ISA 2019 Process Industry Conference

Preliminary Program *subject to change*

Monday, 4 November

SUBSEA Automation Track

10:00 AM-10:30 AM
Underwater Intervention Drones - Status and Way Forward
Daniel Abicht

10:30 AM – 11:00 AM
Saab Sabertooth - A Hybrid Seafloor Resident AUV / ROV
Chris Roper

11:00 AM – 11:30 AM
Aquanaut: The innovation in Deepwater Robotics
Nicholaus Radford

ACARD Track:

1:30 PM – 2:00 PM
Innovation in Smart Automation for Safety, Security and Sustainability

- Provides details of an Industry-University Partnership program for Innovation in Smart Automation for Safety, Security and Sustainability
- Illustrates methodologies for development of plans for Smart Automation Technology based Research & Development, Prototyping, Intellectual Property Protection, Financing, Market Testing, Business Plans and Commercialization

2:00 PM – 2:30 PM
There's Money in Maintenance

- Two main aspects to maintenance: proper maintenance and an appropriate maintenance schedule
- An example of why proper maintenance is important: if an operator puts the wrong lubricant in a seal pot, it can lead to disastrous effects from material incompatibility
- If the maintenance schedule is not optimized in the fact that it occurs too soon, it could be significant and lead to unnecessary cost.
- Careful consideration must be taken into the creation of a maintenance plan, with many disciples providing input, for it to be most effective.

3:30 PM – 4:00 PM
Application of Artificial Neural Networks to Predict the Dynamic Behavior of a Dissolved Air Flotation Unit
Flavio Silva, Ana Claudia Souza, Newton Ferreira, Ivan Franco, and Ana Maria Fileti
University of Campinas

4:00 PM – 4:30 PM
Rejection of False Alarms in Catalytic Reforming Reactor at Bharat Petroleum Kochi Refinery
Prabhul Prabhakaran
Emerson Automation Solutions

- Oil refineries are among the largest producers and consumers of hydrogen
- Refineries have learned over the years to manipulate hydrogen and make provisions for reducing the consequences of accidental releases
- At the Bharat Petroleum refinery in Kochi, India, the challenges of monitoring for hydrogen flames were compounded by interference from steam
- Operators found flame detectors' effective viewing distance was reduced as a result of the radiant energy generated by the heating coils that produce the steam
- In this paper, we review the steps the refinery undertook to reduce the false alarm rate and lessons learned on combating steam interference
- Experience with flame detectors has shown that false alarms can be mitigated through the careful selection of field device and appropriate configuration and placement

Safety Track:

10:00 AM – 11:30 AM
Field Instrument Certification and Reliability Data (Panel)

- The basis of SIF reliability formulae is that failure mechanisms are assumed to be random and constant rate
- Much of the theory is derived from a long history of analyses of equipment from the military, aero-space, electronics and manufacturing industries
- The robustness of the data used in the reliability equations on which many operating and maintenance decisions about safety functions are based needs to be more carefully assessed
- It is highly possible that the governing failure mechanisms may be more influenced by systematic rather than random factors
- This panel discussion will provide an opportunity to exchange ideas and experiences in assessing the "reliability" of the reliability data used in the PFDavg calculations, what are the realistic failure modes and perhaps how can we improve our designs

1:30 PM – 2:15 PM
Process Safety Management, Jenga, Drift, and Preventing Process Industry Accidents
Paul Gruhn
aeSolutions

2:15 PM – 3:00 PM
Improve Reliability Without Compromising Safety
AnnCharlott Enberg
Emerson Automation Solutions

- To obtain a safe site, the solution is to select the right instrumentation/devices, design the system according to IEC 61511 and maintain the process, as well as understand the key data from manufacture IEC61508.

3:30 PM – 5:00 PM
Application Programming SRS, What Do You Do? (Q&A)

Security Track:

10:00 AM – 10:45 AM
Exercising Due Diligence in the Adoption of an Integrated Cybersecurity and Functional Safety Framework
Priyasloka Arya
LRDA

- How to integrate similar but differing demands of safety and security into the same common development lifecycle model, building upon the V-models from relevant functional safety standards such as IEC 61508 (industrial sector), IEC 62304 (medical devices) and ISO 26262 (automotive).
- For example, the SAE (Society of Automotive Engineers) has generated the SAE J3061 guidance document to be used in tandem with ISO 26262 and incorporate system cybersecurity requirements.
- ISA 62443 should be used along with IEC 61508 for industrial systems.

10:45 AM – 11:30 AM
Systematic Cyber Security Checking Approach for Critical Infrastructures Including IEC 61850 Power Substation Confirming ISA/IEC 62443
Felipe Costa
Moxa

- The cyber security approach should consider a holistic approach, embracing some key elements or pillars that IEC [International Electrotechnical Commission] describes as: People, process and technologies where each aspect has equal relevance and need to be taken into consideration

- This paper will focus on the technology perspective of the cyber security in what concerns the critical network communication assets, presenting a systematic and automatic approach in order to minimize the human failures
- The best strategy to protect critical infrastructures is to implement a hybrid approach of standards combining horizontal and vertical standards
- The ISA / IEC-62443 on the part 4 defines good practices and requirements which different types of devices, network devices included, should have in order to establish higher resistance and resilience under cyberattacks tentative proportional to the complexity levels referred to as "security level"
- The output of the systematic approach is to ensure the network compliance to the standard security level 2 with the minimum human interference decreasing the probability of missing available configurations
- It is possible to increase the reliability and ensure the infrastructure level according to the pre-established levels defined by the standard

1:30 PM – 2:15 PM
Case Histories of Monitoring Process Sensors for Cybersecurity, Reliability, and Safety
Joe Weiss
Applied Control Solutions

- Network monitoring technology cannot correlate malware or other network anomalies to physical impacts
- Raw process sensor data are ground truth and directly reflect the health of the sensors and the process
- Need to monitor the sensors, cross correlate it to the network, and determine if the process is actually affected
- Technology is now available that has been demonstrated in actual facility operations to allow coordination of process anomaly and network anomaly detection, provide implicit authentication, and assure sensor health for reliability and safety considerations
- Monitoring of the electrical characteristics of the process sensors can provide early indications of malicious or unintentional problems which is what happened in a water system with an incipient pump failure
- Case histories from power, water, chemicals, and building controls highlight the value of real time monitoring of the raw sensor signals

2:15 PM – 3:00 PM
Best Practices in Cybersecurity Assessment: An Outlook on Industrial Control and Safety Systems
Ukeme Ekong

- Industrial Control and Safety Systems (ICSS) are used to manage critical infrastructures like oil and gas facilities, power plants, etc.; and their usage is characterized by a need for fast and real time response, extremely high availability and reliability

- An increase in the diversity of customers with ICSS embedded in their work systems has necessitated a requirement for Cyber Security worldwide
- Globally, large scale industries are the most susceptible to cyber-attacks especially with the interconnectedness of their operations via internet protocol networks
- Cyber Security Assessment seeks to identify, estimate and prioritize the risks and vulnerabilities that these systems are exposed to
- This paper reviews the cyber security assessment practices and processes; and sets an information platform on current trends in maintaining a robust ICSS

3:30 PM – 5:00 PM
Protecting OT Assets from Five Real-World Cyber Attacks
Mark Carrigan and Nugroho Wibisono
PAS Global LLC/Medco E&P Natuna Ltd.

- Industrial facilities are vulnerable to cyberattacks from external threat actors and to the effects of undocumented or unauthorized changes made by insiders
- Effective OT asset management is foundational to protecting OT assets from cyber threats, because it improves production safety and reliability while reducing OT cyber risk and delivers the depth and breadth of information that both cybersecurity professionals and control system engineers need to secure assets.

Alarm Management Track:

10:00 AM – 10:30 AM
Project Development of an Alarm Management Index
Manuel Hernandez
Fluor Corporation

- Development of an Alarm Management Index on a project requires input from several disciplines, including process, control systems, and mechanical
- The control systems engineering group is assigned the task of leading the effort to develop the index since this group will have the most coordination with the PCS vendor who will perform the actual configuration of a control database that implements the instructions in the Alarm Management Index.
- The AMI will also include information on what the response to an alarm should be, who needs to respond to an alarm, what the time frame is to respond and what alarm priority needs to be assigned to any particular alarm
- This paper will review the process undertaken in a project environment in order to produce a document that interested parties evaluate and agree to and that can be used by an automation contractor to build the alarm in the PCS configuration

10:30 AM – 11:00 AM

The Cost of Irrational Alarms

Richard Miller

Jacobs Technology Inc.

- New systems are designed with tons of data which too often results in excessive quantities of alarms as well as poor discrimination between alarm state and warning condition.
- Without a continuous cycle of investment through a disciplined approach to alarm rationalization, alarm management deteriorates over the life of the facility.
- The inevitable result is reduced operator effectiveness, increased downtime, and increased risk to personnel and equipment, which may be catastrophic.

11:00 AM – 11:30 AM

Controlling Alarm Floods to Meet ISA 18.2 Metrics at Flint Hills

Steve Ferrer

Emerson Automation Solutions

- This presentation will examine the factors that affect alarm floods as well as the practical approaches that make a significant difference by reducing the incidents of floods
- Graphic results of before and after the implementation of Emerson's dynamic alarm management solution at Flint Hills will be shown, along with their relationship to the ISA 18.2 Alarm Performance Metric Standard
- This presentation will also dispel some of the alarm management myths that survive in industry today

HMI Track:

1:30 PM – 2:00 PM

Alarm Management on the Shop Floor - The 7-Year Itch

Bonnie Ramey

DuPont

- DuPont implemented Alarm Management procedures (globally) for high hazard processes in 2012
- This poster/presentation will discuss how different processes are managing alarms 7 years later

2:00 PM – 2:30 PM

Why and How to Improve Alarms and HMI Graphics Design for Ammonia Plant

Zain Ali

Fatima Fertilizer

- The paper will discuss the need of alarms management philosophy at Ammonia plant for Alarms rationalization, prioritization, avoiding nuisance alarms and alarm flooding.
- The graphics designed before ISA101 (July 2015) need to be improved

2:30 PM – 3:00 PM

Operations Risk Management: What is Your Plant REALLY Doing?

Bill Hollifield

PAS

- Plant management sees risk control as a top priority. However, the means available are often a hodgepodge of undocumented, disconnected, and problematic methods
- With new approaches and technologies, building on the infrastructure of alarm management, the real-time visualization and monitoring of operations risk is being achieved
- This presentation covers the components of a layered, systematic, defense-in-depth concept to manage operations risk
- Based on alarm management tools, a convergence of technologies is enabling plant operators, engineers, and managers to know and understand, at all times, exactly how their plants are performing, and where their current risks lie

Abnormal Situation Management Track:

3:30 PM – 4:00 PM

The Evolution of HMIs in a Process Control Environment

Jeffrey Hayes

Beijer Electronics

- Traditionally, the human machine interface (HMI) provides a finite scope of information to the machine operator such as performance, operation, alarm, recipe and trend parameters.
- HMIs are evolving to connect to cloud-based services such as those from Microsoft, IBM, Google, and Amazon
- Data collected by one HMI is combined with data collected with other HMIs to create insights into what is happening in the overall industrial operation
- Those who build the machines can aggregate data from their machines all over the world to provide their customers insights into their specific machine(s) such as preventative maintenance and performance concerns
- Whether the machine is constantly connected to the Internet or occasionally, the modern HMI should be considered a critical component of the SCADA system
- This session will explore these trends and inform the attendees what the HMI development companies are working on as they integrate their products into the modern IIoT environment

4:00 PM – 4:30 PM

Increasing Safety with Human Centered Design

Magnus Gyllenstrand

Emerson Automation Solutions

- The process industry is facing a skills shortage as experienced and knowledgeable workers head into retirement

- By making advanced measurement devices simple to understand, install and maintain by using smart design algorithms, the user can focus on revenue rather than on maintenance and inaccurate readings
- By utilizing Human Centered Design this ensures that the units are commissioned correctly, and that the measurement will be very reliable
- In this presentation we take a deep dive into the development of a new configuration software, which provides greater ease-of-use, that will lead to improved worker efficiency and increased plant safety

4:30 PM – 5:00 PM
Situation Management - The Integrated Approach for Control Room Operators
Douglas Rothenberg
D-RoTH

- Situation Management unifies our understanding of how to deliver real value to control room operations
- To be effective at the role of managing, the human operator must be able to actually monitor what is in his charge, understand the meaning of what is being provided by that monitoring, and to plan and actualize any needed changes
- Integrated situation management can be a game changer in safe and effective operation of industrial plants and operations
  - It advances a firm technical framework that ties together all of the traditional individual aspects (e.g., alarm system, procedures, the human machine interface, control room design, and more) into a technology to understand and design effective control room management operations for enterprises
- This is a unified approach with explicit tools to deliver situation management to control room operators
- An important new contribution is the concepts and technology of weak signals and its use to supplement the alarm system to cover the rest of the situations that alarms are not intended or able to manage

---

Tuesday, 5 November

Education Track:

10:00 AM – 11:00 AM
Texas Board of Professional Engineers and Land Surveyors, Professional Conduct and Engineering Ethics – Continuing Education
George Hartmann
Texas Board of Professional Engineers and Land Surveyors

11:00 AM – 11:30 AM
Mid-Career: Transition to Management (Panel)

Kelvin Erickson
Missouri University of Science and Technology

- A panel of 3-4 individuals to talk about topics relevant to those with 10-20 years of experience.
- Career Pivot – thinking of making a change in your career
- Executive Education – do I need an MBA?
- Rejuvenating your career
- Academia – life after achieving tenure

1:30 PM – 2:00 PM
Computing Vision, Image Processing and Cloud Computing Applied in Advanced Manufacturing
Egidio Raimundo
Inatel

- The following study is about a data analytics system made for advanced manufacturing processes using computing vision that generates and provides online statistics to be used on the process decisions.
- Using a vision system into the manufacturing process becomes possible to produce flexible and personalized products once a real-time image can replace a big range of sensors.
- In addition, the acquisition of diverse data from the production line becomes simpler and concentrated because the vision is able to analyze patterns of shape, color, codes and even speed, quantity and quality of the products.
- The contributions of the work are the integration of computing vision, a system of big data and analytics and an advanced manufacturing system to provide important information to be used on the process optimization in an intelligent way.

Safety Track:

10:00 AM – 10:45 AM
We Have Installed an SIS, so My Risks are Protected, Not SO Fast!
Ken Leary
AECOM SIS Group

- Some companies fall into a false since of security about their installed Safety Instrumented Systems (SIS) and the risk that the system is reducing.
  - These companies install SIS as "plug-and-play" systems with disregard to process safety times and do not answer the question "Is my system fast enough to protect against the safety hazard?"
  - They do not perform the proper proof-test intervals required to meet the Probability of Failure on Demand average (PFDavg).
  - The hazardous scenario has to be properly modeled or simulated for the process safety response time.
- The maintenance of the SIF is important in achieving the proper Risk Reduction Factor (RRF).
- The Computerized Maintenance Management System (CMMS) in place has to have the proper rigor for maintaining the proof-test interval required in the PFDavg calculation.

- The only way to have an effective SIS is to make sure that the SIF is fast enough and that the SIF is properly tested as per the PFDavg calculation.

10:45 AM – 11:30 AM

Fire & Gas Mapping Study and Implementation or Brownfield Plant - PETRONAS Experience
Sharul A-Rashid
PETRONAS

- PETRONAS Refinery had conducted review of its fire and gas mapping exercise done in 2013 as part of the HSE Fire Prevention and Mitigation Framework
- The fire and gas mapping recommendations were to be implemented in phases according to the roll out plan
- For 2018, we focused execution for Infrared Point Gas Detector at Condensate Fractionation Unit and Aromatics Utilities
- Fire & Gas Mapping Is a form of IT/OT convergence - use IT-computing power, data science & 3D digital twin to accurately place the fire & flammable gas detectors at the OT-domain (plant site)
- During any HSE incidence (gas release/ fire break-out), operator would response fast enough to prevent the event from becoming major fire/ explosion

1:30 PM – 2:15 PM

System Testing is a Project's Best Friend: Why System Testing is Good
Simon Lucchini

- The Functional Safety Assessment (FSA) is a sometimes neglected requirement of the functional safety standards.
- The ANSI/ISA-61511 (previous revision was ANSI/ISA-84.00.01) and IEC-61511 standards require that at least one FSA be conducted prior to hazards, which are to be protected against or mitigated by instrumented protective functions, being introduced into the process.
- The standards specify five different stages of the Safety Lifecycle (SLC) at which an FSA can be conducted, and the latest version of the ISA standard adds an additional mandatory FSA.
- The FSA is required to be executed in such a way that "judgement can be made as to the functional safety and safety integrity achieved by every SIF of the SIS".
- Part of conducting an effective FSA is identifying the scope of the assessment.
- This paper will cover examples of poor assessments, assessments done too late to have any impact, what can happen if the scope is poorly defined, suggestions to make assessments more effective, and the impact of the latest version of IEC 61511.

2:15 PM – 3:00 PM

Conducting an Effective Functional Safety Assessment
Greg Hardin

- The Functional Safety Assessment (FSA) is a sometimes neglected requirement of the functional safety standards
- The ANSI/ISA-61511 (previous revision was ANSI/ISA-84.00.01) and IEC-61511 standards require that at least one FSA be conducted prior to hazards, which are to be protected

against or mitigated by instrumented protective functions, being introduced into the
process
- Part of conducting an effective FSA is identifying the scope of the assessment
- This paper will cover examples of poor assessments, assessments done too late to have
any impact, what can happen if the scope is poorly defined, suggestions to make
assessments more effective, and the impact of the latest version of IEC 61511

3:30 PM – 5:00 PM
Conversations to Be Had With Project Management on Systems Testing (Q&A)

Security Track:

10:00 AM – 10:45 AM
Supply Chain Cyber Security in the Industrial Control System
Kurt Forster
Hatch

- This presentation investigates and describes the evolving Industrial Control System (ICS) cyber
supply chain (CSC) practice from a cyber resilience view towards connectivity into the ICS from
untrusted communication zones
- ISA 62443 describes an untrusted zone or conduit as any communication or network that is
external from the ICS and the ICS DMZ boundary
- The CSC is dependent on several different professional communities of multi-disciplined experts
from process control, operational technologists, information security, software engineers and
logistical functions
- The two models used for ICS Cyber Resilience model in this presentation utilizes the cyber
resilience model for engineered cyber systems and a modified Confidentiality Integrity
Availability triad for the ICS and OT
- The presentation will bring an understanding of the threats poised to the ICS supply chain and
how to strengthen the security posture through maturity and risk models that 3rd parties will be
required to deploy for new or current connectivity or supply of products in a joint venture to
improve CSC security

10:45 AM – 11:30 AM
Establishing your Cybersecurity Risk by Assessing your Environment
Jason Lachowsky
Cybertrol Engineering

- From hyper-connected process control systems emerges new and often underrecognized cyber-
attack vectors.
- The combined complexities of these networked information systems serve to amplify threats
and vulnerabilities, creating increased risk to production, safety, and reputation.

- During this digital transformation, you need to update your cyber risk assessment and actively strengthen your cyber risk management plans.
- You can establish the potential hazard and risk by conducting a cybersecurity assessment.
  - This can help you align with appropriate standards for control system security such as NIST SP800-82 or ISA-99/IEC 62443.
- Often an assessment will include technical recommendations to help secure your IoT devices and embedded systems. It can also help reconcile differences between corporate security policies and those of your process control system.
- A proper assessment will create policies for detecting attacks quickly, isolating affected systems, and taking remedial action.
- The presentation will break the cybersecurity assessment methods down into five levels of assessment that may be further refined.

1:30 PM – 2:15 PM

Cyber Physical Attacks Analysis and Detection with Machine Learning Techniques in ICS SCADA Systems
Sinil Mubarak

- Supervisory control and data acquisition (SCADA) system is a computer-based system implemented to control the physical processes which enhances the operational efficiency, cost reduction and energy consumption. It supervises physical process by collecting data from sensors and performs monitoring, data logging, alarm and diagnostic functions
- The advancement in technology for connectivity in communication protocols has resulted the system to be more vulnerable to cyber-attacks
- The classifications of various attacks along with the intrusion detection methods have been highlighted
- Detection techniques with machine learning algorithms, suitable for intrusion detection of cyber-attacks in SCADA systems, as first line of defense have been detailed

2:15 PM – 3:00 PM

Enhancing the Local Cybersecurity of Critical Assets Using Kalman Filter
Fan Zhang
University of Tennessee at Knoxville

- A decentralized cybersecurity strategy is researched to achieve better local cybersecurity of critical assets.
  - This strategy is achievable by implementing a Kalman Filter into the controller to predict the response of the command issued by the controller based on the previous state values and the current command.
- Through comparing the measurement and the predicted value, the command issued under malicious activity could be detected.

- A hardware-in-the-loop (HIL) testbed which consists of an nuclear power plants (NPP) simulator, a programmable logic controller (PLC) and a human machine interface (HMI) was built to evaluate the effectiveness of the proposed method.
- The results show that the Kalman Filter implemented in the PLC could detect such attack effectively, which enhances the local cybersecurity for the critical assets.

3:30 PM – 4:15 PM
Automation System Security Readiness in Brownfield Project Case Study: Buntal-5 Subsea Control System Modification
Nugroho Wibisono
Medco E&P Natuna Ltd

- The brownfield projects in oil & gas processing facility typically use and modify the existing facility, including the modification of automation system, such as process control system and safety instrumented system.
- Conducting an assessment of modification works to the existing automation system prior to implementation of the modification is beneficial for facility owner to understand the modification impact and the readiness of required provision for automation system security
- A case study is presented in this paper by having automation system security assessment in one of Medco E&P Natuna offshore brownfield project, namely Buntal-5 subsea gas development project.
- In order to have thorough assessment, the assessment itself involve internal company project personnel as the one who implement the modification, production operations and asset engineering personnel as the facility owner.

4:15 PM – 5:00 PM
Owner Operator Trends, Challenges Approaches to ICS Security Open Forum (Q&A)

Projects Track:

10:00 AM – 10:30 AM
Control Hierarchy Diagram, Graphical Method for Designing and Documenting Industrial Control Systems
Shiro Ogawa
Brooklund Technologies Inc.

- The DCSs can grow to large and complex systems including thousands of control blocks, where many control blocks are connected with each other.
- These connections are essential information for understanding the functionalities of the whole system.
- The Control Hierarchy Diagram (CHD) has been utilized by the author for designing control systems and describes the control system as a combined system of the DCS and the controlled

process with the clearly demarcated hierarchy, where the controlled process at the base, and interlock, basic control, cascade master, and optimization at the top.

- The CHD is useful for every phase of a DCS life from the design phase to the building and maintenance phases.
- The paper explains the basic rules of the CHD with examples.

10:30 AM – 11:00 AM
The Value of Front End Engineering Design (FEED) in Greenfield Automation Projects
Carlos Pereira
Emerson Automation Solutions

- This presentation highlights the value of performing a deep Front-End Engineering Design at a time when the ability to influence changes are high and the costs are relatively low.
- The value of proof of concepts related to development of early work processes with other stakeholders, definition of detailed division of responsibilities across multiple parties and even test of these work processes will also be explored.

11:00 AM – 11:30 AM
Virtual Commissioning of Industrial Plant Using 3D Environment
Kash Behdinan
Pointfar Automation LLC

- This Presentation describes new concepts for systematic design of manufacturing system models for Virtual Commissioning based on model libraries and standardized recipes for the design of component models from CAD data. By means of virtual commissioning, manufacturing systems, real plants and their related control programs can be tested before being constructed
- By means of digital models, computer-aided planning and design, computer-aided engineering, associated software tools and with the aid of integrated data management, the "Digital Factory" would permit integrated planning, simulation and validation of manufacturing processes and systems.
  - By using functional block library, the dynamic behavior model alters controller commands to virtual cell emulator commands.
  - A simulation situation assists to effectively validate the serviceability of controller model and virtual cell
- By simulating and validating automation equipment virtually, we can confirm that our equipment will work as expected-significantly reducing system installation cost and startup time. This approach can also lead to better software quality and increased safety

1:30 PM – 2:15 PM
Process Control System Migrations
Richard Brooks
Hatch

- Many process control systems that were state of the art at the time of implementation are now either outdated from a technology standpoint or are nearing end of life in terms of hardware and/or software support

- Relying on legacy systems and system components and software that are no longer supported by Control System Vendors raises the risk of plant outages which translate directly to production losses
- Hatch has completed a number of process control system migrations across multiple business sectors (municipal and industrial) and this presentation will discuss the lessons learned and illustrate concrete examples from those projects
- We will feature the opportunities that can be leveraged as part of any control system migration including; Alarm Management; HMI - Performance design; IT/OT Network Security & Reliability; Control System Standardization

2:15 PM – 3:00 PM

Advanced Manufacturing for Agricultural Production Using Artificial Intelligence and IOT
Egidio Raimundo
Inatel

- Advanced manufacturing in the context of the fourth industrial revolution is characterized by the integration of technologies to make productive processes autonomous and intelligent
- The Internet of Things (IoT), with its data protocols such as MQTT, RESTfull and HTTP integrated with the Artificial Intelligence (AI), provides a greater precision crop and management on the fields
- This project proposal is to demonstrate the interaction between the AI with IoT protocols to control a hardware system and provide the agricultural production automation

3:30 PM – 4:00 PM

Data Conditioning, an Essential in the Value Chain of Digital Transformation
Bernard Morneau
Pimsoft Inc.

- Conditioning materials according to the processing capability of the facility is an essential step in the process industries
- Data conditioning, an essential step in the digital transformation which is revolutionizing plant operations and impacts all workers across the entire organization and its value chain.
- In this presentation we will discuss strategies, benefits and concrete actions that can be taken ensure that process data and information are ready for business and can support advanced manufacturing strategies like Industry 4.0

4:00 PM – 4:30 PM

Low-Cost Supervisory System for Industry 4.0 using OPC UA
João Henriques
Inatel

- The Industry 4.0 (Indutrie 4.0) term emerged in Germany as an industrial sector modernization initiative. Industry 4.0 is related as the digitalization of production processes and their variables.

- In this scenario, the industrial communication protocols are very important, especially in case of protocols with high transmission rate and which ensure the compatibility between equipment from different companies, such as the OPC UA protocol. In this context, the present work aims to demonstrate the use of the OPC UA protocol on the industry with the implementation of a Supervisory System for a productive process

---

Wednesday, 6 November

Safety Track:

10:00 AM – 10:45 AM
Functional Safety Management: The Yellow Brick Road to a Safe Plant
Monica Hochleitner
SIS SILverstone LLC

- The experience observed in safety instrumented systems (SIS) along the years has shown that companies have been looking for compliance with international standards and RAGAGEP either due to regulation, insurance requirements or even to a strong safety culture
- It is necessary to protect the plants from cyber-attacks, bringing to the table issues that need to be addressed in a completely different and new format
- This paper discusses the relevance of a well implemented functional safety management system.
- This paper also introduces a workflow tool which conducts the SIS project and maintenance through an essential path, contemplating all the functional safety requirements common to the current standard, and resulting in safer process plants far beyond their deployment phase

10:45 AM – 11:30 AM
Perfecting Proof Test Effectiveness
Iwan van Beurden
exida

1:30 PM – 2:15 PM
Functional Safety in Operation and Maintenance
Qing Cai
Covestro

- End user cannot simply let go the functional safety expertise after a new or modified Safety Instrumented System (SIS) is validated. Functional safety management applies to many activities in operation and maintenance phase of the Safety Life-Cycle (SLC)
- When it comes to manage proof tests according to SIL calculation; validate the assumptions made during engineering phases (e.g. demand mode); manage changes; analyze failures; collect Prior-Use experiences; do statistics on failure rates; and do audits: functional safety needs to know what and how to do to follow the strategy to minimize systematic failures, and adjust it if

necessary

2:15 PM – 3:00 PM
Use of a Standardized Risk Analysis Program to Accurately Estimate Safety Risks
Amanda Fenyves
Integral Engineering Group, LLC

- Use of a standardized risk analysis program can prevent top management from under- or over-estimating process safety risks present within a system.
- This presentation will elaborate upon the development of a client's standardized risk analysis program, implementation of the program, and results of program implementation.

3:30 PM – 5:00 PM
The Safety Plan & Project Management: How to Get Functional Safety Started Early Enough; What Are the Interfaces and Impediments? (Open Q&A)

Instrumentation & Control Track:

10:30 AM – 11:00 AM
PID Controllers Ready to Talk if You Are Listening
Steve Edwards
OSIsoft

- PID controllers can deliver more than just control.
- Controllers produce data streams you can use to detect process health events.
- This paper illustrates the basic steps to detect latent process events with streaming analytics against measures like PID controller strain.
- PID controller strain will be defined and techniques presented on how to stream simple pattern recognition logic.
- This paper digs deep to present best practices that automate detection and communication to the user.
- The analytic techniques are applied to historical data from a random set of sixty PID controllers.

11:00 AM – 11:30 AM
Improving Performance by Faster Response
Gregory McMillan
Emerson Automation Solutions

- The performance of a control system and safety instrumented system depends on the speed of response of measurements, digital controls and the final control elements.
- The performance can be tracked down to how much delay is introduced by the automation system and its relative size to how fast the process can respond.

- The biggest source of delay is often the sensor and the control valve or variable frequency drive, so methods are presented to ensure this is not the case.
- Simple equations are also given to estimate the delay from all components in the automation system and their impact on performance.

1:30 PM – 2:15 PM
Enumerating the Holistic Benefits of Process Optimization
Eugene Halford
Integral Engineering Group, LLC

- Process optimization is a continual effort that is driven each and every day to run a process better, more safely, to increase throughput, to decrease utilities, and the list goes on
- When a plant is designed and built, it is intended to produce a throughput based on capital constraints or market capacities at the time of construction
- As both of those change over time, operating and investment capital increase or demand increases from either market capacity or vendor preference, the first route of exploration is the optimization of the existing process, minimizing capital investment by utilizing the existing unit operations and brain power of personnel
- Continual process optimization prior to throughput driven needs can in and of itself create demand increase by increasing product quality
- Optimization of each unit operation can lead to increases in product quality, driving up customer desire and therefore production demand

2:15 PM – 3:00 PM
Process Unit Module Automation TM
Abdulkadar Susnerwala
AirLiquide

- Air Liquide operates several hundred Air Separation Units throughout the United State and across the globe. One of the Air Liquide's Plant Digitization initiatives is Process Unit Module Automation (PUMA) project which utilizes state-based control concept to achieve operational excellence
- Benefits of using PUMA can be categorized under Production Improvement, Operator Effectiveness, Standardization and Knowledge Capture
- Operator's experience and knowledge of the process is the key to startup our plants safely, reliably and efficiently.
- Startup and shutdown operating procedures are site specific and they vary vastly from one site to another for similar equipment, column or a section of the plant
- After careful review of OT with the operation team to capture the optimized startup, running and shutdown the Functional Requirement Specifications (FRS) is developed for the unit module to be controlled by PUMA

- The Emerson DeltaV PK Controller is used as a PUMA controller to run state base control engine. Based on the Plant DCS (Yokogawa, APACS, Foxboro etc) interface layer is developed to communicate to control blocks and field device layer of plant DCS

Operator Training Track:

3:30 PM – 4:15 PM
Implementing Operator Training Systems
Cleve Johnson
Chemours

- With shifting age demographics at many plants, board operators with 30+ years' experience are retiring and being replaced by operators with < 5 years of experience
- A projected cultural shift could result in young operators changing jobs often, which would cause further turnover
- It is a challenge to transfer knowledge and experience to new operators, but one method is use of Operator Training Systems
- The presentation will focus on key learnings from developing and implementing training systems for board operators in four different chemical processes and with two different DCS systems (some of which were physical DCS systems and some virtual), and with high fidelity, engineering-principled chemical process models

4:15 PM – 5:00 PM
Operational and Safety Challenges and Benefits of Deploying an Operator Training Simulator (OTS) for a Brownfield Petrochemical Plant
Nathan Leonard
Corys Inc.

- Operator Training Simulators (OTS) have long been utilized to improve the skills of an operational workforce, thereby increasing plant performance, improving plant-wide safety, and ultimately increasing company profits through increased throughput and plant availability
- The success of building an accurate simulation process model depends on the accuracy of the input data obtained
- This paper focuses on a recent OTS project executed by Corys at a brownfield petrochemical plant and shares the development philosophy, technology selection, design features, challenges and lessons learned during the implementation of the OTS
- This paper also focuses on the tangible benefits of incorporating the OTS into the facility including DCS migration code validation, improved safety performance, and increased operator efficiency

Center for Operator Performance Track:

10:00 AM – 10:45 AM
Procedural Systems, Safety Culture, and Process Safety: Relationships Between These and

Operational Implications
Camille Peres

- In high-risk industrial work environments, safety culture and procedures are both important, and even imperative, elements to understand for an organization to have a robust safety system
- These systems are often examined in isolation from each other
- This presentation will reflect on and present evidence regarding, how variables associated with procedural systems and safety culture mutually influence each other

10:45 AM – 11:30 AM
Creating a Collaborative Environment in the Control Room and the Field. Insights from the Science of Teamwork
Tiffany Bisbey

- Many natural-resource processing plants have shifted towards consolidating distributed board operators into centralized control rooms while expanding their scope of responsibilities
- Information exchange at these sites now relies heavily on electronic means and radio communications
- One-on-one interviews, focus groups, and behavioral observations were conducted with board and field operators to determine critical points of collaboration within and between teams that are meaningful for both performance effectiveness and safety
- This presentation will showcase findings from these ongoing efforts related to collaboration and communication, along with practical recommendations for managing distributed teams grounded in evidence-based best practices in team science

Open Process Automation Forum Track:

1:30 PM – 2:15 PM
ExxonMobil Open Process Automation Program
Keith Ribe
ExxonMobil

2:15 PM – 3:00 PM
Discovering Best Practices in OPA Design
Bridget Fitzpatrick, Patrick Sloan, and Ben Fuson
Wood

ACARD Track:

10:00 AM – 11:30 AM
Industry Trends in Safety and Cybersecurity
Larry O'Brien and Mark Sen
Gupta