ICSRS 2024

2024 8th International Conference on SYSTEM RELIABILITY AND SAFETY

ICRE

2024 8th International Conference on Reliability Engineering

20-22 November / Sicily, Italy

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Conference Record

20-22 November / Sicily, Italy

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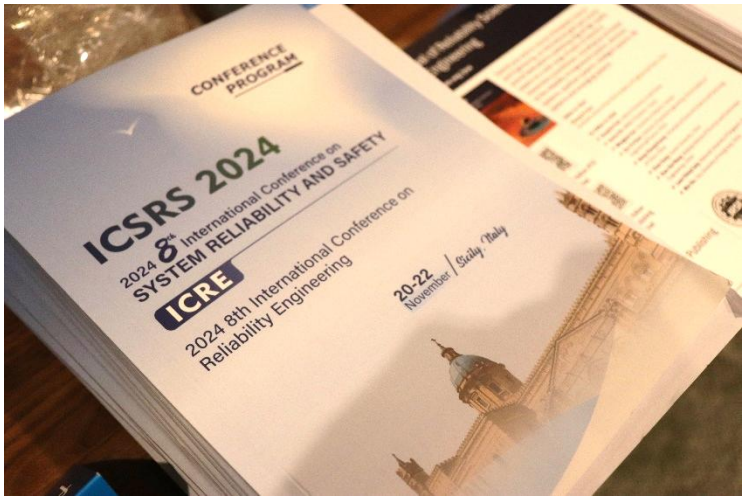


EPFL
Prof. Dr. Olga Fink
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Preventive maintenance schedule, etc.
Data from operation: Event data (ups, downs, failures, repairs, maintenances);
Process data (tasks, outputs, quality metrics); Response data (vibration, temperature, current, acoustics, etc.)
Information integration at
status, health index, RUL, sug
of O&M


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►Excellent Presentation Winners

Session 1 - Federated Generative Models for Predictive Maintenance in Industrial Environments
Usevalad Milasheuski, Piero Baraldi, Enrico Zio, Stefano Savazzi
Presenter: Usevalad Milasheuski, Politecnico di Milano, Italy

Session 2 - Probabilistic Safety Assessment of Nuclear Power Plants under Climate Change
Thomas Matteo Coscia, Francesco Di Maio, Gyunyoung Heo, Enrico Zio
Presenter: Thomas Matteo Coscia, Politecnico di Milano, Italy

Session 3 - Improving the Performance of PHM Models by Post-hoc Explainable Artificial Intelligence (XAI) with Automatic Processing of Explanations
Giovanni Floreale, Piero Baraldi, Enrico Zio
Presenter: Giovanni Floreale, Politecnico Di Milano, Italy

Session 4 - Contextualizing the Sim-to-Real Gap for Hardware-in-the-Loop Testing of Highly Automated Driving Functions
Christian Steinhauser, Joshua Ransiek, Jacob Langner, Eric Sax
Presenter: Christian Steinhauser, FZI Research Center for Information Technology, Germany

Session 5 - A Classification Problem Formulation for the Reliability Assessment of End-To-End Communication among Cyber Devices of Cyber-Physical Systems
Juan Pablo Futalef, Francesco Di Maio, Enrico Zio
Presenter: Juan Pablo Futale, Politecnico di Milano, Italy

Session 6 - Home Appliance Reliability Study – The Failure of the Turntable Motor
Alberto Miele, Francesco Gallegati, Carlo Di Rosa
Presenter: Alberto Miele, Electrolux Italia S.p.A, Italy

Session 7 - Advanced Tools and Model-Based Analysis for Digital and Software-Defined Systems in Safety-Critical Applications
Samuel Garcia Lorente, Daniel Villafañe Delgado, Pablo Lopez Negro
Presenter: Samuel Garcia Lorente, Anzen Aerospace Engineering, Spain

Session 8 - Artificial Intelligence (AI) – Accelerated Stochastic Simulation for the Resilience Assessment of Critical Energy Infrastructures
Santiago Taguado Menza, Francesco Di Maio, Enrico Zio
Presenter: Santiago Taguado Menza, Politecnico di Milano, Italy

►Excellent Presentation Winners

Session 9 - Severe Accident Management of Nuclear Power Plants by A Condition-Informed Dynamic Bayesian Network
Giovanni Roma, Francesco Di Maio, Enrico Zio
Presenter: Giovanni Roma, Politecnico Di Milano, Italy

Session 10 - Fatigue Life Prediction Method with Multi-Stress-Ratio Sparse Data
Tianpei Zu, Shixi Yang, Waichon Lio, Qingyuan Zhang
Presenter: Zu Tianpei, Beihang University, China

Session 11 - Fault Diagnosis in Hybrid-Fiber Coaxial Networks Using Sliding Window-Based Features
Rocco Cassandro, Zhaojun Steven Li, Jason W. Rupe and Mariela Cerrada
Presenter: Rocco Cassandro, Western New England University, USA

Session 12 - Landscape of AI safety concerns - A methodology to support safety assurance for AI-based autonomous systems
Ronald Schnitzer, Lennart Kilian, Simon Roessner, Konstantinos Theodorou, Sonja Zillner
Presenter: Ronald Schnitzer, Technical University of Munich / Siemens AG, Germany

Session A - The Reliability of Demand-Side Power Flexibility Provision - An Analytical Framework
Charlotte Jacquet, Hanmin Cai, Arvind Srinivasan, Arnab Chatterjee, Giovanni Sansavini, Philipp Heer
Presenter: Hanmin Cai, Empa, Switzerland

Session B - Asset Management Strategies for District Heating Networks
Jens Gronborg, Maryam Maryamsadat Tahavori and Peder Bacher
Presenter: Jens Grønborg, Technical University of Denmark, Denmark

Session C - Mitigating Risks in Renewable Energy Power Systems: Predicting Transient Voltage Angles with Physics-Informed Neural Networks
Ruoging Yin, Liz Varga, Gemma Cremen
Presenter: Ruoqing Yin, University College London, UK

Session D - Taxonomy of Safe Uncertainty Handling in the Context of Dynamic Risk Management
Philipp Schleiss, Shanza Ali Zafar, Luciana Tanzarella, Francesco Carella
Presenter: Philipp Schleiss, Fraunhofer IKS, Germany

►Keynote Speakers

Mingjian Zuo

University of Alberta, Canada

Bio: Dr. Mingjian Zuo is Special Professor of the University of Electronic Science & Technology of China, Professor Emeritus of the University of Alberta, Canada, and Founder and Chief Scientist of Mingserve Technology Co. Ltd., China. He received the Bachelor of Science degree in Agricultural Engineering in 1982 from Shandong Institute of Technology, China, and the Master of Science degree in 1986 and the Ph.D. degree in 1989 both in Industrial Engineering from Iowa State University, Ames, Iowa, USA. His research interests include system reliability analysis, maintenance modeling and optimization, signal processing, fault diagnosis, machine learning, and prognosis & health management. He is Fellow of the Canadian Academy of Engineering (CAE), Fellow of the Prognostics and Health Management Society (PHMS), Fellow of the Asia-Pacific Artificial Intelligence Association (FAAIA), Fellow of the Institute of Industrial and Systems Engineers (IISE), and Founding Fellow of the International Society of Engineering Asset Management (ISEAM). He served as Department Editor of IISE Transactions, Associate Editor of IEEE Transactions on Reliability, Associate Editor of Journal of Risk and Reliability, Associate Editor of International Journal of Quality, Reliability and Safety Engineering, Regional Editor of International Journal of Strategic Engineering Asset Management, and Editorial Board Member of Reliability Engineering and System Safety, Journal of Traffic and Transportation Engineering, and International Journal of Performability Engineering.

Speech Title: Machine Learning for Practical Prognosis and Health Management

Abstract: Machine learning has great potential for reliability assurance of engineering assets through prognosis and health management (PHM). It has been attracting attention from both academic and industrial sectors. Recent developments of machine learning, especially the evolving branches of deep learning, transfer learning, and reinforcement learning, bring new opportunities for effective PHM. This talk will first introduce general principles of prognosis and health management and machine learning. We will then present our recent research work on developing machine learning techniques for PHM. Finally, development of PHM tools for industrial settings including traditional and intelligent approaches will be covered.

►Keynote Speakers

Olga Fink

EPFL, Switzerland

Bio: Olga Fink has been assistant professor of intelligent maintenance and operations systems at EPFL since March 2022. Olga is also a research affiliate at Massachusetts Institute of Technology. Olga's research focuses on Hybrid Algorithms Fusing Physics-Based Models and Deep Learning Algorithms, Hybrid Operational Digital Twins, Transfer Learning, Self-Supervised Learning, Deep Reinforcement Learning and Multi-Agent Systems for Intelligent Maintenance and Operations of Infrastructure and Complex Assets. Before joining EPFL faculty, Olga was assistant professor of intelligent maintenance systems at ETH Zurich from 2018 to 2022, being awarded the prestigious professorship grant of the Swiss National Science Foundation (SNSF). Between 2014 and 2018 she was heading the research group "Smart Maintenance" at the Zurich University of Applied Sciences (ZHAW). She has gained valuable industrial experience as reliability engineer with Stadler Bussnang AG and as reliability and maintenance expert with Pöyry Switzerland Ltd. In 2018, Olga was selected as one of the "Top 100 Women in Business, Switzerland" and in 2019, she was selected as young scientist of the World Economic Forum. In 2020 and 2021, she was honored as young scientist of the World Laureate Forum.

Speech Title: Integrating Prior Knowledge and AI: Leveraging Inductive Bias in Machine Learning for Effective PHM Solutions

Abstract: In the field of prognostics and health management, the integration of machine learning has enabled the development of advanced predictive models that ensure the reliable and safe operation of complex assets. However, challenges such as sparse, noisy, and incomplete data necessitate the integration of prior knowledge and inductive bias to improve model generalization, interpretability, and robustness.

Inductive bias, defined as the set of assumptions embedded in machine learning models, plays a crucial role in guiding these models to generalize effectively from limited training data to real-world scenarios. In PHM applications, where physical laws and domain-specific knowledge are fundamental, the use of inductive bias can significantly enhance a model's ability to predict system behavior under diverse operating conditions. By embedding physical principles into learning algorithms, inductive bias reduces the reliance on large datasets, ensures that model predictions are physically consistent, and enhances both the generalizability and interpretability of the models.

►Keynote Speakers

Katrina Groth

University of Maryland, USA

Bio: Katrina M. Groth is an Associate Professor of Mechanical Engineering and the Director of the Reliability Engineering program at the University of Maryland. Groth specializes in safety, risk, and reliability analysis of energy systems. She has an active portfolio of research, including developing quantitative risk assessment (QRA) methods, prognostics and health management (PHM) techniques, and reliability data collection frameworks and algorithms. Her work has influenced safety practices and codes and standards for hydrogen fueling stations, hydrogen storage and electrolyzers, fuel cells, gas pipelines, and nuclear power plants and more. Groth has published over 125 peer-reviewed papers and technical reports, 1 textbook, and has developed multiple software packages. She has received numerous awards, including an NSF CAREER award in 2021 and a DOE Hydrogen Program R&D Award, and the David Okrent Award for Nuclear Safety. She holds a Ph.D. in Reliability Engineering from the University of Maryland.

Speech Title: Insights for Hydrogen Safety from Quantitative Risk Assessment (QRA): Implications for Fueling Stations, Forklifts, Pipelines, and Electrolyzers

Abstract: Safety and reliability issues can impede development and adoption of new technologies, and hydrogen systems are no exception. The widely anticipated adoption of hydrogen technologies requires that the risks associated with those technologies be rigorously investigated and mitigated early in the lifecycle. Quantitative risk assessment (QRA) enables proactively addressing potential failures before they happen - and learning from failures and near misses when they happen. Assessing and addressing risk will enable minimizing failures, downtime, maintenance costs, property damage, injuries, loss of public trust, and costly litigation. This talk presents design-stage QRAs completed for four hydrogen technologies: fueling stations, forklifts, pipelines, and electrolyzers. The emphasis is on 1) sharing early insights that will enable safety and reliability of new deployments, 2) discussing the role of and 2) sharing high-priority research gaps to motivate the hydrogen safety and reliability engineering research community to address known gaps before they become barriers to hydrogen deployments.

▶Session Keynote Lecturers

Elena Zaitseva
University of Zilina, Slovakia
Speech ID: 2528

Fabio Postiglione
University of Salerno, Italy
Speech ID: 0387

Mohammad Pourgol
University of Maryland, USA
Speech ID: 2024

Jie Liu
Beihang University, China

Speech ID: 2125

Ahmed Shokry
CMAP, Ecole Polytechnique, France

Speech ID: 0000

Alba Sofi
University “Mediterranea” of Reggio Calabria, Italy
Speech ID: 3133

Yanhui Lin
Beihang University, China

Speech ID: 5613

Nicolae Brinzei
University of Lorraine, Research Center for Automatic Control of Nancy (CRAN)
Speech ID: 7464

Mohammad Ali Saniee Monfared
Alzahra University, Iran

Speech ID: 4284

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Márcio das Chagas
Federal University of Pernambuco, Brazil
Speech ID: 1156

Umberto Alibrandi
Aarhus University, Denmark

Speech ID: S22114

Yi-Ping Fang
University of Paris Saclay, France
Speech ID: 4173

Marco Cocconcelli
University of Modena and Reggio Emilia, Italy
Speech ID: 1497

Bahri Uzunoglu
Uppsala University, Sweden

Speech ID: 3069 & S55175

Masoud Naseri
The Arctic University of Norway, Norway
Speech ID: 0725

Zhiguo Zeng
Université Paris-Saclay, France
Speech ID: 5214

Huixing Meng, Beijing Institute of Technology, China

Speech ID: 6858

About Sicily, Italy






Every journey begins with a wish. And your every wish comes true in Sicily.

Would you like to stroll through the grandeur and majesty of the Valley of the Temples? Would you like to be speechless in front of the Palatine Chapel, described as " the most beautiful religious jewel created by human imagination"? Would you like to be dazzled by the white and majestic beauty of the Scala dei Turchi?

Dream and reality, myth and history, come together in a unique dimension. Culture, art, and nature create something incomparable. Yesterday and tomorrow fade into an endless present.

Thunderous applause echoes centuries later in the ancient theatre of Syracuse. The mosaics of Villa del Casale talk about the glorious past of imperial Rome. The megaliths of Argimusco whisper in the wind about the origins of time. Observing them, here and now, will be a transcendental experience.

Discover Sicily's little sisters, the enchanting smaller islands, all different from each other. Each one has its characteristic and charm, older or more 'glittering'.

After visiting Cefalu, Noto, Taormina, your heart will beat with a new and unexpected rhythm: it will be impossible to leave these places and forget them.

Luckily, Sicily will always be ready to welcome you.
For every new wish, for a new journey and your desire for wonder, this island will always lead you to the right place.

More information, please visit: https://www.visitsicily.info/en/

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