

# 11th Annual Conference of the PHM Society 2019

## Call for ...

- Papers
- Tutorials
- Data Challenge
- Panel Sessions
- Technical Session Chairs
- Doctoral Symposium Applications
- Student Poster Session Abstracts
- Technology Demos/ Product Showcases

September 21-26, 2019  
Scottsdale Resort  
at McCormick Ranch  
Scottsdale  
Arizona, USA



## 11<sup>th</sup> Annual Conference of the Prognostics and Health Management Society September 21-26, 2019

- PHM Short Courses: September 21-22, 2019
- Doctoral Symposium: September 23, 2019
- *Industrial AI for PHM* Workshop: September 23, 2019
- *Measurement & Evaluation for PHM in Manufacturing* Workshop: September 23, 2019
- Technical Program: September 24-26, 2019

<http://www.phmconference.org>

## IMPORTANT DATES

### Key Paper Dates

- Abstract Submissions**  
- March 04, 2019
- Abstract Acceptance Notification**  
- March 15, 2019
- Paper Submission Due**  
- May 06, 2019
- Paper Acceptance Notification**  
- July 08, 2019
- Final Papers Due**  
- August 05, 2019

### Key Submission Dates

Catching Summer in late September in Scottsdale, AZ, this 11th Annual Conference of the Prognostics and Health Management (PHM) Society will bring together the global community of PHM experts from industry, academia, and government in diverse application areas including energy, aerospace, transportation, automotive, manufacturing, and industrial automation. The conference will feature technical paper sessions, panel sessions, a doctoral symposium, and tutorials included for all registrants. A PHM data analysis competition will be carried out in parallel and the results will be presented during the conference. Leading companies and research institutions will exhibit their products and demonstrate their technologies throughout the event. Two Workshops will be held at the beginning of the conference: an Industrial AI for PHM Workshop to discuss issues in using machine learning to enhance PHM capabilities, and a Measurement and Evaluation for PHM in Manufacturing Workshop to focus the PHM community on current efforts and challenges in verifying and validating PHM in manufacturing operations. Several social events will round up the program by providing opportunities for participants to connect and network with colleagues, including a high-quality career fair and diversity outreach & networking event. The PHM Society will also offer separate, dedicated short courses focused on fundamental PHM concepts and techniques, as well as data analytics before the start of the main conference.

A major differentiator for the PHM Society is its modern approach toward intellectual property rights. Authors retain copyright in their work while allowing the PHM Society to distribute their work through a Creative Commons License. As a result, all articles published by the PHM Society are available to the global PHM community via the internet for free and without any restrictions.

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## CALL FOR PAPERS

Prospective authors are invited to contribute full length, original, high-quality papers at [www.phmpapers.org](http://www.phmpapers.org). The topics suggested by the conference can be categorized as analysis methods, asset-specific algorithms, prototype implementations, fielded systems, and business case analysis. Both research and industry contributions are welcomed. Submitted papers will be reviewed by experts based on the criteria of content, significance, technical validity, innovation, writing style, accuracy, clarity, simplicity and readability. For more information, please contact the Technical Committee Chairs at [tpc@phmconference.org](mailto:tpc@phmconference.org).

**Topics of Interest:**

## Panel Session Topic Proposals

- February 04, 2019

## Technical Session Proposals

- March 04, 2019

## Doctoral Symposium

- May 27, 2019

## Student Poster Session

- May 27, 2019

## Product Showcase/ Technology Demos

- May 27, 2019

## CONFERENCE MANAGEMENT TEAM

### Conference Chairs

**Wolfgang Fink**

*University of Arizona*

**Ginger Shao**

*Honeywell*

### Conference Advisors

**Karl Reichard**

*Penn State University*

**Ian Jennions**

*Cranfield University*

### Local Chairs

**Chris Hickenbottom**

*Honeywell Aerospace*

**Emmanuel Nwadiogbu**

### Sponsorship

**Michael Walker**

*D2K Technologies*

**Jim Larkin**

*Aerojet Rocketdyne*

**Laurel Frediani**

*Sporian Microsystems*

### Keynotes/Luminaries

**Andy Hess**

*Hess PHM Group*

### TPC Chairs

**Bin Zhang**

- Advanced Sensing & Embedded Devices
- Adaptive Control & Fault Accommodation
- Automotive Systems
- Autonomous / Robotic / Unmanned Systems
- PHM in Aviation (Commercial and Defense) Systems
- CBM Return on Investment & Business Case Analysis
- Cloud Analytics
- Corrosion
- Cybersecurity PHM
- Data Driven Approaches
- Decision Support Systems
- Detection, Diagnostics & Prognostics Methods
- Digital Twin and Digital Thread
- Electronic Transaction and Blockchain
- Energy (e.g., Nuclear, Smart Grid, Wind)
- Enterprise-wide PHM Applications
- Human-centric PHM
- PHM for Human Health and Performance
- Marine, Mining, and Railway Applications
- PHM for Precision Agriculture
- Oil & Gas
- Physics of Failure & Model Based Prediction
- Predictive Analytics
- Smart Grid
- Smart Manufacturing
- Space Technologies and Systems
- Standards, Metrics, and Verification & Validation

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## CALL FOR PANEL SESSION CHAIRS

A panel session chair will moderate panel discussions with other speakers who have expertise in specific topics. Each panelist will provide remarks for no longer than 7 minutes and then participate in a Q&A session with the audience. Ideas for new panels are also welcome. For someone interested in leading a panel session, please contact David Siegel and Radu Pavel at [panels@phmconference.org](mailto:panels@phmconference.org).

## Prospective Panel Topics Include:

- Academic/Education
- Aerospace PHM
- Automotive PHM
- Fielded Systems
- MEMS Technologies to Enable PHM
- Oil and Gas
- PHM Applications Deployment

*Univ. of South Carolina*

**Co-Chair: Abhinav**

**Saxena**

*General Electric*

**Marcos Orchard**

*University of Chile* **Chetan**

**Kulkarni**

*SGT, Inc.*

**Ian Jennions**

*Cranfield University*

**Jose Celaya**

*Schlumberger*

**Ramin Moradi**

*University of Maryland*

**Ravi Rajamani**

*drR2 consulting*

## Proceedings

**Scott Clements**

*Lockheed Martin*

## Panel Sessions

**David Siegel**

*Predictrionics*

**Radu Pavel**

*TechSolve*

## PHM Data Challenge

**Kurt Doughty**

*Collins Aerospace*

**Kamal Medjaher**

*ENIT France*

**Justinian Rosca**

*Siemens*

**Scott Clements**

*Lockheed Martin*

**Jamie Coble**

*University of Tennessee*

## Tutorials

**Kai Goebel**

*NASA Ames*

## Short Course

**Jeff Bird**

*TECnos*

**George Vachtsevanos**

*Georgia Tech*

**Neil Eklund**

- PHM for Human Health and Performance
- PHM for Precision Agriculture
- Railway PHM
- Manufacturing PHM
- Standards for PHM
- Theoretical Aspects of Prognostics
- Unmanned/ Autonomous Systems

*Analatom*

### Technology Demos/ Product Showcases

**Jim Larkin**

*Aerojet Rocketdyne*

**Laurel Frediani**

*Sporian Microsystems*

**Derek DeVries**

*Northrop Grumman*

### Poster Session

**Jamie Coble**

*University of Tennessee*

**Alexslis Maindze**

*Cranfield University*

**Nick Eleftheroglou**

*TU Delft*

**Sofia Koukoura**

*University of Strathclyde*

**Ramin Moradi**

*University of Maryland*

### Conference Career Fair

**Abbas Chokor**

*Seagate*

### Education & Professional Dev

**Jeff Bird**

*TECnos*

**Karl Reichard**

*Penn State University*

### Diversity Outreach

**Kathryn Elliott**

*Rolls Royce*

**Jamie Coble**

*University of Tennessee*

### University Outreach

**Ian Jennions**

*Cranfield University*

**Jim Larkin**

*Aerojet Rocketdyne*

### Student Activities

**Sofia Koukoura**

*University of Strathclyde*

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## CALL FOR TUTORIAL SPEAKERS

The PHM 2019 Conference tutorials is planning to offer a set of tutorials that are providing coverage of topics of interest to the PHM audience. The tutorials are meant to provide a learning experience to the audience by giving a comprehensive introduction to the particular topic. Proposed tutorials need to address the interests of a varied audience: beginners, developers, designers, researchers, practitioners, and decision makers who wish to learn a given aspect of prognostic health management. For more information or to volunteer as a speaker, please contact Kai Goebel at [tutorials@phmconference.org](mailto:tutorials@phmconference.org).

### Tutorial Topics of Interest include (but are not limited to):

- Asset Health Management
- CBM Policies
- Cost-Benefit Analysis
- Diagnosis and Prognosis
- Life Cycle and Risk Management Methodologies
- PHM System Design and Engineering
- Standards and Methodologies
- Deep Learning
- Other advanced topics

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## CALL FOR TECHNOLOGY DEMONSTRATIONS & PRODUCT SHOWCASE PRESENTATIONS

The PHM Society invites sponsors to show off their monitoring, diagnostic, and/or prognostic engineering approaches through **Technology Demonstrations** and the **Product Showcase Presentations**.

The concept of the Technology Demonstrations is to offer a true “hands-on” learning experience to conference attendees. Multiple demonstrations will be given as brief tutorials to small groups, scheduled over a two-day period. Each demo will last for 30 – 60 minutes, where attendees will be encouraged to actively participate.

The Product Showcase track offers the opportunity for companies to advertise their products and/or services to conference attendees. Showcase presenters are provided a 10-minute timeslot to give marketing presentations via computer/table, projector, and microphone. Showcase presentations are not intended to be interactive and participants are encouraged to network with audience members after their showcase.

#### **Tech Demo & Product Showcase Topics of Interest:**

- Certification and Validation Techniques for Health Management Applications
- Fielded Prognostic or Advanced Diagnostic Systems
- Innovative System Maintenance Approaches
- Monitoring, Diagnostic, and/or Prognostic Hardware/Software Technologies
- Rapid Aging Testing and Analysis Techniques
- Sensors and Sensor Integration for PHM
- System Identification Processes to Support PHM Goals

For more information on either the Technology Demonstrations or the Product Showcase Presentations, please contact Jim Larkin, Laurel Frediani, and Derek DeVries at [techdemos@pnmconference.org](mailto:techdemos@pnmconference.org).

***Please Note: Demonstration/presentation hardware, software, concepts, material, data, etc., must be cleared for public release prior to the conference.***

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#### **INDUSTRIAL AI for PHM WORKSHOP**

Artificial Intelligence (AI) is a cognitive science including pattern recognition, natural language processing, machine learning, deep learning, robotics, etc. It has broad impacts to future autonomous system. Industrial AI is a systematic discipline in using various machine learning techniques to improve the performance, productivity, reliability, and safety of an industrial system, and ultimately to achieve resilient intelligence.

This Workshop is organized to discuss the systematic issues in using machine learning to improve PHM capabilities. Some selected experts will give technical presentation about recent advances and trends of Industrial AI for PHM with applications. A panel which consists of these experts will also have open discussions with the audiences. For more information, please contact Jay Lee at [jay.lee@uc.edu](mailto:jay.lee@uc.edu).

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**SAE Liaison**  
**Rhonda Walthall**  
*Collins Aerospace*

**Conference Materials**  
**Scott Clements**  
*Lockheed Martin*

**Doctoral Symposium**  
**Jamie Coble**  
*University of Tennessee*  
**Felipe Viana**  
*Univ. of Central Florida*

**Conference Finances**  
**Karl Reichard**  
*Penn State University*

**Website Development**  
**Scott Clements**  
*Lockheed Martin*

**Publicity**  
**Neil Eklund**  
*Anatom*  
**Scott Clements**  
*Lockheed Martin*  
**Kai Goebel**  
*NASA Ames*  
**Sofia Koukoura**  
*University of Strathclyde*

## **MEASUREMENT and EVALUATION for PHM in MANUFACTURING (ME4PHM) WORKSHOP**

This largely discussion-based event will feature talks from PHM technologists, researchers, integrators, end-users, and researchers operating/focused in manufacturing. It is expected that this event will be documented in a resultant report that will present the best practices, lessons learned, challenges, and needs in measuring, verifying, and validating PHM technologies applicable to or active in manufacturing. The sessions will be organized in the areas of:

- Performance metrics, test methods, data sets, and reference documentation to verify and validate (V&V) PHM
- Existing methods to and challenges of performing V&V of PHM of Software, Hardware (at the component level) necessary to generate PHM, Equipment and Process PHM, and Enterprise-Level PHM
- Developmental efforts in enhancing V&V capabilities of PHM
- Emergence of Industrial AI to enhance PHM capabilities and how to effectively evaluate its contribution.

The expected format will include several introductory presentations followed by panel sessions (with a strong emphasis on speaker and audience interaction) that will be dominated with discussion centered around the topics above and driven by crowd-sourced questions (questions are expected to be generated ahead of time and asked during the workshop). For more information, please contact Brian Weiss at [brian.weiss@nist.gov](mailto:brian.weiss@nist.gov).

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## **CALL FOR DOCTORAL SYMPOSIUM APPLICATIONS**

The PHM Society Doctoral Symposium will be held as a workshop on Monday, September 23. Full-time students are invited to submit their thesis ideas to the Doctoral Symposium. It provides an opportunity for graduate students to present their interests and plans at a formative stage in their research. The students will receive structured guidance from a panel of distinguished researchers as well as comments from conference participants and fellow students in a collegial setting. For more information, please contact Jamie Coble and Felipe Viana at [ds@phmconference.org](mailto:ds@phmconference.org).

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## **CALL FOR PHM DATA CHALLENGE PARTICIPANTS**

The PHM Society invites participants to compete in a data challenge to find the best solution to a PHM-related problem. Collaboration is encouraged. The top scoring teams will be invited to present their

solution at the conference. For more information, please contact the Data Challenge Committee at [data@phmconference.org](mailto:data@phmconference.org).

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### **CALL FOR STUDENT POSTER SESSION ABSTRACTS**

The PHM Society invites students at any stage in their education to submit an extended abstract to present their PHM-related work at the poster session on Tuesday, September 24. The poster session will allow students to present their work to the PHM community without requiring a full-length technical paper. For more information, please contact Jamie Coble at [posters@phmconference.org](mailto:posters@phmconference.org).

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### **SHORT COURSES**

The PHM Society will offer again by high demand the very successful short course on *PHM Fundamentals and Case Studies*, as well as the advanced course on *Analytics for PHM*.

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### **SPONSORSHIP**

Learn how you can support the PHM Society. Please contact Michael Walker, Jim Larkin, and Laurel Frediani at [sponsorship@phmconference.org](mailto:sponsorship@phmconference.org) for more information.

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### **CALL FOR TECHNICAL SESSION CHAIRS**

The PHM Society is also seeking individuals to 'champion' a specific topic relevant to PHM that can be realized into a technical paper session during the conference. Technical session chairs will be responsible for proposing a topic (which can be within or outside of the 'Call for Papers Topic Areas'), recruiting paper submissions within this topic area, identifying appropriately-qualified reviewers for submissions within this area, and leading the resultant technical session at the 2018 conference. All prospective papers should be submitted through the conference submission website and will undergo the same review process as papers not submitted for a specific technical session. Please contact Technical Program Committee Chairs at [tpc@phmconference.org](mailto:tpc@phmconference.org).

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*Sincerely,*

**Prof. Dr. Wolfgang Fink and Dr. Ginger Shao**  
*General Chairs*

Annual Conference of the PHM Society 2019

[chairs@phmconference.org](mailto:chairs@phmconference.org)

