

Regards,
Daniel Steik
ISA67 Chair
(208) 600-4430
**ISA77 Committee Update**

Effective January 1, 2020, Sinming Kwong became the new Chair for ISA77 Fossil Power Standard Committee. Currently, Sinming works as Senior Lead Engineer with Emerson Automation Solutions and has over 35 years’ experience in the power generation industry. His specialties include Boiler Control System, Burner Management System, and high-fidelity simulation in power plants. We would like to thank Daniel Lee, the former Chair, for his service and dedication in the Committee over the years.

The last committee meeting was held on February 12, 2020. Following standards were discussed.

- **ISA77.13 Turbine Steam Bypass Systems** (in revision and still in progress)
- **ISA77.22.01 Power Plant Automation** (new document and still in progress)
- **ISA77.44.01 Steam Temperature** (balloting completed – new to resolve editorial comments)

Standards awaiting publication include:

- **ISA-TR77.00.01 Definitions and Design Consideration**
- **ISA-77.14.01 Steam Turbine Controls**

The ISA77.20.01 Fossil Power Plant Simulator working group chair Bill Talbot would like to revise this standard and is looking for working group members. Of particular interest are current utility employees. If you would like to participate as a working group member, please contact Bill at talbot@TalbotSimulationAssociates.com

The next meeting Committee meeting will be on June 17, 2020.

**POVID Membership Recognition**

**July 2019 through January 2020**

The Power Industry Division (POVID) would like to welcome all our new and returning members and our new student members. We hope you will take advantage of everything POWID has to offer for your work and your career including the opportunity to network with power industry professionals across the globe. Our primary goal is to provide a means for information exchange among engineers, scientists, technicians, and managers involved in instrumentation, control and automation related to the production of power. POWID is active in developing industry safety and performance standards, working closely with two ISA standards committees—ISA67, Nuclear Power Plant Standards, and ISA77, Fossil Power Plant Standards. The Division also conducts technical training and sponsors awards for power plants and individuals advancing instrumentation and control within the power industry. POWID welcomes your involvement in our division activities. Opportunities are available to provide information for our newsletter and web site, to develop papers for presentation at our annual conference, and to participate in our division’s management structure. It’s a great way to get to know other industry professionals, to gain professional recognition, and to keep informed!

**Welcome New and Returning POWID Members**

| Carlos Boronat Ferrater, Responsable Carlos Boronat Ferrater, Responsable de Proyectos | Mr George Olamide Dosumu, Electricity Supply Board |
| de Proyectos | Francois Dubois, Benchmark Instrumentation & Analytical Services, Manager |
| Saulo Silvino Bortorini | Neal Edwards, UCI, Instrument Control Technician |
| Manfred Botschek, Manfred Botschek Consulting, Owner | Mr Dennis Fairchild, Maintenance Foreman |
| James Brown | Muhammad Yousuf Faisal |
| Mr, Danny Robert Burton, Jr., Northwest Instruments & Controls, Sales | Xin Yun Feng, Automation Technology Support Inc., President |
| Joshua Carlson, Dragos, Inc., Senior Business Development Manager | Michael Flaherty |
| Elmer Ernesto Castillo Hernández, LA GEO, Ingeniero electricista | Mark Fletcher, Vestas, Global Head Plant Operations Engineering |
| Ravi Chaturvedi | Ms Sarah Fluchs, Admeritia GmbH, OT Security Consultant |
| Gliserio Chavez, CCST, Instrumentation Técnico | Juan Ulises Fuentes Barrera, LA GEO, Ingeniero en Instrumentación |
| Andrew Clifton | Brian Dennis Gaon, University of New Hampshire, ISO |
| Iris Colón-Berrios, DSI | Julian Garcia Arias, CELSIA S.A. ESP, Michael Garza |
| Jose Contreras Mora, Ingeniera de Proyectos | Mr William Genz |
| Ben Cox, Viridor Waste Management, Principal C&I Engineer | Emma Gihl, Burns & McDonnell |
| Joseph Cunningham | Michael R. Glass, CMAS Assessor (Automation) |
| José Ricardo Díaz Guevara, Ingeniero en Plant Operations Engineering | |
| Mark Fletcher, Vestas, Global Head Plant Operations Engineering | Ms Sarah Fluchs, Admeritia GmbH, OT Security Consultant |
| Brian Dennis Gaon, University of New Hampshire, ISO | Julian Garcia Arias, CELSIA S.A. ESP, Michael Garza |
| Mr William Genz | Emma Gihl, Burns & McDonnell |
| Michael R. Glass, CMAS Assessor (Automation) | |
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| de Proyectos | Francois Dubois, Benchmark Instrumentation & Analytical Services, Manager |
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| Joseph Cunningham | Michael R. Glass, CMAS Assessor (Automation) |
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