Preface

THE MESSAGE FROM THE GENERAL CHAIRS

It is our great pleasure to welcome all of you to the PHM 2021 Zhengzhou International Conference. In the past few years, this annual conference represented one of the largest gatherings of researchers and professionals to discuss most recent advancements in prognostics and system health management. This year, however, the ongoing COVID-19 pandemic and the resulting travel restrictions in many regions impose unprecedented challenges to the organization of the conference. Instead of meetings fully in person, the Conference Organization Committee has decided to shift the conference to a hybrid mode, with which some authors attended this conference in person while others participated in this conference virtually via a shared Zoom link. We hope this shift in conference mode will not affect your enthusiasm in participating in the conference and discussions.

We are pleased to invite two well-known experts in the field to deliver keynote speeches at this conference: Professor Wilson Wang, Professor and University Research Chair in Intelligent Diagnostics and Prognostics of Engineering Systems, Lakehead University, Canada, and his talk is on “Fault diagnosis in gearboxes”; Dr. Yiqiang Chen, Deputy Chief Engineer of National Key Laboratory, China Electronic Product Reliability and Environmental Testing Research Institute, China, and his talk is about “Prognostic and health management technology for electric system based on PoF and data-driven method”. The conference program is also offering three paper oral presentation sessions and one poster session, arranged in the late morning and entire afternoon on October 23.

This conference could not be organized without the earnest efforts from all our organization committee members. The conference is also indebted to dozens of volunteers who contributed to the various processes of the conference. It has been a great privilege for both of us to serve as the General Chairs of PHM 2021 Zhengzhou and it is our hope that you find the conference fulfilling and enjoyable. We thank you for your support and wish you a pleasant experience at PHM 2021 Zhengzhou.

Sincerely,

Rongjie Huang
Wenliao Du

General Chairs, PHM2021 Zhengzhou International Conference
Professors, Zhengzhou University of Light Industry
KEYNOTE SPEAKERS

Keynote 1: Fault Diagnosis in Gearboxes

Dr. Wilson Wang, Professor and University Research Chair in Intelligent Diagnostics and Prognostics of Engineering Systems, Lakehead University, Canada

Abstract:
Gearboxes are commonly used in rotating machinery for power transmission and speed modification. As a matter of fact, most machinery imperfections are related to defects in gearboxes, including gears and rolling element bearings. However, reliable fault detection in gears and bearings in a gearbox still remains a challenging task in this R&D field, due to reasons such as signal complexity, feature modulation and coupling. This talk will address some recent research and development in gear and bearing fault detection. The covered research aspects include signal processing for fault detection in gear systems and rolling element bearings, feature extraction, and automatic fault diagnostics in gearboxes. This speech will also discuss the related challenges and possible solution strategies.

Speaker’s Bio:
Wilson Wang received his MSc in Industrial Engineering from the University of Toronto (Ontario, Canada), and PhD in Mechatronics Engineering from the University of Waterloo (Ontario, Canada) in 2002. From 2002 to 2004, he was a Senior Scientist/Project Manager at Mechworks Systems Inc. He joined Lakehead University (Thunder Bay, Canada) in 2004, where he is currently a Professor in the Department of Mechanical Engineering. His research interests include mechatronics, diagnostics, prognostics, signal processing, artificial intelligence, and machine learning. Dr. Wang is a Lakehead Research Chair in Intelligent Diagnostics and Prognostics of Engineering Systems. He is the founder/director of the Research Center for Intelligent Mechatronics Systems. He has supervised about 80 highly qualified personnel (PDF, PhD and MSc students), and published about 200 peer reviewed articles. He has also
successfully developed a series of smart systems for online condition monitoring of mechanical and electrical machines.

**Keynote 2: Prognostic and Health Management Technology for Electric System based on PoF and Data-Driven Method**

Dr. Yiqiang Chen, Deputy Chief Engineer of National Key Laboratory, China Electronic Product Reliability and Environmental Testing Research Institute, China

**Abstract:**
The reliability and safety of electrical products has always been a concern in many industries like aerospace, offshore, and transportation. At present, existing prognostics techniques or approaches can generally be divided into three categories: (1) physics-based; (2) data-driven; and (3) hybrid-based. Physics-based approaches incorporate prior knowledge of physical and/or analytical models/laws with measured data, to predict the degradation behavior of a system and its RUL. Data-driven approaches, rely on historically collected data and attempt to derive models directly from the data for the RUL prediction. The hybrid-based approaches attempt to make use of the strengths of both approaches, by combining the knowledge about the physical process as well as information from the observed data together to improve the prediction performance. The use of both physics-based and data-driven approaches might be one of the suitable solutions. The report will introduce the background of the PHM for the Electric System at first. And then share our works about the chip-level PHM for the SoC, the board-level PHM for the module, and the system-level PHM for the servomechanism and so on.

**Speaker's Bio:**
Yiqiang Chen, Ph. D., research fellow, deputy chief engineer, team leader, Principal investigator, has long been engaged in basic theory, method and application
research of microwave, power, information processing and reliability of electronic products, progress has been made in failure mechanism and model of device, PHM of power conversion system and system on chip (SoC). About six SoC failure monitoring and warning chips have been successfully developed and verified, and a series of instruments such as the semiconductor device quantitative evaluation system and power cycle test system have been developed, and it provides a technical support for the reliability and security of electronic products. He has won the China Electronic Information Science and Technology Innovation Team Award, the Science and Technology Innovation Team Award of the Ministry of Industry and Information Technology, the working skills competition award of Guangdong Province, and the first, second and third prizes of provincial and ministerial level science and technology progress. He was selected as one of the outstanding young talents in science and technology innovation of Guangdong Province, the outstanding natural science foundation of Guangdong Province, the special support project, and the Pearl River Science and Technology Star. He is the experts on national Science and Technology Achievements Evaluation Center, Ministry of Science and Technology of the People’s Republic of China, National Natural Science Foundation of China, a department of the central government, Guangdong Province and Guangzhou City Science and technology project evaluation. He is responsible for more than 20 projects, such as national key R & D Program, National Natural Science Fund, Major International Cooperation Projects, high quality projects of MIIT, pre-research on installation and development. As the first author or corresponding author, has published more than 70 SCI papers in IEEE EDL, IEEE TED, APL and other journals, and applied for 69 international and domestic invention patents, of which 7 U.S. invention patents and 35 Chinese invention patents have been granted, publishing reliability editing 3 books, 5 standards, 2 sets of software, the joint cultivation of doctoral, master more than 20 students.

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