phme21
Virtual Event - 28 June / 2 July 2021
6TH EUROPEAN CONFERENCE OF THE PROGNOSTICS AND HEALTH MANAGEMENT SOCIETY 2021

DETAILED SCHEDULE 2021

DAY 1 – 28 JUNE 2021

09:00 - 09:30 **Welcoming Address**
Introduction to the PHM Europe virtual conference by Octavian Niculita

09:30 – 11:00 **Tutorial 1: Practical issues and challenges in Predictive Maintenance**
By Prof. dr. ir. Tiedo Tinga – professor at the University of Twente and Netherlands Defence Academy

11:00 – 12:00 **Paper Session 1: Technical Language Processing 1**
Chaired by Melinda Hodkiewicz

- Technical language processing for efficient classification of failure events for safety critical equipment
- Algorithmically Exploiting the Knowledge Accumulated in Textual Domains for Technical Support
- Semi-automated estimation of reliability measures from maintenance work order records

12:00 – 13:00 **LUNCH**

13:00 – 14:00 **Paper Session 2: Technical Language Processing 2**
Chaired by Michael Brundage

- Qualifying Evaluations from Human Operators: Integrating Sensor Data with Natural Language Logs
- The Impact of Data Quality on Maintenance Work Order Analysis: A Case Study in Historical HVAC Maintenance Work Orders
- Evaluating word representations in a technical language processing pipeline
- A Natural Language Processing method for the identification of the factors influencing road accident severity

14:00 – 15:00 **Paper Session 3: Prognostics, Predictive & Condition-based Maintenance 1**
Chaired by Piero Baraldi

- A semantic similarity model to compare heterogeneous data sources to augment engineering data with new failure modes in automotive industry
- An Assessment of the Economic Viability of Engine Wash Procedures on the Lifecycle Costs of an Aircraft Fleet.
- Multiple-Model Estimation-based Prognostics for Rotating Machinery

15:00 – 16:30 **Panel 1: Future Mobility: Synergies and perspectives**
Chaired by Ryan Walker (Mercedes)

- What the different mobility industries learn from others?
- Challenges and opportunities in increased connectivity on reliability
- How will automation advances impacting CM/CBM/PHM in each mobility?
- What each mobility aspire to?

DAY 2 – 29 JUNE 2021

09:00 - 10:30 **Panel 2: Natural Language Processing, Knowledge Graphs and Ontologies**
Chaired by Melinda Hodkiewicz, University of Western Australia

Discussion with the authors of the special session with focus on the following questions:

- Why did you choose this use case for TLP, what was the value for industry?
- What were the main challenges in developing your pipeline?
- What were or do you anticipate the challenges in deployment to users?

10:30 – 11:00 **Q&A for Tutorial 1**

11:00 – 12:00 **Paper Session 4: Prognostics, Predictive & Condition-based Maintenance 2**
Chaired by Kai Hencken

- Harmonic drive gear failures in industrial robots applications: an overview
- Age & condition-based preventive replacement timing for periodic aircraft maintenance checks
- An adaptive framework for remaining useful life predictions of aircraft systems

12:00 – 13:00 **LUNCH**

13:00 – 14:00 **Paper Session 5: Advances and further developments in DL for PHM applications 1**
Chaired by Floris Freeman

- Transfer Learning Approaches for Wind Turbine Fault Detection using Deep Learning
- Feature based deep unsupervised domain adaptation for improved working condition generalization in bearing fault detection with phase current sensor signals
- Generative Adversarial Networks used for latent space Optimization: a comparative study for the Classification of Partial Discharge Sources

14:00 – 15:00 **Paper Session 6: Machine Learning for PHM 1**
Chaired by Steve King

- Fault detection and condition monitoring in district heating usingsmart meter data
- Unsupervised anomaly detection for hard-drives predictive maintenance
- Embedding diagnosability of complex industrial systems into the design process using a model-based methodology

15:00 – 15:30 **BREAK**

15:30 – 16:30 **Paper Session 7: Condition monitoring, fault detection & diagnosis 1**
Chaired by Konstantinios Gryllias

- Data Selection Criteria for the Application of Predictive Maintenance to Centrifugal Pumps
- Automate quality prediction in an end-of-line test of a highly variant production of geared motors – Discussion of a full concept
- Power devices health condition monitoring, a review of recent papers
- Securing deep learning models with Autoencoder based anomaly detection

16:30 – 17:30 **Paper Session 8: Machine Learning for PHM 2**
Chaired by Ryad Zemouri

- Data-Driven Capability-based Health Monitoring Method for Automative Manufacturing
- Fully Bayesian Fleet Lifetime Prediction based on Workshop-Service Data
- Hybrid Prediction Method for Remaining Useful Lifetime Estimation Considering Uncertainties

DAY 3 – 30 JUNE 2021

09:00 - 10:00 **Paper Session 9: Prognostics, Predictive & Condition-based Maintenance 3**
Chaired by Dong Wang

- An Operational Availability Optimization Model Based on the Integration of Predictive and Scheduled Maintenance
- Remaining Useful Life Prediction of Turbo Actuators for Predictive Maintenance of Diesel Engines
- Real-time diagnosis of physical failures using causation-based AI

10:00 – 11:30 **Tutorial 2: Domain Adaptation for Fault Diagnosis with Deep Learning**
By Mr. Qin Wang – PhD student at the Chair of Intelligent Maintenance Systems, ETH Zürich (ETHZ)

11:30 – 12:00 **Q&A for Tutorial 2**

12:00 – 13:00 **LUNCH**

13:00 – 14:00 **Paper Session 10: Oil & Gas**
Chaired by Zeina Al Masry

- Optimal Service Points (OSP) for PHM Enabled Condition Based Maintenance for Oil & Gas Applications
- Hybrid Approach for Health Monitoring of Mud Motor Fleet
- Data-Driven Fault Detection Method for Electronic Boards in Intelligent Remote Dual-Valve System

14:00 – 15:00 **Paper Session 11: Advances and further developments in DL for PHM applications 2**
Chaired by Kamal Medjaher

- Canonical polyadic decomposition and deep learning for machine fault detection
- Domain Adaptations for Guided Wave SHM of Composites: Towards Fleet Monitoring
- A Deep Support Vector Data Description Method for Anomaly Detection in Helicopters

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15:00 – 15:30 **BREAK**

15:30 – 17:00 **Panel 3: Explainable Standards for Explainable Prognostics and Health Management**
Chaired by Jeff Bird, PHM Society Standards Committee, TECnos, Canada

- How can innovation, sustainability, business case rationalization and trustworthiness be boosted by standards and best practices?
- How can best practices and standards be more accessible and responsive to all parts of the research, development, commercialization and asset management value chain?
- How do 'new' technology domains like AI and machine learning benefit from or challenge more traditional PHM practices for explainability and standards?

DAY 4 – 1 JULY 2021

09:00 - 10:00 **Paper Session 12: Advances and further developments in DL for PHM applications 3**
Chaired by Olga Fink

- Learning representations with end-to-end models for improved remaining useful life prediction
- Metalworking Fluid Classification Based on Acoustic Emission Signals and Convolutional Neural Network
- Towards a Digital Twin Enabled Multifidelity Framework for Small Satellites
- A Deep Learning First Approach to Remaining Useful Lifetime Prediction of Filtration System With Improved Response to Changing Operational Parameters Using Parameterized Fully-connected Layer

10:00 – 11:30 **Tutorial 3: Challenges in data science application in healthcare**
By Prof Yvonne Lu, University of Cambridge Engineering Science Computational Health Informatics Lab & Dr. Samaneh Kouchaki, Lecturer in Machine Learning for Healthcare, Centre for Vision, Speech, and Signal Processing, University of Surrey

11:30 – 12:00 **Q&A for Tutorial 3**

12:00 – 13:00 **LUNCH**

13:00 – 14:00 **Paper Session 13: Prognostics, Predictive & Condition-based Maintenance 4**
Chaired by Pierre Dersin

- A flexible data management system for the analysis of an electro-mechanical actuator on a test bench
- Data Analytics Methodology for Construction of Fouling Prognostic Indicators: Towards Cost-Effective Maintenance Scheduling
- Model-based Remaining-Useful-Life prognostics for aircraft Cooling Units

14:00 – 15:00 **Doctoral Symposium**
In 2021, the 6th European Conference of the PHM Society will offer a dedicated session for PhD students:

- Present your research project to an expert panel
- Network with other European researchers in the PHM field
- Receive contextualized and structured feedback on your plans and initial results
- Free registration for sucessful applicants

15:00 – 15:30 **BREAK**

15:30 – 17:00 **Panel 4: Applied Deep Learning**
Chaired by Neil Eklund, Palo Alto Research Center (PARC), USA

« Industry 4.0 » promises to merge advanced production and operations techniques with smart digital technologies to transform how parts and products are designed, made, used, and maintained. One key enabler of this industrial revolution be predictive maintenance, which allows asset owners to reduce secondary damage and unscheduled downtime. As the amount of asset data available continues to explode, deep learning is likely to play a central role in PHM. This panel will focus on the practical application of deep learning in PHM, and will be very interactive, with plenty of opportunity for questions from the audience.

DAY 5 – 2 JULY 2021

09:00 - 10:00 **Paper Session 14: Machine Learning for PHM 3**
Chaired by Gabriel Michau

- A Machine Learning Based System Identification for Online Health Monitoring of Aircraft Air Conditioning System
- Diagnosing the Stage of COVID-19 using Machine Learning on Breath Sounds
- A Probabilistic Similarity Based Modeling Approach for Turbomachine Fault Prediction
- Automated and Rapid Seal Wear Classification Based on Acoustic Emission and Support Vector Machine

10:00 – 12:00 **Data Challenge**
Chaired by Danilo Giordano & Daniel Gagar

In this edition of the annual PHME Data Challenge, participants are invited to demonstrate application of state-of-the-art algorithms and models to perform fault detection, classification and root cause identification for a manufacturing production line setup. In collaboration with the Swiss Centre for Electronics and Microtechnology (CSEM), exclusive access to rich datasets generated from a real-world industrial testbed has been provided for this competition. The setup comprises sub-systems such conveyor belt motors, infrared camera and robotic arms used in the process of continuous testing of electronic components.

12:00 – 13:00 **LUNCH**

13:00 – 14:00 **Paper Session 15: Condition monitoring, fault detection & diagnosis 2**
Chaired by Octavian Niculita

- Wavelet scattering network based bearing fault detection
- Bearings Fault Detection Using Hidden Markov Models and Principal Component Analysis Enhanced Features
- Robust Model-Based Fault Detection Using Monte-Carlo Methods and Highest Density Regions

14:00 – 15:00 **Paper Session 16: Sensors and Inspection technologies for PHM**
Chaired by Ian Jennions

- Lean Blowout Sensing and Processing via Optical Interferometry and Wavelet Analysis of Dynamic Pressure Data

- Requirements for Designing A Robotic System for Aircraft Wing Fuel Tank Inspection
- Rapid Material Characterization using Smart Skin with functional Data Analysis

15:00 – 15:30 **BREAK**

15:30 – 17:00 **Panel 5: PHM Methodology and Reliability**

Chaired by Zhimin Xi (Rutgers, The State University of New Jersey, US)

- There are a variety of PHM modelling methods such as physics-based, data-driven, hybrid, and deep learning. What are general guidelines to use these methods?
- What are potential problems for these methods?
- How to access the model credibility or validity?
- When predicted lifetime or failures are wrong, is this the PHM method problem or due to the uncertain nature?
- If the PHM model is not accurate, are there ways to diagnose the model reliability?

17:00 – 17:30 **BREAK**

17:30 – 18:00 **Closing Remarks**