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**Proposal for Special Session @ WCCI2020**

**1. Title for the Special Session**

AI in Reliability Engineering and Applications (**AIREA**)

**2. Aims**

Artificial intelligence (AI) makes a continuing major contribution to today’s global economy and future’s, it needs to address the challenge of producing more, while consuming less material, using less energy and creating less waste, which requires further investigation on its networking, increased flexibility, adapted structures, stronger links among research, innovation and industrial application. AI approaches are nature-inspired methods, which offer a wealth of ideas for complex problems solving. In the era of AI, AI is a way to program computers to learn from experience and improve their performance in a way that resembles how humans and animals learn tasks. As machine learning techniques become more common in everything from industrial applications, health care, finance to management.

Reliability is the important characteristics of products to ensure their operational safety. With the decreasing complexity of the structure and working conditions, reliability analysis and optimization have been challenging tasks. AI is now a reasonable selection for the complicated reliability analysis and optimization problems.

**3. Scope:**

The special issue includes theoretical, numerical, and experimental contributions that describe original research results, innovative concepts that address all aspects of Reliability Engineering and Applications.

**Potential topics include, but are not limited to:**

* methods for reliability and probabilistic safety assessment;
* model and parameter uncertainties;
* aleatory and epistemic uncertainties, sensitivity analysis, data collection and analysis;
* engineering judgement and expert opinions;
* human reliability; test and maintenance policies;
* models for ageing and life extension;
* systems analysis of the impact of earthquakes, fires, tornadoes, winds, floods, etc.;
* codes, standards and safety criteria;
* operator decision support systems;
* software reliability;
* methods and applications of automatic fault detection and diagnosis;
* dynamic reliability;
* design and evaluation of man machine systems and human interfaces;
* design innovation for safety and reliability;
* safety culture;
* accident investigation and management.

**4. Organiser**

5 organisers

**Professor Zhonglai Wang**

**Dr Xianlin Ren,**

**Professor Genbao Zhang**

**Dr Leo Chen**

**Professor Shaomin Wu**

1. **Professor Zhonglai Wang**

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Zhonglai Wang is Professor of Mechatronics Engineering at University of Electronic Science and Technology of China. He has served as PI or Co-PI for over ten research projects including National Science Foundation of China (NSFC). He has published over 50 journal and conference papers, and has 7 authorized patents. He is a recipient of the ministry of education of Natural Science Award and National Defense Science and Technology Progress Award. He has been selected as “the Most Cited Chinese Researchers” in safety, risk, reliability and quality field for five times from the year 2014 to 2018 by Elsevier. His research interests mainly include system reliability modelling, reliability-based design optimization, robust design and model validation.

1. **Dr Xianlin Ren**

School of Mechatronics Engineering, University of Electronic Science and Technology of China, Chengdu, 611731, China. [renxianlin0@163.com](mailto:renxianlin0@163.com)

Xianlin Ren (M’11) received the B.Sc., M.Sc. and Ph.D. degrees in mechanical engineering from the Chongqing University, in 1999, 2004 and 2010. He is currently an Assistant Professor of Mechanical and Electrical Engineering at University of Electronic Science and Technology of China, a director of Industrial Internet and Intelligent Manufacturing Institute, a member of a member of the China Quality Association, a member of Sichuan Science and Technology Association and a member of the National Association of Basic Research on Interchangeability and Measurement Technology. He has served as PI or Co-PI for over twenty research projects, including the National Natural Science Foundation Youth Foundation, the Natural Science Foundation General Projects and the Natural Science Foundation Key Projects, and the National 863 Projects, the National Major Projects and the Transverse Projects of Enterprises. He has published over 60 journal and conference papers, and has 6 authorized patents. His research interests mainly include Intelligent manufacturing systems, quality engineering, reliability modeling, reliability-based design optimization, and model validation.

1. **Professor Genbao Zhang**

College of Mechanical Engineering, Chongqing University, Chongqing 400044, China, [gen.bao.zhang@263.net](mailto:gen.bao.zhang@263.net)

Genbao Zhang, MSc (Chongqing University, China), PhD (Swiss Federal Institute of Technology in Lausanne, Switzerland), Professor in Mechanical Engineering at Chongqing University. Editorial board of International Journal of Production Research (2002-2006). Explores the aspects: advanced quality engineering, computer integrated manufacturing system, design and manufacturing of machine tools, intelligence manufacturing technology and system, reliability of automotive, reliability of machine tools.

1. **Dr Leo Chen**

School of Engineering, Newcastle University, Newcastle upon Tyne, NE1 7RU, United Kingdom. <leo.chen@ieee.org>

Leo Chen (M'10-SM'17) received the B.Sc degree in Automotive Engineering from Chongqing University of Technology, in 2000, the M.Sc. degree in Automotive Engineering from Chongqing University, in 2004, and the Ph.D. degrees in Mechanical Engineering from University of Glasgow, in 2010. He has been taking a leading role in the previous and current department to maintain cross-disciplinary research links, and develop external research collaborations both nationally and internationally. Also, he has been leading a few research grants in the areas of artificial intelligence, high-performance computing, robotics and autonomous systems, and also studies in multi-disciplinary contexts. He has a high-level output of research publications in leading international journals and presentations at international conferences, which related to the research area of robotics, digital manufacturing, and industry 4.0, which demonstrates significant research and grant potential in engineering and cross-disciplinary applications. He is a member of IET, AAAI, AIAA, and ASME, a fellow of HEA, and a fellow of IMechE. He is also a Chartered Engineer. Dr Chen has published over 100 academic papers in both high impact international academic journal and international conferences and has been selected as a Publons' top 1% of reviewers in Computer Science and Engineering. He has been actively involved in both academic research and KTP projects as PI and CoI funded by EPSRC (UK), Horizon2020 (EU), NSFC (China), National Key Research and Development Program of China and Industrial funding bodies. One of the co-organisers of the WCCI'16 Special Session on Computational Intelligence for Industry 4.0 and CEC'19 Special Session on Evolutionary Computation for Creativity, Manufacture and Engineering Management in the Industry 4.0 Era. Besides, he is an editorial board member, and he has been a guest editor for five special issues.

1. **Professor Shaomin Wu**

Kent Business School, University of Kent, Canterbury, CT2 7FS. <s.m.wu@kent.ac.uk>

Shaomin Wu is currently Programme Director for the MSc Business Analytics and coordinates the Student Implant Scheme. He received his PhD and MSc in Applied Statistics. Professor Wu serves on the editorial board of several journals, including IISE Transactions, Reliability Engineering and System Safety, and IMA Journal of Management Mathematics. He has co-chaired 3 international conferences, has been invited to act as scientific committee members by more than 18 international conferences has edited 3 special issues, has been invited to review research proposals for four countries, and has published over 60 papers in academic journals. Professor Wu has also won research funding from the EPSRC as the PI and a Co-I, respectively. He is currently undertaking a research project funded by the ESRC as a co-investigator.

**5. A proposed timeline and schedule which includes:**

15 Jan 2020 Paper Submission Deadline

15 Mar 2020 Paper Acceptance Notification Date

15 April 2020 Final Paper Submission and Early Registration Deadline

19-24 July 2020 IEEE WCCI 2020, Glasgow, Scotland, UK