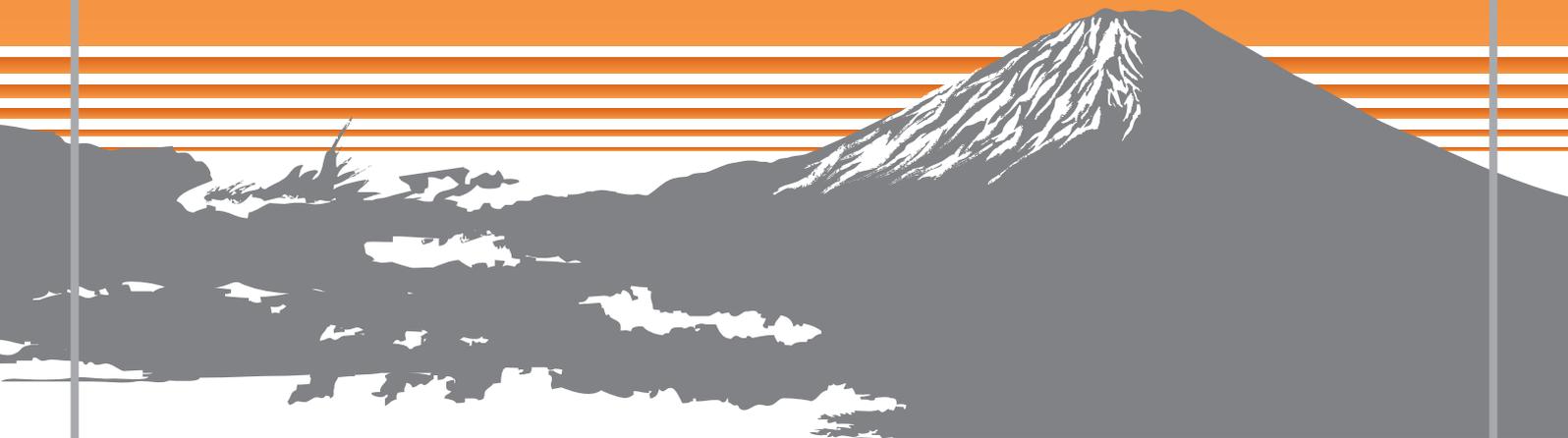# PHM Asia Pacific 2023

Asia Pacific Conference of
the Prognostics and Health Management Society 2023

September 11-14, 2023

Hitotsubashi Hall, National Center of Sciences Building,

**Tokyo, Japan**

Hosted by

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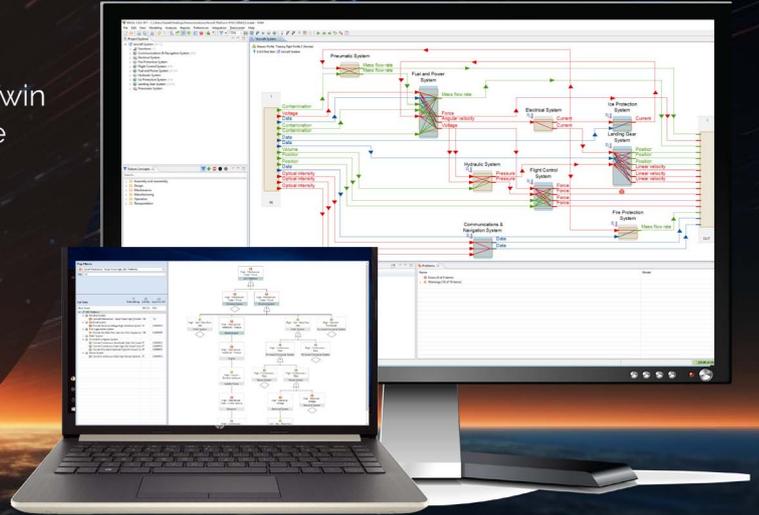
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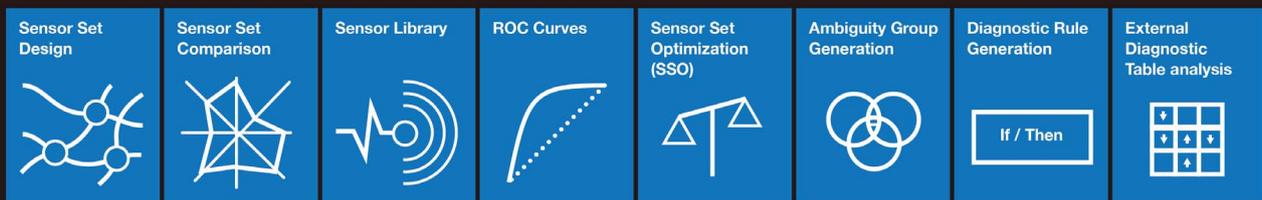
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# Contents

# Welcome Message

As the general chair, I am deeply honored to host the 4th Asia Pacific Conference of the Prognostics and Health Management Society (PHMAP23) in Tokyo, and to welcome numerous researchers, experts, engineers and students who are interested in PHM, finally in person after overcoming the prolonged pandemic.

Looking back on the history of PHMAP, the first meeting was initiated in 2017 in Korea and two successive meetings have been held in 2019 in China and 2021 again in Korea. After the series of successful meetings, we finally obtained an opportunity to host this young and energetic event in Japan, thanks to the generous support of the PHM Society (PHMS) and the Japan Society for Aeronautical and Space Sciences (JSASS). We have also had many valuable pieces of advice from the PHMAP21 committee, financial support from SECOM Science and Technology Foundation and KDDI Foundation, sponsorship from many companies, and a lot of support from academic societies. We would like to express our gratitude to all these organizations.

As far as I know, PHMAP23 is the first international conference specialized in prognostics and health management to be held in Japan. In my view, the main reason why no other PHM conferences have not been held in Japan in the past even though a number of people are interested in PHM is that there have not been academic communities specialized in the methodologies of PHM because the PHM-related studies have long been conducted in individual industries such as automobile, electronics, construction and so on in Japan. In recent years, however, emerging technologies such as AI, IoT, digital twins are about to break down the barriers between the industries, and we are witnessing a growing interest in PHM and predictive maintenance across all industries. In fact, PHMAP23 has collected more than 160 submissions from a variety of industries including aerospace, production, civil engineering, electronics, and so on. I can't help getting excited to imagine the discussions, exchanges of ideas, and interactions among people with different backgrounds, leading to numerous chemical reactions during the four days from September 11th to 14th in Tokyo.

In PHMAP23, in addition to regular / organized sessions, there will be plenary talks by leading researchers in various fields, a short course for PHM beginners, panel discussions, data challenge and social events featuring Japanese hospitality to provide all participants with global networking opportunities. We kindly ask all participants of PHMAP23 to contribute continuously to the future development of the PHM research community, and also hope that you will actively leverage this experience to establish connections with professionals from other fields and industries.

Takehisa Yairi
General Chair of PHM Asia Pacific 2023

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# 🎤 General Information

### ●Conference Proceedings

The conference proceedings can be accessed via the link below. Attendees can also access the proceedings via Whova.

https://papers.phmsociety.org/index.php/phmap/issue/view/64

### ●Whova

The conference program is live on Whova. Attendees can personalize your experience by creating your own itinerary. Using the Whova platform, you can select the sessions you're most interested in and plan out your day with ease. Do not miss to download the Whova app to your smartphone or other devices before arriving at the conference.

### ●Registration desk

Registration desk will open at the following time and locations. If you have any trouble, please contact to the staff at the desk.

Sep. 11, 9:30-16:30, 2F Lobby
Sep. 12, 9:30-19:00, 1F Lobby
Sep. 13, 9:30-18:00, 1F Lobby
Sep. 14, 9:30-15:00, 1F Lobby

### ●Wireless Internet

Wireless internet is available for the participants at the conference venue. ID/PW will be informed on-site.

### ●Hybrid Meeting

PHMAP23 will be held as a hybrid format of in-person and online.
The online venue will be hosted by

- Whova for Poster sessions,
- Zoom for Technical sessions and Panel session 1,
- YouTube for Keynotes and Panel sessions 2 and 3.

Access information for online participation will be made available to participants via the web page.

### ●Coffee service

Free coffee will be served in the exhibition area.

### ● ‼ Important Notice ‼

■ Eating and drinking in the Hall is prohibited.
■ Please take home any garbage such as food trays or empty bottles that you brought with you.

Thank you for your cooperation.

# Floor Guide
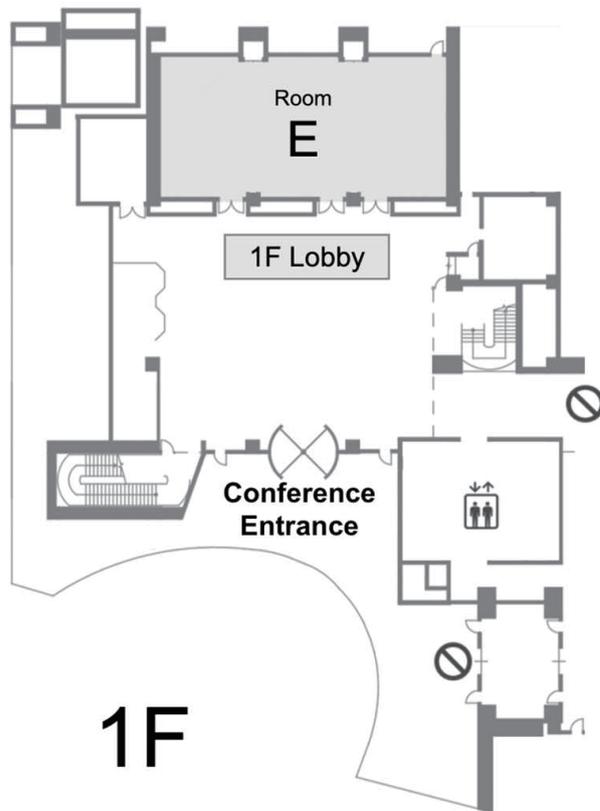
**●Eating / Drinking**

Eating and drinking are prohibited in the hall.

**1F**

Room E

1F Lobby

Conference Entrance

**2F**

Hall

Room A

Room B

Room C

Room D

2F Lobby

Posters

Exhibitions

# Program at a Glance

## Sep. 11 (JST, UTC+9)

| Time | Room A | Room B | Room C | Room D | 2F Lobby |
|---|---|---|---|---|---|
| 9:00–9:50 | | | | | P02 Poster Session 2 |
| 10:00–11:50 | Short Course | | Waiting place for welcome reception | Registration | |
| 12:00–12:50 | Lunch | | | | |
| 13:00–16:50 | Short Course | | | | |
| 17:00–18:50 | Welcome Reception | | | | |

## Sep. 12 (JST, UTC+9)

Columns: Hall, Room A, Room B, Room C, Room D, Room E, Exhibition, 1F Lobby

- **Opening Ceremony (Hall)**
- **Keynote1 (Hall)** — Asteroid Sample Return Mission "Hayabusa2" – A Successful Example of Large-Scale Scientific Project Management — Prof. Yuichi Tsuda (JAXA)
- **Sponsor Talk 1 (Hall)**
- **Lunch**

| Time | Room A | Room B | Room C | Room D | Room E |
|---|---|---|---|---|---|
| Session 1 | OS04-1 PHM for Commercial Airplanes 1 | OS05-1 Evolving Smart Manufacturing System by design and implementation of PHM 1 | R01-1 PHM for Electric Power Systems 1 | OS01-1 Prognostic Discriminator under Uncertainty 1 | OS06-1 PHM Applications for Urban Infrastructure Resilience and Maintenance 1 |
| Coffee Break | | | | | |
| Session 2 | OS04-2 PHM for Commercial Airplanes 2 | OS05-2 Evolving Smart Manufacturing System by design and implementation of PHM 2 | OS12-1 Advances in PHM for Tribology 1 | OS01-2 Prognostic Discriminator under Uncertainty 2 | OS6-2 PHM Applications for Urban Infrastructure Resilience and Maintenance2 |
| Coffee Break | | | | | |
| Session 3 | OS04-3 PHM for Commercial Airplanes 3 | OS05-3 Evolving Smart Manufacturing System by design and implementation of PHM 3 | OS12-2 Advances in PHM for Tribology 2 | OS01-3 Prognostic Discriminator under Uncertainty 3 | OS6-3 PHM Applications for Urban Infrastructure Resilience and Maintenance3 |
| Coffee Break | | | | | |
| Session 4 | OS04-4 PHM for Commercial Airplanes 4 | | OS12-3 Advances in PHM for Tribology 3 | R02-1 Smart Monitoring/Maintenance/Operation 1 | OS6-4 PHM Applications for Urban Infrastructure Resilience and Maintenance 4 |
| | Panel Session 1 — Full Flight Sensor Data sharing within the stakeholders of PHM | | | | |

Exhibition / 1F Lobby: Registration, Exhibition

## Sep. 13 (JST, UTC+9)

Columns: Hall, Room A, Room B, Room C, Room D, Room E, Exhibition, 1F Lobby, 2F Lobby

- **P01 Poster Session 1 (2F Lobby)** 9:00–9:50
- **Keynote 2 (Hall)** — Industrial AI-Augmented Prognostics for Highly Connected and Complex Industrial Systems — Prof. Jay Lee (University of Maryland College Park)
- **Sponsor Talk 2 (Hall)**
- **Keynote 3 (Hall)** — How is Industrial AI Transforming Manufacturing Industry? — Prof. Byeng Dong Youn (Seoul National University and OnePredict)
- **Lunch**

| Time | Room A | Room B | Room C | Room D | Room E |
|---|---|---|---|---|---|
| Session 1 | R01-2 PHM for Electric Power Systems 2 | OS02-1 New trends and challenges in aerospace PHM 1 | OS07-1 Autonomous decision making under complex conditions or situations 1 | R02-2 Smart Monitoring/Maintenance/Operation 2 | R03-1 Machine Learning/Deep Learning for PHM 1 |
| Coffee Break | | | | | |
| Session 2 | OS08 Technologies and methods for achieving Zero Defect Manufacturing in the era of Industry 4.0 / 5.0 | OS02-2 New trends and challenges in aerospace PHM 2 | OS07-2 Autonomous decision making under complex conditions or situations 2 | R02-3 Smart Monitoring/Maintenance/Operation 3 | OS09 AI based PHM for Power Electronics components and systems |
| Coffee Break | | | | | |
| Session 3 | R04 PHM for Power Electronics/Battery | R05 PHM for Motors | R03-2 Machine Learning/Deep Learning for PHM 2 | R02-4 Smart Monitoring/Maintenance/Operation 4 | D01 Data Challenge |

- **Banquet** 18:00–

Exhibition / 1F Lobby: Registration, Exhibition

## Sep. 14 (JST, UTC+9)

Columns: Hall, Room A, Room B, Room C, Room D, Room E, Exhibition, 1F Lobby, 2F Lobby

- **P02 Poster Session 2 (2F Lobby)** 9:00–9:50
- **Keynote 4 (Hall)** — Prediction of the Movement of a Landslide for the Early Warning System Against Disaster in Japan — Prof. Katsuo Sasahara (Kochi University)
- **Coffee Break**

| Time | Room A | Room B | Room C | Room D | Room E |
|---|---|---|---|---|---|
| Session 1 | Panel Session2 — Quantum Computing meets PHM | PHM for Device Monitoring | OS2-3 New trends and challenges in aerospace PHM | R07-1 RUL Prediction 1 | PHM for Rotary Machines / R03-3 Machine Learning/Deep Learning for PHM 3 |
| Session 2 | Panel Session3 — Predictive Maintenance Challenges and Solutions: Vendor Insights | PHM for Turbines | Digital Twin for PHM | R07-2 RUL Prediction 2 | R02-5 Smart Monitoring/Maintenance/Operation 5 |

- **Lunch**
- **Coffee Break**
- **Keynote 5 (Hall)** — From Physics to Machine Learning and Back: Applications to Prognostics and Health Management — Prof. Olga Fink (EPFL, Lausanne)
- **Closing/Award Ceremony (Hall)**

Exhibition / 1F Lobby: Registration, Exhibition

| Time/Date | | | | Sep. 12 | | | | |
|---|---|---|---|---|---|---|---|---|
| JST (UTC+9) | | Hall | Room A | Room B | Room C | Room D | Room E | 2F Lobby |

**10:00–10:10 — Opening Ceremony (Hall)**

**Keynote1 (Hall)**
Asteroid Sample Return Mission "Hayabusa2" – A Successful Example of Large-Scale Scientific Project Management
Prof. Yuichi Tsuda (JAXA)

**11:20–11:30 — Sponsor Talk 1 (Hall)**

**12:00–12:30 — Lunch**

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### 12:40 Session (Room A–E)

**Room A — OS04-1**
PHM for Commercial Airplanes 1
Chair: Junichiro Kaya (ANA)

- **OS04-01** (12:40) A Method for Executing Digital System Models and Digital Twins at Scale to Enrich Fleet Health Management — Daniel Newman[1]; 1. Boeing
- **OS04-02** (13:00) Operational Prognostic Model Evaluation — Shashvat Prakash[1], and Katarina Vuckovic[1]; 1. Raytheon
- **OS04-03** Applicability of Traditional and AI Models in Predictive Maintenance in Aviation — Dimitri Reiswich[1]; 1. Lufthansa Technik
- **OS04-04** MLOps for PHM systems — Mikael Yemane[1]; 1. Collins Aerospace

**Room B — OS05-1**
Evolving Smart Manufacturing System by design and implementation of PHM 1
Chair: Makoto Imamura (Tokai University)

- **OS05-01** Quality Management Issues for Machine Learning-based Systems — Yutaka Oiwa[1]; 1. National Institute of Advanced Industrial Science and Technology
- **OS05-02** Smart Manufacturing Kaizen Level(SMKL) based maturity evaluation access to DX and decarbonization — Nicole S. Otoki[1], Yasuo Onodera[1], and Mitsuhiro Fujishima[1]; 1. Mitsubishi Electric
- **OS05-03** Development and operation of a piping corrosion external surface inspection system using Human in the Loop Machine Learning — Toshihiro Shimbo[1], Yousuke Okada[2], and Hitoshi Matsubara[3]; 1. Mitsubishi Gas Chemical Company, Inc., 2. ABEJA, Inc, 3. The University of Tokyo
- **OS05-04** Anomaly detection for yield improvement in glass production — Haruo Yonemori[1], Kenichi Arai[1], Hironobu Yamamichi[1], Ichiro Sakata[1], and Makoto Imamura[2]; 1. AGC Inc., 2. Tokai University

**Room C — R01-1**
PHM for Electric Power Systems 1
Chair: Eric Bechhoefer (GPMS Inc.)

- **R01-01** A monitoring method for detecting and localizing overhead faults in wind turbine nacelle — Minsoo Lee, Eunchan Do, and Ki-Yong Oh[1]; 1. Hanyang University
- **R01-02** Research on the method of digital twin operation and maintenance platform for intelligent early warning of wind turbine tower — Yu Jia[1], and Xiaomo Jiang[1]; 1. Dalian University Of Technology
- **R01-03** A Survey of Prognostics and Health Management for Transformers: From Statistical Analysis to Condition-Based Diagnostics — Jiaxiang Cheng[1], Sungin Choi[1], Yap Peng Tan[1], and Guoqiang Hu[1]; 1. Nanyang Technological University, 2. Singapore Power
- **R01-04** Advanced Weibull Modelling with Outliers — Yipeng Pang[1], Guoqiang Hu[1], and Sungin Choi[1]; 1. Nanyang Technological University, 2. SP PowerGrid

**Room D — OS01-1**
Prognostic Discriminator under Uncertainty 1
Chair: Takahiro Saitoh (Gunma University)

- **OS01-01** Automatic Detection of Concrete Surface Defects Using Deep Learning and Laser Ultrasonic Visualization Testing — Takahiro Saitoh[1], Syampei Ohyama[1], Tsuyoshi Kato[1], and Sohichi Hirose[1]; 1. Gunma University, 2. Tokyo Institute of Technology
- **OS01-02** Observation maintenance for bridges using early detection of deterioration progress — Hitoshi Ito[1], and Toshiaki Mizobuchi[1]; 1. Yachiyo Engineering Co., Ltd., 2. Hosei University
- **OS01-03** Study on the Estimation of Concrete Defects Volume on Dam Body Surface — Akira Ishii[1], Hiroaki Sugawara[1], and Masazumi Amakata[1]; 1. Yachiyo Engineering Co., Ltd.
- **OS01-04** Outlier Analysis of Bridge Deflections using Satellite SAR and Structural Simulation: A Case Study on a Collapse SAR event in a Water Pipe Bridge in Japan — Kosuke Kinoshita[1], Yoshiyuki Yajima[1], Takahito Kumura[1], and Mayuko Nishio[1]; 1. NEC, 2. University of Tsukuba

**Room E — OS06-1**
PHM Applications for Urban Infrastructure Resilience and Maintenance 1
Chair: Ken Ueno (Toshiba)

- **OS06-01** Anomaly Sign Detection for Automatic Ticket Gates by Histogram Limitation Method — Ken Ueno[1], Shigeru Maya[1], and Kiyoku Endo[1]; 1. Toshiba, 2. Toshiba Automation Systems Service
- **OS06-02** Predictive Maintenance for station equipment and Applications for the Space field — Ryoma Yokoyama[1], Ryosuke Kono[1], Atsushi Matsuda[1], and Yohei Shiomi[1]; 1. West Japan Railway
- **OS06-03** Digital Twin for Diagnosis of Belt Looseness in HVAC Systems using multi-body dynamics simulation — Daeguen Lim[1], Wonho Jung[1], Sung Hyun Yun[1], Yong Hwa Park[1], and Gil-Yong Lee[1]; 1. Korea Advanced Institute of Science and Technology
- **OS06-04** Anomaly Detection in Air Handling Units using Motor Current Signal Imaging for Belt Looseness Detection — Sung Hyun Yun[1], Wonho Jung[1], Daeguen Lim[1], and Yonghwa Park[1]; 1. Korea Advanced Institute of Science and Technology

**14:00–14:10 — Coffee Break**

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### 14:20 Session

**Room A — OS04-2**
PHM for Commercial Airplanes 2
Chair: Masaru (Ken) Nishiwaki (ANA)

- **OS04-05** Model Based and Big data enabled Predictive Maintenance Capability Development Experience — Mark Mazarek[1], Darren Mace[1], and Changzhou Wang[1]; 1. Boeing
- **OS04-06** Fleet Monitoring as a means of Operationalizing PHM — Gururaj Saralaya[1]; 1. Collins Aerospace
- **OS04-07** Lessons Learned from Aircraft Component Failure Prediction using Full Flight Sensor Data — Changzhou Wang[1], Darren Pugh[1], Audrey Lee[1], Wei Guo[1], Jun Yuan[1], and Mark Mazarek[1]; 1. Boeing
- **OS04-08** Effect of Aircraft Health Management on Aircraft Maintenance Program Development by Aircraft Manufacturer — Takuro Koizumi[1], and Nozomu Kogiso[1]; 1. Osaka Metropolitan University

**Room B — OS05-2**
Evolving Smart Manufacturing System by design and implementation of PHM 2
Chair: Yutaka Oiwa (National Institute of Advanced Industrial Science and Technology)

- **OS05-05** Integration of health monitoring of cutting tools and production scheduling in smart factory — Hitoshi Komoto[1], German Herrera[1], Jonny Herwan[1], and Yoshiyuki Furukawa[1]; 1. National Institute of Advanced Industrial Science and Technology
- **OS05-06** Advancing Predictive Maintenance: A Study of Domain Adaptation for Fault Identification in Gearbox Components — Shinya Tsuruta[1], Koji Wakimoto[1], Takaaki Nakamura[1], Shahin Siahpour[2], Marcella Miller[2], John Tazo[2], and Jay Lee[3]; 1. Mitsubishi Electric, 2. University of Cincinnati, 3. University of Maryland
- **OS05-07** Building the health monitoring and fault diagnosis models for stamping press — Yuan-Jen Chang[1], Lin-Jie Chen[1], Yuta Tu[2], Hung-Pin Yang[2], and Chen-Kang Lee[2]; 1. Feng Chia University, 2. Chin Fong Machine Industrial Co., LTD, 3. University of California San Diego
- **OS05-08** An Easy-to-Use and Customizable Data Science Tool for Predictive Maintenance in Manufacturing — Naoki Sugawara[1]; 1. Mitsubishi Electric

**Room C — OS12-1**
Advances in PHM for Tribology 1
Chair: Tomomi Honda (University of Fukui)

- **OS12-01** A feature Selection Method for Machine Tool Wear Diagnosis — Yuji Honma[1]; 1. Mitsubishi Electric
- **OS12-02** Modeling of Journal Bearings for Wear Diagnosis and Its Verification Using SVM — Masaki Goto[1], Tsuyoshi Inoue[1], Akira Heya[1], Keiichi Katayama[1], Shogo Kimura[1], Shigeyuki Tomimatsu[1], and Shota Yabui[1]; 1. Nagoya University, 2. DMW, 3. Tokyo City University
- **OS12-03** Size Estimation of Flaking in Rolling Bearings Using Deep Learning with Explainability — Osamu Yoshimatsu[1], Keiichiro Taguchi[1], Yoshihiro Sato[1], and Takehisa Yairi[1]; 1. NSK, 2. University of Tokyo
- **OS12-04** Expert Knowledge Transfer from CAE Models to CNN Models Using Enhanced Adversarial Domain Adaptation — Minseok Choi[1], Dongmin Lee[1], Mikyung Hwang[1], Dongwhi Yoo[1], and Hyunseok Oh[1]; 1. Gwangju Institute of Science and Technology

**Room D — OS01-2**
Prognostic Discriminator under Uncertainty 2
Chair: Takato Yasuno (Yachiyo Engineering, Co.Ltd)

- **OS01-05** Imbalanced Anomaly Detection Using Augmented Deeper FCDDs for Wooden Sleeper Deterioration Prognostics — Takato Yasuno[1], Junichiro Fujii[1], and Masahiro Okano[1]; 1. Yachiyo Engineering Co., Ltd.
- **OS01-06** Field study toward anomaly road damage detection with drive recorder — Masato Tsuchiya[1], Ken Miyamoto[1], Takashi Ota[1], and Yasushi Sugama[1]; 1. Nagoya University
- **OS01-07** Automating daily inspection for Expressways using anomaly detection model — Yuta Shirakawa[1], Satoshi Ito[1], Reiko Noda[1], Naoto Yoshitani[1], Masahide Wake[1], and Honoka Takano[1]; 1. Toshiba, 2. Central Nippon Expressway Company Limited

**Room E — OS06-2**
PHM Applications for Urban Infrastructure Resilience and Maintenance 2
Chair: Ken Ueno (Toshiba)

- **OS06-05** A new approach to multivariate statistical process control and its application to wastewater treatment process monitoring — Osamu Yamanaka[1], and Yukio Hiraoka[1]; 1. Toshiba Infrastructure Systems & Solutions
- **OS06-07** Development of a method for detecting V-belt looseness — Hiroshi Inoue[1], Ken Hirakida[1], Makoto Kanemaru[1], and Peng Chen[2]; 1. Mitsubishi Electric, 2. Mie University
- **OS06-08** Few-Shot Learning for Full Ceramic Bearing Fault Diagnosis with Acoustic Emission Signals — David He[1], Miao He[1], and Alessandro Taffari[1]; 1. University of Illinois at Chicago, 2. Siemens Technology

**15:40–15:50 — Coffee Break**

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### 16:00 Session

**Room A — OS04-3**
PHM for Commercial Airplanes 3
Chair: Junichiro Kaya (ANA)

- **OS04-09** The role of visualizations in Ascentia, analytics-based aircraft maintenance — Arman Haidari[1]; 1. Collins Aerospace
- **OS04-10** Big data platform as a foundation of airlines predictive and health monitoring — William Bernard[1]; 1. Airbus
- **OS04-11** Deep dive into Prediction with AVIATAR with in-service examples from Airlines — Mia Witzig[1]; 1. Lufthansa Technik
- **OS04-12** A New Challenge in Predictive Maintenance Analysis for Aircraft — Takashi Takemura[1]; 1. JAL

**Room B — OS05-3**
Evolving Smart Manufacturing System by design and implementation of PHM 3
Chair: Koji Wakimoto (Mitsubishi Electric)

- **OS05-09** Design of a framework for demand forecasting using time series decomposition-based approach — Hazuki Shibayama[1], Aya Ishigaki[1], Takasumi Kobe[1], Takafumi Ueda[1], Daichi Arimizu[1], and Takaaki Nakamura[1]; 1. Tokyo University of Science, 2. Deloitte Tohmatsu Consulting LLC, 3. Mitsubishi Electric
- **OS05-10** Prediction of Remaining Life of Turbo Pump inducer for Spacecraft Using Cumulative — Hatsuo Mori[1], and Makoto Imamura[1]; 1. IHI, 2. Tokai University
- **OS05-11** Deep Learning/Machine Learning Techniques for Vibration Condition Monitoring of Major Facilities in Automobile Assembly/Painting Plants — Gun Sik Kim[1], Deog Hyeon Kim[1], Jin Woo Park[1], and Ju Heon Hwang[1]; 1. Hyundai Motors
- **OS05-12** A case study of applying power consumption optimization in EAF using time series prediction — Jaehyuk Lee[1], Songhwan Kim[1], Boseon Yoo[1], and Jaesik Choi[1]; 1. ineeji

**Room C — OS12-2**
Advances in PHM for Tribology 2
Chair: Osamu Yoshimatsu (NSK)

- **OS12-05** Acoustic Signal based Non-Contact Ball Bearing Fault Diagnosis Using Adaptive Wavelet De-Noising — Wonho Jung[1], Sung-Hyun Yun[1], and Yong-Hwa Park[1]; 1. Korea Advanced Institute of Science and Technology
- **OS12-06** Time Shifting Data Augmentation to Alleviate Class-Imbalance Problem for Cross-Domain Bearing Fault Diagnosis — Wonho Jung[1], Sung-Hyun Yun[1], and Yong-Hwa Park[1]; 1. Korea Advanced Institute of Science and Technology
- **OS12-07** A quantitative analysis of domain discrepancies between general-speed and very low-speed bearings and its applications to fault diagnosis of very low-speed bearings using transfer learning — Seungwan Lee[1], Sungjong Kim[1], Su Ji Kim[1], Jiwon Lee[1], Heejin Yoon[1], and Byeng D. Youn[1]; 1. Seoul National University, 2. OnePredict, 3. Soongsil University
- **OS12-08** On-site degradation diagnosis method for the antioxidants by the colorimetric analysis of membrane patches — Tomomi Honda[1]; 1. University of Fukui

**Room D — OS01-3**
Prognostic Discriminator under Uncertainty 3
Chair: Yasutaka Narazaki (Zhejiang University)

- **OS01-08** Digital Twin of Built Structures assisted by Computer Vision Techniques: Overview and Preliminary Results — Yasutaka Narazaki[1]; 1. Zhejiang University
- **OS01-09** Digital Twin for condition based maintenance within a railway infrastructure testing lab — Antonio J. Guillén López[1], Juan Fco. Gómez Fernández[1], Pedro Urda[1], Jose Luis Escalona[1], Adolfo Crespo Márquez[1], and Fernando Olivencia[1]; 1. Universidad de Sevill
- **OS01-10** Efficient Inspection of Civil Engineering Structures for Railways and Roads Using Images and GNSS — Tomoya Abe[1]; 1. Nakashacreative.co

**Room E — OS06-3**
PHM Applications for Urban Infrastructure Resilience and Maintenance 3
Chair: Tomoyuki Iwawaki (Mitsubishi Electric)

- **OS06-09** Semi-supervised machine learning for motor eccentricity fault diagnosis — Bingnan Wang[1], Shen Zhang[1], Hiroshi Inoue[1], and Makoto Kanemaru[1]; 1. Mitsubishi Electric Research Laboratories, 2. Georgia Institute of Technology, 3. Mitsubishi Electric
- **OS06-10** Extracting Broken-Rotor-Bar Fault Signature of Varying Speed Induction Motors — Dehong Liu[1], Anantaram Varatharajan[1], and Abraham Goldsmith[1]; 1. Mitsubishi Electric Research Laboratories
- **OS06-11** Fault detection of rotor bars in inverter-fed induction motors based on current signature analysis technique — Tomoyuki Iwawaki[1], Makoto Kanemaru[1], Yubi Yazukawa[1], and Toshihiko Miyauchi[1]; 1. Mitsubishi Electric
- **OS06-12** Data-driven pump performance analysis using online monitoring data accumulated with supervisory control and data acquisition system — Ryo Namba[1], Hiroyuki Hokari[1], and Hideaki Komine[1]; 1. Toshiba Infrastructure Systems & Solutions

**17:00–17:20 — Coffee Break**

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### 17:30 Session

**Room A — OS04-4**
PHM for Commercial Airplanes 4
Chair: Masaru (Ken) Nishiwaki (ANA)

- **OS04-13** Prognostic is nothing without fulfillment – Set-up of an holistic fleet management and integration into daily processes — Sebastian Lang[1], and Mia Witzig[1]; 1. Lufthansa Technik
- **OS04-14** Anomaly Detection in Airliner Centrifugal Compressor using sensor data during the climb phase — Sadanari Shigetomi[1], Makoto Imamura[2], Naoya Kaido[2], Makoto Taniguchi[2], Masaru Nishiwaki[1], and Junichiro Kaya[1]; 1. ANA, 2. Tokai University

**Panel Session 1**
Full Flight Sensor Data sharing within the stakeholders of PHM
Organizer: Masaru (Ken) Nishiwaki (ANA)
Panelists:
1. Darren Mace (Boeing)
2. Gavin Chew (Collins Aerospace)
3. Sebastian Lang (Lufthansa Technik)
4. Manabu Tono (ANA)

**Room C — OS12-3**
Advances in PHM for Tribology 3
Chair: Osamu Yoshimatsu (NSK)

- **OS12-09** Non-destructive Diagnostics for Rolling Bearings by Eddy Current Testing — Daisuke Kobayashi[1], Koichiro Ono[1], Masahide Natori[1], and Hiroki Komata[1]; 1. NSK

**Room D — R02-1**
Smart Monitoring/Maintenance/Operation 1
Chair: Tadahiro Shibutani (Yokohama National University)

**Coffee Break**

- **R02-01** Energy Saving Structural Health Monitoring Using Semi-Active Identification — Yushin Hara[1], Tianyi Tang[1], Keisuke Otsuke[1], and Kanjuro Makihara[1]; 1. Tohoku University
- **R02-02** Physical reservoir-based health monitoring of a structure with nonlinear attachments — Arata Masuda[1], and Konosuke Takashima[1]; 1. Kyoto Institute of Technology
- **R02-03** Advanced condition-based monitoring of CFRP under multiple impacts using monte carlo based prognostics and real-time self-sensing data — In Yong Lee[1], So Young Oh[1], Juhyeong Jang[1], and Young-Bin Park[1]; 1. Ulsan National Institute of Science and Technology
- **R02-04** Prediction of impact information of composites laminates considering the practicality — Saki Hasebe[1], Ryo Higuchi[1], Tomohiro Yokozeki[1], and Shin-ichi Takeda[1]; 1. University of Tokyo, 2. Japan Aerospace Exploration Agency

**Room E — OS06-4**
PHM Applications for Urban Infrastructure Resilience and Maintenance 4
Chair: Tomoyuki Iwawaki (Mitsubishi Electric)

- **OS06-13** Localization of partial discharges in oil-filled transformers using acoustic emission signals — Yasutomo Otake[1], and Kunihiko Tajiri[1]; 1. Mitsubishi Electric
- **OS06-14** AI image analysis technologies for efficient water pipe inspection — Ying Piao[1], Hiroshi Sukegawa[1], Kenji Kimiyama[1], Kensuke Nakamura[1], Toshiharu Sugino[1], Takaharu Kunizane[1], and Akira Koizumi[1]; 1. Toshiba Infrastructure Systems & Solutions, 2. Tokyo Metropolitan University
- **OS06-15** Deep Neural Network Anomaly Detection and Statistical Estimation of High Pressure Liquefied Natural Gas Pipe — Dabin Yang[1], and Jongsoo Lee[1]; 1. Yonsei University
- **OS06-16** Machine learning model for detecting hydrogen leakage from hydrogen pipeline using physical modeling — Yuki Suzuki[1], Jo Nakayama[1], Tomoya Suzuki[1], Tomoya Soma[1], Yu-ichiro Izato[1], and Atsumi Miyake[1]; 1. Yokohama National University, 2. NEC

# Oral Sessions

| Time/Date | | Sep. 13 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| JST (UTC+9) | | Hall | Room A | Room B | Room C | Room D | Room E | 2F Lobby |
| 9 | 9:00 | | | | | | | Poster Session 1 |
| | 9:10 | | | | | | | |
| | 9:20 | | | | | | | |
| | 9:30 | | | | | | | |
| | 9:40 | | | | | | | |
| | 9:50 | | | | | | | |
| 10 | 10:00 | **Keynote 2 (Hall)** — Industrial AI-Augmented Prognostics for Highly Connected and Complex Industrial Systems — Prof. Jay Lee (University of Maryland College Park) | | | | | | |
| | 10:10 | | | | | | | |
| | 10:20 | | | | | | | |
| | 10:30 | | | | | | | |
| | 10:40 | | | | | | | |
| | 10:50 | | | | | | | |
| 11 | 11:00 | **Sponsor Talk 2 (Hall)** | | | | | | |
| | 11:10 | | | | | | | |
| | 11:20 | **Keynote 3 (Hall)** — How is Industrial AI Transforming Manufacturing Industry? — Prof. Byeng Dong Youn (Seoul National University, and OnePredict Inc.) | | | | | | |
| | 11:30 | | | | | | | |
| | 11:40 | | | | | | | |
| | 11:50 | | | | | | | |
| 12 | 12:00 | Lunch | | | | | | |
| | 12:10 | | | | | | | |
| | 12:20 | | | | | | | |
| | 12:30 | | | | | | | |
| | 12:40 | | | | | | | |
| | 12:50 | | | | | | | |
| 13 | 13:00 | | | | | | | |
| | 13:10 | | | | | | | |

## Afternoon Sessions (Sep. 13)

### Session block 1 (13:20–14:50)

**Room A — R01-2: PHM for Electric Power Systems 2**
Chair: Byeng Dong Youn (Seoul National University, and OnePredict Inc.)

- **R01-05** Detection and Diagnostic with Random Forest Classifier (RFC) to Improve the Maintenance Management System in Steam Boiler of Power Plant
  Driffat Awisal Muhammad Alchbuy, Tawaji Ramadunyany, Toni Probosoto, and Achmad Widodo; 1. Diponegoro University, 2. PT PLN Indonesia Power
- **R01-06** Deep Learning-Enabled Statistical Model Estimation for Power Transformers under Censoring and Truncation Constraints
  Jiaxiang Cheng; Sungjin Cho; Yap Peng Tan; and Guoqiang Hu; 1. Nanyang Technological University, 2. Singapore Power
- **R01-07** Long-Term Preventive Failure Mitigation Strategy For Transformers Based on Markov Method
  Jianzheng Wang; Guoqiang Hu; and Sungin Cho; 1. Nanyang Technological University, 2. SP Group
- **R01-08** Explainable multimodal learning for predictive maintenance of steam generators
  Duc An Nguyen; Sagar Jose; Th-Phuong Khanh Nguyen; and Kamal Medjaher; 1. Ecole Nationale d'Ingénieurs de Tarbes

**Room B — OS02-1: New trends and challenges in aerospace PHM 1**
Chair: Nozomu Kogiso (Osaka Metropolitan University)

- **OS02-01** Data-driven satellite monitoring method applicable to various telemetry
  Noriyasu Omata1; Seiji Tsutsumi1; Masaharu Abe2; and Iku Shinohara2; 1. Japan Aerospace Exploration Agency, 2. Ryoyu Systems
- **OS02-02** A Health Index for Satellite System Based on Characteristics of Telemetry Data
  Shun Katsube1; and Hironori Sahara1; 1. Tokyo Metropolitan University
- **OS02-03** Systemic symptom detection in telemetry of ISS with explainability using FRAM and SpecTRM
  Shota Iino1; Hideki Nomoto2; Takashi Fukuo3; Sayaka Ishizawa4; Miki Sasaki4; Yohei Yagisawa5; Takayuki Hirose5; Yasutaka Michiura5; and Hiroharu Shibayama5; 1. Japan Manned Space Systems Corporation, 2. Japan NUS Co., Ltd. 3. Space Engineering Development Co., Ltd.
- **OS02-04** [Withdraw] Early Detection of Lithium-ion Battery Degradation Leveraging Conditional Generating VAEs for Dynamic Feature Extraction Min-Joo Kim, Yun Hee Kim, Sun Gyu Chae, and Suk Joo Bae; 1. Hanyang University

**Room C — OS07-1: Autonomous decision making under complex conditions or situations 1**
Chair: Masanao Natsumeda (NEC)

- **OS07-01** A study on self-diagnosis/prediction technology for Lidar sensor of autonomous vehicles
  Jaewook Lee1; and Jongsoo Lee1; 1. Yonsei University
- **OS07-02** Deep Learning Approach for Operational Transfer Path Analysis: Case Study of Electric Vehicles
  Jeongmin Oh1; Donghwi Yoo1; Hyunseok Oh1; Yong Hyun Ryu2; Kyung-Woo Lee2; and Dae-Un Sung2; 1. Gwangju Institute of Science and Technology, 2. Hyundai Motor Company
- **OS07-03** Algorithmic Study for Power Restoration in Electrical Distribution Networks
  Jun Kawahara1; Chuta Yamaoka1; Takahiro Ito2; Akira Suzuki2; Daisuke Ishii3; Shuhei Sugimura4; Seiya Gotsu4; and Takayuki Tanabe4; 1. Kyoto University, 2. Tohoku University, 3. Chubu University, 4. MEIDENSHA
- **OS07-04** A study on the intent-based system design automation method for fault detection and fault tolerance
  Takayuki Kuroda1; Toshio Watanabe1; and Tatsuya Fukuda1; 1. NEC

**Room D — R02-2: Smart Monitoring/Maintenance/Operation 2**
Chair: Eric Bechhoefer (GPMS Inc.)

- **R02-05** Tacholess instantaneous speed estimation considering the characteristics of vibration harmonic
  Jinoh Yoo1; Jongmin Park1; Taehyung Kim1; Jong Moon Ha2; and Byeng Dong Youn1; 1. Seoul National University, 2. Korea Research Institute of Standards and Science
- **R02-06** Statistical Analysis and Runtime Monitoring for an AI-based Autonomous Centerline Tracking System
  Yuning He1; and Johann Schumann1; 1. NASA
- **R02-07** Quantum Optimization for Location Assignment Problem in AS/RS
  Kuniaki Satori1; and Nobuyuki Yoshikawa1; 1. Mitsubishi Electric
- **R02-08** Automatic Generation of Seven-Segment Display Image for Machine-Learning-Based Digital Meter Reading
  Kota Gashima1; and Takahiro Kashima1; 1. Mitsubishi Electric

**Room E — R03-1: Machine Learning/Deep Learning for PHM 1**
Chair: Atsuhiro Takasu (National Institute of Informatics)

- **R03-01** Assessing the Performance of Transformer for Time Series Anomaly Detection
  Takudo Nakashima1; and Takehisa Yairi1; 1. University of Tokyo
- **R03-02** Unsupervised Anomaly Detection in Marine Diesel Engines using Transformer Neural Networks and Residual Analysis
  Qin Liang1; 2; Knut Erik Knutsen1; Erik Vanem1; Houxiang Zhang2; and Vilmar Æsøy2; 1. DNV, 2. Norwegian University of Science and Technology
- **R03-03** Prognostics in Highly Accelerated Limit Testing Using Deep Learning Data Analysis
  Tadahiro Shibutani1; Yuki Terauchi1; and Yosuke Kikuchi1; 1. Yokohama National University
- **R03-04** Unsupervised Retrieval Based Multivariate Time Series Anomaly Detection and Diagnosis with Deep Binary Coding Models
  Takehiko Mizoguchi1; Yuji Kobayashi1; and Yasuhiro Ajiro1; 1. NEC

**Coffee Break**

### Session block 2 (15:00–16:30)

**Room A — OS08: Technologies and methods for achieving Zero Defect Manufacturing in the era of Industry 4.0 / 5.0**
Chair: Foivos Psarommatis (University of Oslo), and Samir Khan (University of Tokyo)

- **OS08-01** Applications of Active Learning in Predictive Maintenance
  Navid Zaman1; You Jung Jun1; Yan Li1; and Daniel Chan1; 1. PHM Technology
- **OS08-02** Development of demonstration system for fault diagnosis of rotating equipments using RK4 test rig
  Hyun Joon Lee1; Jae Won Jang1; Hyung Jun Park1; Kyoung Rae Noh1; Sangchul Lee1; and Joo-Ho Choi1; 1. Korea Aerospace University, 2. LG Electronics
- **OS08-03** A Time Series Anomaly Detection Method Using Image Encoding Techniques
  Ryo Sakurai1; and Takehisa Yairi1; 1. University of Tokyo

**Room B — OS02-2: New trends and challenges in aerospace PHM 2**
Chair: Seiji Tsutsumi (Japan Aerospace Exploration Agency)

- **OS02-05** Study on Fault Diagnosis in a Spacecraft Propulsion System
  Kazushi Adachi1; Samir Khan1; Kohji Tominaga2; Noriyasu Omata2; Seiji Tsutsumi2; and Taichi Nagata2; 1. University of Tokyo, 2. Japan Aerospace Exploration Agency
- **OS02-06** Anomaly detection of propulsion system of spacecrafts with Light GBM
  Shuta Iino1; Hideki Nomoto1; Takayuki Hirose1; Yasutaka Michiura1; Go Fujii2; and Takashi Uchiyama2; 1. Japan Manned Space Systems Corporation, 2. Japan Aerospace Exploration Agency
- **OS02-07** Development of a space exploration rover digital twin for damage detection
  Lucio Pinello1; Marco Giglio1; Claudio Sbarufatti1; Francesco Cadini1; and Giuseppe Francesco De Luca2; 1. Politecnico di Milano, 2. Agenzia Spaziale Italiana
- **OS02-08** Construction and evaluation of an anomaly detection system using System Invariant Analysis Technology(SIAT) for sound data
  Tomoya Soma1; and Akiko Sasaki1; 1. NEC

**Room C — OS07-2: Autonomous decision making under complex conditions or situations 2**
Chair: Masanao Natsumeda (NEC)

- **OS07-05** Nonlinear Model Predictive Control using Neural ODE Replicas of Dynamic Simulators
  Shumpei Kubosawa1; 2; Takashi Onishi1; 2; and Yoshimasa Tsuruoka3; 1. National Institute of Advanced Industrial Science and Technology, 2. NEC, 3. The University of Tokyo
- **OS07-06** A two-step detection method for actuator and sensor failures based on self-repairing PID control
  Masayoshi Hara1; and Masanori Takahashi1; 1. Oita University
- **OS07-07** An Experimental Study of the Effect of Patrol Inspection Strategy for Improving Detection Rate of Abnormality of Industrial Plants
  Akio Gofuku1; and Riku Kishimoto1; 1. Okayama University

**Room D — R02-3: Smart Monitoring/Maintenance/Operation 3**
Chair: David Weihua He (University of Illinois at Chicago)

- **R02-09** Online fault detection for industrial processes through Kalman filter
  Wenyi Liu1; and Takehisa Yairi1; 1. University of Tokyo
- **R02-10** Abnormal Detection Using Two-Stage Method in Combined Power Plant
  Yun Hee Kim1; Suk Joo Bae1; SangWoo Ha1; Shengjon Jin1; Moon Won Lim1; Sungyong Chang2; HeeGu Kang2; Giyoung Park2; and Milee Joo2; 1. Hanyang University, 2. Korea Electric Power Corporation
- **R02-11** Event detection in a noisy time series data using static smoothening & gradient variation analytics
  Saravanaram T1; Umeit Manka0; Simi Madhavan Karathara1; Carmine Allegorico1; and Arati Halaki1; 1. Baker Hughes, 2. Wissen Infortech
- **R02-12** Improving Anomalous Sound Detection by Distance Matrix-Based Visualization of Measurement Flaws
  Nobuaki Tanaka1; Takeru Shiraga1; and Yusuke Itani1; 1. Mitsubishi Electric

**Room E — OS09: AI based PHM for Power Electronics components and systems**
Chair: Madhav Mishra (RISE Research Institutes of Sweden)

- **OS09-01** RUL Estimation for Package Failure of Power Electronic Devices Using Integral Mean of Precursor Signal
  Zhonghai Lu1; and Chao Guo1; Pré Ghesquiere1; Kai Kriegel2; and Gerhard Mitic2; 1. KTH Royal Institute of Technology, 2. Siemens
- **OS09-03** A Simple Hybrid Model for Estimating Remaining Useful Life of SiC MOSFETs in Power Cycling Experiments
  Mattias P. Eng1; Andreas Lövberg1; Maciej Misiorny1; Wilhelm Söderkvist Vermelin1; and Klas Brinkfeldt1; 1. RISE Research Institutes of Sweden, 2. QRTECH AB
- **OS09-04** Damage-Based Lifetime Modeling for Power Electronic Devices
  Chao Guo1; and Zhonghai Lu1; 1. KTH Royal Institute of Technology

**Coffee Break**

### Session block 3 (16:40–17:50)

**Room A — R04: PHM for Power Electronics/Battery**
Chair: Byeng Dong Youn (Seoul National University, and OnePredict Inc.)

- **R04-01** An Enhanced Model-Based Algorithm for Early Internal Short Circuit Detection in Lithium-Ion Batteries
  Yiqi Jia1; Lorenzo Brancato1; Marco Giglio1; and Francesco Cadini1; 1. Politecnico di Milano
- **R04-02** Multiphysics-informed DeepONet of a lithium-ion battery to predict thermal runaway
  Jinho Jeong1; Eunji Kwak1; Jun-Hyeong Kim1; and Ki-Yong Oh1; 1. Hanyang University
- **R04-03** A Concept of Condition Monitoring for AC-DC Converter Output Capacitors via Discriminative Features
  Akeem Bayo Kareem1; and Jang Wook Hur1; 1. Kumoh National Institute of Technology

**Room B — R05: PHM for Motors**
Chair: Arata Masuda (Kyoto Institute of Technology)

- **R05-01** Analysis of Diagnostic Capabilities for Degradation of Brushless Direct Current Motors Depending on Varying Simulation Data
  Max Weigert1; 1. Technical University of Darmstadt
- **R05-02** A multi-periodicity and multi-scale network for motor fault diagnosis
  Pengzheng Xie1; Kaiwen Zhang1; Yixiang Huang1; and Chengliang Liu1; 1. Shanghai Jiao Tong University
- **R05-03** Anomaly data synthesis and detection via domain randomization
  Joonha Jun1; and Jongsoo Lee1; 1. Yonsei University

**Room C — R03-2: Machine Learning/Deep Learning for PHM 2**
Chair: Naoya Takeishi (University of Tokyo)

- **R03-06** To Trust or Not: Towards Efficient Uncertainty Quantification for Stochastic Shapley Explanations
  Joseph Cohen1; Eunshin Byon1; and Xun Huan1; 1. University of Michigan
- **R03-07** Analysis of the Effect of the Data Heterogeneity in Federated Fault Identification
  Zahra Taghiyarenani1; Slawomir Nowaczyk1; and Sepideh Pashami1; 1. Halmstad university
- [Withdraw] **R02-15** Optimal warranty policy for a system considering a failure interaction Minjae Park1, Beomseok K. Iskandar1, and Dong Ho Park2 1. Hongik University, 2. Bandung Institute of Technology, 3. Hallym University

**Room D — R02-4: Smart Monitoring/Maintenance/Operation 4**
Chair: Yixiang Huang (Shanghai Jiao Tong University)

- **R02-13** A Reliability-Centered Maintenance Framework for Distribution Grids Based on Fault-Tree Analysis
  Ting Wang1; Guoqiang Hu1; and Sungin Cho1; 1. Nanyang Technological University, 2. SP Group
- **R02-14** A Comparative Study of K-Means Clustering and a Novel Ranking Algorithm for Risk Priority Number Analysis in FMECA
  Jiaxiang Cheng1; Sungin Cho2; Yap Peng Tan1; and Guoqiang Hu1; 1. Nanyang Technological University, 2. Singapore Power
- **P01-11** A Signal Pre-processing Method for Condition Monitoring based on Vibration Signals from On-Site Manipulators
  Hea-Ryeon Seo1; Geonhai Lee1; Gun Sik Kim2; Jae Min Lee2; Deog Hyeon Kim1; Jin Woo Park2; and Hae-Jin Choi1; 1. Chung Ang University, 2. Hyundai Motor Group
- **R02-16** Sound-Dr: Reliable Sound Dataset and Baseline Artificial Intelligence System for Respiratory Illnesses
  Yan Truong Hoang1; Quang Nguyen2; Quoc Cuong Nguyen1; Xuan Phong Nguyen1; and Hoang Nguyen1; 1. FPT Software, 2. Vietnam National University, 3. University College Cork

**Room E — DC01: Data Challenge**
Chair: Satoshi Suzuki (ISID)

- **D01-01** Dataset generation based on 1D-CAE modeling for fault diagnostics in a spacecraft propulsion system
  Kohji Tominaga1; Yu Daimon1; Masao Toyama1; Kazushi Adachi2; Seiji Tsutsumi1; Noriyasu Omata1; and Taichi Nagata1; 1. Japan Aerospace Exploration Agency, 2. University of Tokyo
- **D01-02** PHM for Spacecraft Propulsion Systems: Similarity-Based models and Physics-Inspired Features
  Takanobu Minami1; 2; and Jay Lee1; 1. University of Maryland College Park, 2. Komatsu Ltd.
- **D01-03** Hybrid Approach of Xgboost and Rule-based Model for Fault Detection and Severity Estimation in Spacecraft Propulsion System
  Sang Kyung Lee1; Jaon Lee1; Seungyun Lee1; Bongmo Kim1; Yong Chae Kim1; Jinwook Lee1; and Byeng D. Youn1; 2; 1. Seoul National University, 2. OnePredict Inc.
- **D01-04** Anomaly Detection in Spacecraft Propulsion System using Time Series Classification based on K-NN
  Yoshiki Kato1; Taku Kato1; and Tsubasa Tanaka1; 1. Mitsubishi Electric

# PHM Asia Pacific 2023

# Oral Sessions

| Time/Date | | Sep. 14 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| JST (UTC+9) | | Hall | Room A | Room B | Room C | Room D | Room E | 2F Lobby |
| 9 | 9:00 / 9:10 / 9:20 / 9:30 / 9:40 / 9:50 | | | | | | | **Poster Session 2** |
| 10 | 10:00–10:50 | **Keynote 4 (Hall)** — Prediction of the Movement of a Landslide for the Early Warning System Against Disaster in Japan — Prof. Katsuo Sasahara (Kochi University) | | | | | | |
| 11 | 11:00 / 11:10 | | | | | | | |

## Session headers (11:00–)

| | Hall | Room A | Room B | Room C | Room D | Room E |
|---|---|---|---|---|---|---|
| | **Panel Session 2** Organizer: Ken Ueno (Toshiba), Seiji Tsutsumi (Japan Aerospace Exploration Agency) | **R06** PHM for Device Monitoring Chair: Makoto Imamura (Tokai University) | **OS02-3** New trends and challenges in aerospace PHM 3 Chair: Samir Khan (University of Tokyo) | **R07-1** RUL Prediction 1 Chair: Yuantao Fan (Halmstad University) | **R08** PHM for Rotary Machines Chair: Xiaomo Jiang (Dalian University of Technology) | **R03-3** Machine Learning/Deep Learning for PHM 3 Chair: Francesco Cadini (Politecnico di Milano) |

### 11:20–11:50

- **Hall:** Quantum Computing meets PHM — 1. Noriaki Shimada (IBM Quantum/IBM Research) 2. Nobuyuki Yoshikawa (Mitsubishi Electric) 3. Takao Tomono (Toppan Inc.)
- **Room A — R06-01:** Failure prediction of hard disk drives in redundant arrays using disk-level performance metrics — Masano Natsumeda[1] — 1. NEC
- **Room B — OS02-09:** Resilient Operation Planning for CubeSat Using Reinforcement Learning — Shuntaro Kuroiwa[1], and Nozomu Kogiso[1] — 1. Osaka Metropolitan University
- **Room C — R07-1 (Withdraw):** ~~Estimation of Remaining Useful Life of Complex Systems Based on Autoencoder Based Latent Variable Extraction — Sungou Chae[1], and Sukjoo Bae[1] — 1. Hanyang University~~
- **Room D — R08-01:** Multi-Label Fault Diagnosis of Rotary Machine via Domain Adversarial Neural Network-Based Domain Generalization Targeting High Range Rotating Speed — Sukeun Hong[1], and Jongsoo Lee[1] — 1. Yonsei University
- **Room E — R03-08:** Fusion with Joint Distribution and Adversarial Networks: A New Transfer Learning Approach for Intelligent Fault Diagnosis — Xueyi Li[1], Tianyu Yu[1], David He[2], Zhijie Xie[1], and Xiangwei[1] — 1. Northeast Forestry University, 2. University of Illinois at Chicago, 3. Northeast University

### 11:30–12:10 (R06-02 etc.)

- **Room A — R06-02:** Automatic detection of hardware failures in an air quality measuring station with low cost sensors — Sylvain Poupry[1], Kamal Medjaher[1], and Cédrick Béler[1] — 1. ENIT-LGP
- **Room B — OS02-10:** Improvement in Identification Accuracy of a Failure Diagnostic System for a Reusable Rocket Engine — Fumihisa Nagashima[1], Hatsuo Mori[1], Yasuhiro Ishikawa[1], Masaki Sato[2], and Tomoyuki Hashimoto[2] — 1. IHI, 2. Japan Aerospace Exploration Agency
- **Room C — R07-02:** Ensemble Probabilistic Neural Networks for RUL Prediction — Abhishek Srinivasan[1,2], Juan Carlos Andresen[2], and Anders Holst[1] — 1. KTH, 2. Scania, 3. RISE
- **Room D — R08-02:** Sequential Domain Adaptation for Fault Diagnosis in Rotating Machinery — Yong Chae Kim[1], Jin Uk Ko[1], Jinwook Lee[1], Taehun Kim[1], Joon Ha Jung[2], and Byeng D. Youn[1] — 1. Seoul National University, 2. Ajou University
- **Room E — R03-09:** Elastic wave field neural networks for structural health monitoring: an analytical and numerical study of multiple neurons — Arata Masuda[1], and Konosuke Takashima[1] — 1. Kyoto Institute of Technology

### 12:00–12:30

- **Room A — R06-03:** Study on the intermittent fault mechanism of electromagnetic relay under complex environmental stress — Jingzhong Ye[1], Jing Qiu[1], Guanjun Liu[1], and Kehong Lyu[1] — 1. National University of Defense Technology
- **Room B — OS02-11:** Data-Driven Prognostics and Diagnostics of Industrial Machinery- A Turbofan Engine Case Study — Russell Graves[1], Peeyush Pankaj[1], Vineet J Kuruvilla[1], Rachel Johnson[1], and Michio Inoue[1] — 1. MathWorks
- **Room C — R07-03:** A Simple Remaining Useful Life Algorithm Using the Quadratic Eric Bechhoefer[1], Nobuhiro Fujiki[2], Yusuke Kitsukalsa[2], Sotaro Tsukamoto[2], and Akio Usui[2] — 1. GPMS International, 2. Toho Technology
- **Room D — R08-03:** An improved OAKR approach to condition monitoring of rotating machinery — Kexin Zhang[1], and Xiaomo Jiang[1] — 1. Dalian University of Technology
- **Room E — R03-10:** Fuzzy-membership-based labeling – a new labeling method for both classification task and regression task — Diwang Ruan[1], Zhaorong Li[1], Yuheng Wu[1], Jianping Yan[2], and Clemens Gühmann[1] — 1. Technische Universität Berlin, 2. Zhejiang University

### 12:20–12:30

- **Room A — R06-04:** A Simplified Framework for Fault Prediction in Radar Transmitter based on Vector Autoregression Model — Sheriff Murtala[1], Soojung Hur[1], and Yongwan Park[1] — 1. Yeungnam University
- **Room B — OS02-12:** Demonstration of model-based real-time anomaly detection in a JAXA 6.5m×5.5m low-speed wind tunnel — Shotaro Hamato[1], Seiji Tsutsumi[1], Hirotaka Yamashita[1], Tatsuro Shiohara[1], Tomonari Hirotani[1], and Hiroyuki Kato[1] — 1. Japan Aerospace Exploration Agency
- **Room C — R07-04:** Prognosis using Bayesian Method by Incorporating Physical Constraints — Hyung Jun Park[1], Nam Ho Kim[2], and Joo-Ho Choi[1] — 1. Korea Aerospace University, 2. University of Florida
- **Room D — R08-04:** Observation and Prediction of Instability due to RD Fluid Force in Rotating Machinery by Operational Modal Analysis — Daiki Goto[1], Tsuyoshi Inoue[1], Akira Heya[1], Shogo Kimura[1], Shinsaku Nakamura[2], and Yusuke Watanabe[2] — 1. Nagoya University, 2. Ebara

| 12 | 12:40 / 12:50 | | | | | | | |
| 13 | 13:00–13:30 | **Lunch** | | | | | | |

## Session headers (13:40–)

| | Hall | Room A | Room C | Room D | Room E |
|---|---|---|---|---|---|
| | **Panel Session 3** Organizer: Michio Inoue (MathWorks) | **R09** PHM for Turbines Chair: David Weihua He (University of Illinois at Chicago) | **R07-2** RUL Prediction 2 Chair: Joo-Ho Choi (Korea Aerospace University) | **R02-5** Smart Monitoring/Maintenance/Operation 5 Chair: Ken Ueno (Toshiba) | **R10** Digital Twin for PHM Chair: Hyunseok Oh (Gwangju Institute of Science and Technology) |

### 13:40–13:50

- **Hall:** Predictive Maintenance Challenges and Solutions: Vendor Insights — 1. Byeng Dong Youn (OnePredict Inc.) 2. Chris Stecki (PHM Technology) 3. Eric Bechhoefer (GPMS Inc.) 4. Rachel Johnson (MathWorks)
- **Room A — R09-01:** A Physics Informed Machine Learning Approach for Performance Degradation Monitoring of Gas Turbine — Yiyang Liu[1], Xiaomo Jiang[1], Xin Ge[1], and Manman Wei[1] — 1. Dalian University of Technology
- **Room C — R07-05:** Bayesian-based Component Lifetime Prediction Model Using Workshop and Telematics Data — Seungyoung Park[1], and Jihyun Lee[1] — 1. HL Mando
- **Room D — R02-17:** Comprehensive Failure Diagnosis Model with Degradation Indicators of Multiple Sensors — Jun Tominaga[1], Shoya Kamiaka[1], and Kohei Kuroda[1] — 1. Daikin Industries
- **Room E — R10-01:** Development of an Operational Digital Twin of a Locomotive Braking System Solenoid Valve for Fault Classification — Gabriel Davidyan[1], Jacob Bortman[2], and Ron.S Kenett[3] — 1. Israel Railway, 2. Ben-Gurion University of the Negev, 3. Samuel Neaman Institute for National Policy Research

### 14:00–14:10

- **Room A — R09-02:** Discovering Premature Replacements in Predictive Maintenance Time-to-Event Data — Abdallah Abdallah[1], Thorsteinn Rognvaldsson[1], Yuantao Fan[1], Sepideh Pashami[1], and Mattias Ohlsson[1] — 1. Halmstad University
- **Room C — R07-06:** Bridging the Gap: A Comparative Analysis of Regressive Remaining Useful Life Prediction and Survival Analysis Methods for Predictive Maintenance — Mahmoud Rahat[1], Zahra Kharazian[1], Peyman Shekhotharam Mashhadi[1], Thorsteinn Rögnvaldsson[1], and Shamik Choudhury[1] — 1. Halmstad University, 2. Stockholm University, 3. Volvo
- **Room D — R02-18:** Prescriptive Maintenance-Decision Analysis Through Energy Efficiency-Based Hybrid Prognostic and Diagnostic Model — MT arwaji Warsokusumo[1], Ghiffari Awliya Muhammad Ashfahani[1], Toni Prahasto[1], and Achmad Widodo[1] — 1. PT PLN Indonesia Power, 2. Diponegoro University
- **Room E — R10-02:** Architecting a Digital Twin-Based Predictive Maintenance System for Modelling Cable Joint Degradation — Raymon van Dinter[1,2], Görkem Ekmekci[1], Sander Riekens[1], Bedir Tekinerdogan[1], and Cagatay Catal[1] — 1. Wageningen University, 2. Sioux Technologies, 3. Alliander, 4. Wageningen University, 5. Qatar University

### 14:20–14:30

- **Room A — R09-03:** Trip Reduction in Turbo Machinery — Pranay Mathur[1], Carlo Michelassi[1], Simi Karatha[1], Gilda Pedoto[1], and Miguel Gomez Alguacil[1] — 1. Baker Hughes
- **Room C — R07-07 (Withdraw):** ~~Explainable Condition Monitoring Identification for Degradation Trend Analysis and Fault Prognosis — Amine Ateui[1] — 1. University of Halmstad~~
- **Room D — R02-19:** Differential Diagnosis with Active Testing — Emile van Gerwen[1], Leonardo Barbini[1], and Michael Borth[1] — 1. TNO-ESI, 2. TNO

| 14 | 14:40 / 14:50 | **Coffee Break** | | | | | | |
| 15 | 15:00–15:50 | **Keynote 5 (Hall)** — From Physics to Machine Learning and Back: Applications to Prognostics and Health Management — Prof. Olga Fink (EPFL, Lausanne) | | | | | | |
| 16 | 16:00 / 16:10 | **Closing/Award Ceremony (Hall)** | | | | | | |

# Poster Sessions

## Join us for our Poster Sessions!

Dates: Sep 13 (Wed) and Sep 14 (Thu)
Time: 9:10-9:50AM
Place: 2F Lobby

Posters will be displayed throughout the conference, but poster presenters will be present for discussions and Q&A during the designated times mentioned above. Don't miss this opportunity to dive deep into their research, ask questions, and share insights.

For online attendees, posters and presentation videos will appear in Whova. Go to the poster sessions, and ask questions, and share insights to the poster presentation using chat of Whova.

| No. | Sep. 13 9:00-12:00 Title | Speaker |
|---|---|---|
| P01-01 | Demonstration of Sensor Monitoring of Lubricants | Kyoko Kojima[1] 1. Hitachi, Ltd. |
| P01-02 | Data-driven method for assessing slagging/fouling index in thermal power plant using autoencoder-based covariate filtering and feature extraction | Seongjoon Kim, Geunseop Lee, and Seonggwan Son[1] 1. Chosun University |
| P01-03 | Health Monitoring of Power Semiconductor Module Using Temperature Sensitive Electrical Parameter | Guesuk Lee[1], Sungsoon Choi[1], Byongjin Ma[1], and Jemin Kim[1] 1. Korea Electronics Technology Institute |
| P01-04 | Application of Model-Based Deep Reinforcement Learning Framework to Thermal Power Plant Operation Considering Performance Change | Yutaka Watanabe[1], and Takehisa Yairi[2] 1. Central Research Institute of Electric Power Industry, 2. University of Tokyo |
| P01-05 | Survival Time Analysis of Turbocharger Devices in a Real Fleet of Volvo Trucks: Incorporating Temporal Information from Condition Monitoring Sensors | Mahmoud Rahat[1], and Peyman Mashhadi[1] 1. Halmstad University |
| P01-06 | Simulation-driven Bearing Fault Diagnosis for Condition Monitoring without Faulty Data | Iljeok Kim[1], and Seungchul Lee[1] 1. Pohang University of Science and Technology |
| P01-07 | Fully Unsupervised Defect Clustering using Adversarial Autoencoder and Bayesian Mixture Model | Taewan Kim[1], and Seungchul Lee[1] 1. Pohang University of Science and Technology |
| P01-08 | Evaluation of Multi-Modal Learning for Predicting Coolant Pump Failures in Heavy Duty Vehicles | Yuantao Fan[1], Amine Atoui[1], Slawomir Nowaczyk[1], and Thorsteinn Rognvaldsson[1] 1. Halmstad University |
| P01-13 | Change Point-based Spatio-temporal Process Modeling of Image Degradation for Manufacturing Process | Munwon Lim[1], and Suk Joo Bae[1] 1. Hanyang University |
| P01-15 | Deep Metric Learning for Anomaly Detection of Satellites from Irregularly Sampled Light Curve | Jun Yoshida[1], Ryosuke Togawa[1], and Taichiro Sano[1] 1. NEC |
| R10-03 | Configuration and Comparative Study of Prediction Models for Indoor Air Quality | Geonhwi Lee[1], Hea-Ryeon Seo[1], and Hae-Jin Choi[1] 1. Chung Ang University |
| R06-04 | A Simplified Framework for Fault Prediction in Radar Transmitter based on Vector Autoregression Model | Sheriff Murtala[1], Soojung Hur[1], and Yongwan Park[1] 1. Yeungnam University |
| R07-05 | Bayesian-based Component Lifetime Prediction Model Using Workshop and Telematics Data | Seungyoung Park[1], and Jihyun Lee[1] 1. HL Mando |
| OS06-06 | Condition-based Maintenance of Brake Pads and Tires in Shared Vehicles using Cloud-based Health monitoring and prognostics | Jeong Hae Lee[1], Jaewook Oh1, Jeongwoo Lee[2], Seungyoung Park[2], Jihyeon Lee[2], and Namsu Kim[1] 1. Konkuk University, 2. HL Mando |

# Poster Sessions

Poster session is held in 2F Lobby.

| No. | Title | Speaker |
|---|---|---|
| P01-09 | Spacecraft Propulsion System Diagnosis via MiniRocket: a result of PHMAP 2023 Data Challenge | Kento Kotera[1], and Akihiro Yamaguchi[1]<br>1. Toshiba |
| P01-10 | High-Speed Feature Extraction and Real-Time Fault Diagnosis Using Unscented Kalman Filter | Fumihisa Nagashima[1], Hatsuo Mori[1], and Yasuhiro Ishikawa[1]<br>1. IHI |
| P01-11 | Sparse Modeling of Wavelet Features for Fault Classification and Regression in Spacecraft Propulsion Systems | Joseph Cohen[1], Andreas Rauch[1], Jennifer Li[1], Bernardo Modenesi[1], James Boyko[1], Yutong Wang[1], Eunshin Byon[1], and Xun Huan[1]<br>1. University of Michigan |
| P01-12 | Expert-Informed Hierarchical Diagnostics of Multiple Fault Modes | Osarenren Kennedy Aimiyekagbon[1], Amelie Bender[1], Alexander Löwen[1], Lars Muth[1], and Walter Sextro[1]<br>Paderborn University |
| P02-16 | Bayesian Autoencoder with Uncertainty Quantification for Predicting Premature Lithium-Ion Battery Degradation | Sungeu Chae[1], Minjoo Kim[1], Yunhee Kim[1], and Suk Joo Bae[1]<br>1. Hanyang University |
| P02-17 | On Explaining Anomaly Detection by Anomaly Score Attribution | Naoya Takeishi[1]<br>1. University of Tokyo |
| P02-18 | Facility Risk Management at JAXA's Tanegashima Space Center \| Flagship Rocket Launch Site and Preventive Maintenance Using the Latest Technologies | Takahiro Akeda[1]<br>1. Japan Aerospace Exploration Agency |
| P02-19 | A Study on Hierarchical Defect Detection Algorithm for \| Transparent Plastic Bottles Based on YOLO | Young Woon Choi[1], Hyun Seok Lee[1], and Sang Won Lee[1]<br>1. Sungkyunkwan University |
| P02-20 | Fair Inventory Ordering Method for a Supply Chain Health Management | Jundai Koketsu[1], and Aya Ishigaki[1]<br>1. Tokyo University of Science |
| P02-21 | Fleet Vehicle Component Lifetime Prediction Using Driver Input | Seungyoung Park[1], and Jihyun Lee[1]<br>1. HL Mando |
| P02-22 | Unpaired Image-to-Image Translation for Cable Vibration Detection from Low-Visibility CCTV Images | Sunjoong Kim[1], and Hun Lee[1]<br>1. University of Seoul |
| R02-09 | Online fault detection for industrial processes through Kalman filter | Wenyi Liu[1], and Takehisa Yairi[1]<br>1. Univerisity of Tokyo |
| R02-16 | Sound-Dr: Reliable Sound Dataset and Baseline Artificial Intelligence System for Respiratory Illnesses | Van Truong Hoang[1], Quang Nguyen[2], Quoc Cuong Nguyen[1], Xuan Phong Nguyen[1], and Hoang Nguyen[3]<br>1. FPT Software, 2. Vietnam National University, 3. University College Cork |
| R05-04 | System-Level Simulation of 120 kW Interior Permanent Magnet Synchronous Motor Drive for Electric Vehicle Usage Under Various Types of Faults for Fault Diagnosis | Woyeong Kwon[1], Jaewook Oh[1], Inhyeok Hwang[1], and Namsu Kim[1]<br>1. Konkuk University |

# Keynote Speakers

All the keynote speeches are held in Hall.

**Keynote 1**   Sep. 12, 10:20-11:20

Asteroid Sample Return Mission "Hayabusa2" – A Successful Example of Large-Scale Scientific Project Management

**Prof. Yuichi Tsuda**

Institute of Space and Astronautical Science (ISAS), Japan Aerospace Exploration Agency (JAXA)

**Keynote 2**   Sep. 13, 10:00-11:00

Industrial AI-Augmented Prognostics for Highly Connected and Complex Industrial Systems

**Prof. Jay Lee**
Univ. of Maryland College Park

**Keynote 3**   Sep. 13, 11:20-12:20

How is industrial AI transforming manufacturing industry?

**Prof. Byeng Dong Youn**
Seoul National University and ONEPREDICT INC

**Keynote 4**  **Sep. 14, 10:00-11:00**

Prediction of the movement of a landslide for the early warning system against disaster in Japan

**Prof. Katsuo Sasahara**
Kochi University

**Keynote 5**  **Sep. 14, 15:00-16:00**

From physics to machine learning and back: Applications to prognostics and health management

**Prof. Olga Fink**
Intelligent Maintenance and Operations Systems, EPFL, Lausanne

# Panel Sessions

## 【Panel Session 1 】

**Date: Sep. 12, 18:10-19:00**
**Location: Room A**

### Full Flight Sensor Data sharing within the stakeholders of PHM

Organizer: Masaru (ken) Nishiwaki (ANA)
Panelists:
1. Darren Macer (Boeing)*
2. Gavin Chew (Collins Aerospace)*
3. Sebastian Lang (Lufthansa Technik)*
4. Manabu Tono (ANA)*

## 【Panel Session 2 】

**Date: Sep. 14, 11:20-12:20**
**Location: Hall**

### Quantum Computing meets PHM

Organizer: Ken Ueno (Toshiba), Seiji Tsutsumi (JAXA)
Panelists:
1. Noriaki Shimada* (IBM Quantum/IBM Research)
2. Nobuyuki Yoshikawa* (Mitsubishi Electric)
3. Takao Tomono* (Toppan Inc.)

## 【Panel Session 3 】

**Date: Sep. 14, 13:40-14:40**
**Location: Hall**

### Predictive Maintenance Challenges and Solutions: Vendor Insights

Organizer: Michio Inoue (MathWorks)
Panelists:
1. Byeng Dong Youn* (OnePredict)
2. Chris Stecki* (PHM Technology)
3. Eric Bechhoefer* (GPMS Inc)
4. Rachel Johnson* (MathWorks)

* Invited

# Exhibitions

## Join Us at the Sponsor's Exhibition

PHMAP23 is proud to present an exclusive exhibition, featuring the latest innovations and research contributions from our esteemed sponsors. This year, we are thrilled to invite you to explore the forefront of technology and engage with industry-leading companies in our exhibition area.

Exhibition Details:
    Date: September 12th, 12:40 PM to September 14th, 3:00 PM
    Location: Exhibitions

Don't miss this unique opportunity to immerse yourself in a world of innovation and inspiration. Mark your calendar and make plans to join us at the exhibition.

| Earth | Earth | | Moon | Moon | | Mars |
|-------|-------|---|------|------|---|------|
| JAMSS | onepredict | | MathWorks | TOSHIBA | | Lufthansa Technik |

Moon — iSiD

Moon — PHM Technology
Decisions better made

Coffee

# 🤵 Welcome Reception and Baquet

A welcome reception & banquet will be held at the conference. We will pick you up from the nearby Hitotsubashi Hall on Sep 11 and take you to the reception site.Please refer to the map on the next page for the location. The fee for this event is included in the conference registration fee. We look forward to seeing you there.

※The welcome reception may be held on September 14 for the farewell reception or alternative arrangements depending on the weather conditions.

## Welcome Reception

**Please complete the registration by 16:30**, and wait at the Room C and Room D. The bus will leave the venue at 16:30-17:00. We will take you to the bus as soon as the bus arrives.

The welcome reception will be held on Monday, September 11, from 17:30 to 20:00 aboard a Yakatabune, cruising along the picturesque Sumida River in Tokyo. Enjoy a delectable Japanese kaiseki cuisine while taking in the enchanting beauty of Tokyo's night skyline and the traditional ambiance of the Yakatabune. There is also the bus back to the venue.

### Welcome Reception / Sep. 11 (Mon.), 17:30-20:00
### YAKATABUNE HARUMIYA

4-6-1 Kachidoki, Chuo-ku, Tokyo
TEL: 03-3644-1344, FAX: 03-3644-5445,
http://yakatabune-tokyo.com/index.html#0401
※ If you are not taking bus, please come directly to the venue referring the below map.
(No boarding YAKATABUNE after 17:30)
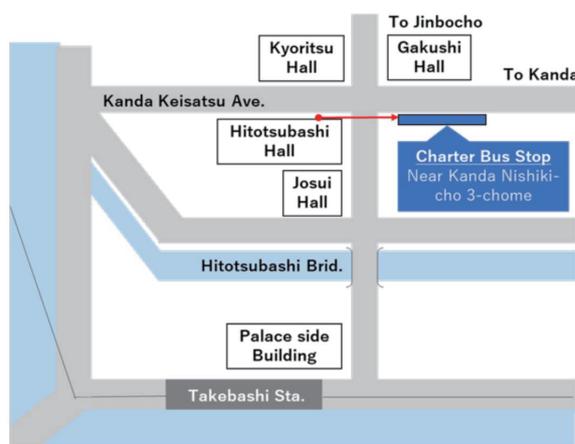


**Chater Bus Stop (Reception & Banquet)**
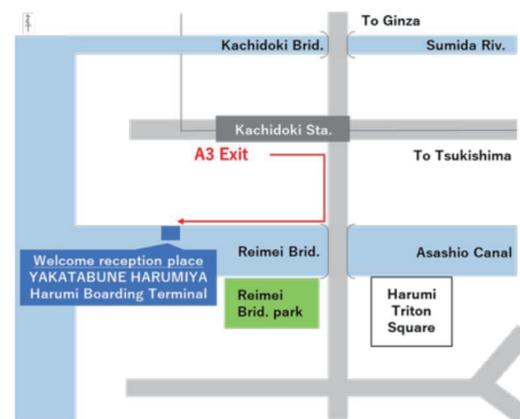


**Welcome Reception: Sep. 11(Mon.), 17:30-20,30**

# PHM Asia Pacific 2023

## Banquet

The banquet will be held on Wednesday, September 13, from 19:00 to 21:00. in a vibrant beer garden located in Shinjuku, one of Japan's busiest districts. Experience the lively atmosphere of the beer garden and enjoy the unique ambiance while savoring delicious party food. The award ceremonies will be held during the banquet. Please come to the banquet site by yourself using Toei Shinjuku Line. Check the maps below. At the Shinjuku station, please exit from the gate of "Keio Shinsen Gate". You can see staffs there.

### Banquet / Sep. 13 (Wed.), 19:00-21:00
### Shinjuku BBQ beer-garden Hello

LUMINE 1-RF L Terrace, 1-1-5 Nishi-Shinjuku, Shinjuku-ku, Tokyo

TEL: 03-9694-7071,

https://hello-bbq.tokyo/

※ Please come directly to the venue referring the below map and URL (Using the Toei Shinjuku Line).

### Jimbocho station map

https://www.tokyometro.jp/lang_en/station/jimbocho/index.html

### Shinjuku station map

https://www.kotsu.metro.tokyo.jp/eng/services/subway/stations/shinjuku.html#solid
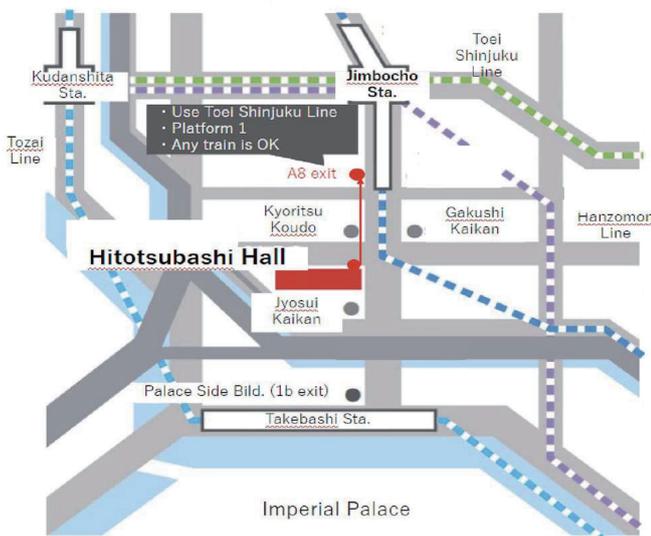


**Banquet (From Hitotsubashi Hall to Jimbocho Sta.)**
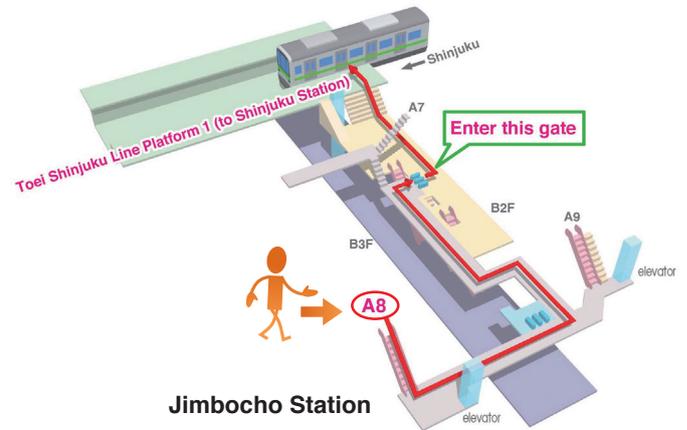


**Jimbocho Station**
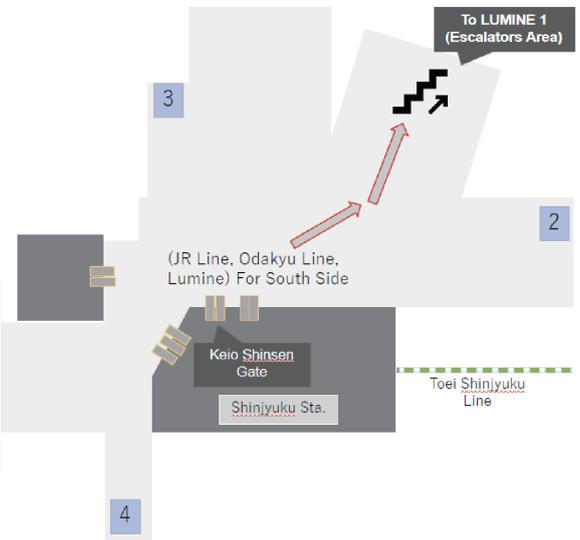


**Banquet (From Toei Shinjyuku Line Shinjyuku Sta. to LUMINE 1)**

# Short course

PHM Asia Pacific 2023 offers one-day intensive short course on Sep. 11, 2023. The course will be delivered in Japanese.

| 時間（講師） | テーマ | サマリー |
|---|---|---|
| 10:00-12:00<br>（今村） | PHM 入門 | ・PHM とは<br>・データ分析プロセス<br>・不確実性 |
| | 機械学習を用いた予知保全 | ・異常検知<br>・故障診断<br>・余寿命予測 |
| | 寿命分布の推定<br>（寿命データの活用） | ・寿命データとは，打ち切りデータ<br>・パラメトリック推定<br>　（ワイブル分布など）<br>・ノンパラメトリック推定<br>　（カプランマイヤー法など） |
| 13:00-15:00<br>（今村） | 劣化モデルに基づく余寿命予測<br>（状態基準保全でのデータ活用） | ・類似度モデル<br>・累積損傷モデル<br>・状態空間モデル |
| | 時系列処理 | ・周波数解析<br>・時系列データマイニング<br>　（Motif,Discord,Shaplet など） |
| 15:00-16:30<br>（有馬） | リチウムイオン電池の基本事項 | ・他の電池と比較した特徴、主要材料、<br>　これまでとこれからの用途<br>・資源的課題とリユース・リサイクル<br>　の動向<br>・重要な特性（充電率、満充電容量、<br>　開回路電圧、内部抵抗） |
| | リチウムイオン電池の劣化と<br>その診断（予知保全） | ・1/2 乗則・アレニウス則および劣化現象<br>　を構成する要素<br>・交流インピーダンス法とバッテリー<br>　マネジメントシステム<br>・非破壊劣化診断手法の体系分類 |
| | 適応フィルタによるリチウムイオン<br>電池の残量推定・劣化診断の事例 | ・状態空間モデル<br>・残量推定と満充電容量推定<br>・特性プロファイルの学習への拡張と<br>　充放電効率推定 |

【講師】

## 有馬 理仁

2006 年 3 月東京工業大学大学院生命理工学研究科修士課程（分子生命科学専攻）修了。
同年 4 月大和製罐（株）入社。2021 年 3 月立命館大学大学院理工学研究科博士後期課程
（電子システム専攻）修了．博士（工学）。現在，リチウムイオン蓄電池の評価試験・寿命劣化・
運用経済性に関する新規事業・研究開発に従事。（寿命データの活用）

## 今村 誠

1986 年三菱電機株式会社入社。自然言語インタフェース、製造業向け知識管理、Web マイニング等を
経て、予知保全や生産性向上のためのデータ分析技術の研究・開発に従事。2016 年 4 月より東海大学
情報通信学部組込みソフトウェア工学科教授。予知保全関連の産学共同プロジェクトにも精力的に従事。