CONFERENCE PROGRAM

SRSE 2022

The 4th International Conference on System Reliability and Safety Engineering

December 15-18, 2022 | Virtual Conference

Co-sponsored by 中山大学 SUN YAT-SEN UNIVERSITY | IEEE Reliability Society | IEEE

Supported by NUS National University of Singapore

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Welcome Address

Prof. Loon Ching TANG
National University of Singapore

Welcome to 2022 The 4th International Conference on System Reliability and Safety Engineering (SRSE 2022), which is to be held during December 15-18, 2022. The conference is co-sponsored by Sun Yat-Sen University, IEEE, IEEE Reliability Society, supported by National University of Singapore, patrons with Beijing Institute of Technology, Guangdong University of Technology, Harbin Institute of Technology, Nanjing University of Science and Technology, Qingdao University, Shanghai University, Shanghai Jiao Tong University, Northwestern Polytechnical University, Zhejiang Gongshang University, City University of Hong Kong, University of Alberta, The Fifth Electronics Research Institute of Ministry of Industry and Information Technology, organized by School of Intelligent Systems Engineering, Sun Yat-sen University, China.

After several rounds of rigorous review, the program committee not only indicated acceptance but also provided ratings on those papers accepted for publication in the SRSE conference proceedings. We wish to express our sincere appreciation to all individuals who have contributed to SRSE 2022 conferences in various ways. Special thanks are extended to our colleagues in the program committee for their thorough review of all the submissions, which is vital to the success of the conference, and also to the members in the organizing committee and other volunteers who had dedicated their time and efforts in planning, promoting and organizing the conference.

There are 14 sessions in this conference. One best presentation will be selected from each session, which will be evaluated based on originality, applicability, technical merit, quality of PPT and communication skill. The best one will be announced at the end of each Session, and the presenter will receive an e-mail confirmation after the conference. An overall Best Paper Award and a Best Student paper will also be selected and announced after the conference.

I would like to take this opportunity to thank all the experts and scholars for their long-term care and support for the development of our school and college! Thank you for your support to SRSE 2022! Finally, I wish SRSE 2022 a great success. I sincerely wish all experts and scholars good health, peace and happiness! Hope all of you can keep safe and sound and take care of yourself, we wish to see every one of you face to face in the next year.

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Giovanna Mura, University of Cagliari

Special Sessions
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Co-chair: Jingyuan Shen, Nanjing University of Science and Technology

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Chair: Rui Peng, Beijing University of Technology

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Chair: Qiuzhuang Sun, National University of Singapore

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Chair: Yuchen Song, Harbin Institute Of Technology
Chair: Lu Jin, University of Electro-Communications
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Session X: Modeling, Assessing and Optimizing Critical Systems for Reliability and Safety

Enhancement

Chair: Jiaxiang Cai, National University of Singapore

Session XI: High-reliability Distributed Control, Estimation and Optimization of Networked Systems

Chair: Tao Xu, Beijing Institute of Technology & Yangtze Delta Region Academy of Beijing Institute of Technology

Co-chair: Xiaojian Yi, Beijing Institute of Technology & Yangtze Delta Region Academy of Beijing Institute of Technology

Session XII: Novel Operation and Maintenance Solutions for Complicated Systems

Chair: He Li, University of Lisbon

Chair: Henry Kang, Universiti Teknologi Malaysia

Chair: Mengzhen Li, Wuhan University of Technology

Chair: Ke Feng, University of British Columbia

Guideline for Online Conference

Time Zone

The conference is arranged based on Beijing Time (UTC/GMT +8).
Please carefully check your presentation time, and join the conference 10 minutes in advance.

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Stable WIFI or Wired network.
Equipment be with enough battery or connected with chargers.
If your network is not good, please send us presentation videos about 10 Minutes as a back-up.

Presentation

English only during the conference.
Stay online during Keynote & Invited speeches and your own sessions.
Certificates & receipts will be emailed to you after the conference.

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Download the APP ZOOM on zoom.us or www.zoom.com.cn (China only). Turn on your Audio and start your Video.
Use headsets/earphones to enhance the audio effect and avoid the speaker echo or howling.
Stay in a quiet place without noise.
Authors please rename like Session Number+Paper ID+Name as you join the room. E.g.: S1+A1001+Lairyn.
For KN or SC, please rename like KN/SC+ Name Join TEST DAY on Dec. 15.

ROOM A   Meeting ID: 82601011493   https://us02web.zoom.us/j/82601011493
ROOM B   Meeting ID: 83316564428   https://us02web.zoom.us/j/83316564428
ROOM C   Meeting ID: 83845807802   https://us06web.zoom.us/j/83845807802

Agenda Overview

Date	Time	Online Test	Zoom ID:
December 15 Thursday	10:30-11:30	Test for Keynote and Invite Speakers	82601011493
		Test for Special Session 2-4	83316564428
	11:30-14:00	Break	
	14:00-15:00	Test for Special Session 5-7	82601011493
		Test for Special Session 8-10	83316564428
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	15:30-16:30	Test for Special Session 11-12	82601011493
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Date	Time	Keynote, Invite Speeches and Oral Sessions	Zoom ID:
December 16 Friday	9:00-9: 15	Opening Ceremony	82601011493
	9:15-9:55	Keynote Speech I *Prof. Yunfei En*	
	9:55-10:35	Keynote Speech II *Prof. Xiao Liu*	
	10: 35-11:00	Group Photo & Break	
	11:00-11:40	Keynote Speech III *Prof. Yu Liu*	
	11:40-12:10	Invited Speech I *Prof. Xuerong Ye*	
	12:10-14:00	Lunch	
	14:00-14:40	Keynote Speech IV *Prof. Carlos Guedes Soares*	
	14:40-15:10	Invite Speech I *Prof. Jingyuan Shen*	
	15:10-15:30	Break	
	15:30-18:15	Special Session 4 A High Safety, High Reliability and High Intelligence in Nuclear Energy	
	15:30-17:30	Special Session 4 B High Safety, High Reliability and High Intelligence in Nuclear Energy	Offline

Date	Time	Keynote, Invite Speeches and Oral Sessions	Zoom ID:
December 17 Saturday	10:00-10:40	Keynote Speech I *Prof. Yanfu Li*	82601011493
	10:40-11:10	Invited Speech I *Prof. Zhigang Tian*	
	11:10-11: 30	Break	
	11:30-12:00	Invited Speech II *Prof. Zhiqiang Cai*	
	12:00-13:30	Lunch	
	13:30-15:45	Special Session 2 Reliability Modeling and Optimization of Key Complex Systems	**82601011493**
		Special Session 3 Machine Learning and Data Analytics in Reliability Modeling, Warranty Optimization, and Degradation Data Analysis	**83316564428**
		Special Session 5 Resilience and Maintenance Modeling of Complex Systems	83845807802
	15:45-16:15	Break	
	16:15-18:30	Special Session 6 Reliability Estimation from Degradation Data Analysis	**82601011493**
		Special Session 7 Reliability Centered Studies on Optimization, Statistics and Application	**83316564428**
		Special Session 8 Data-driven Approaches in Reliability and Operations Management	83845807802

| Date	Time	Oral Sessions	Zoom ID:
December 18 Sunday	10:00-12:00	**Special Session 9** Reliability and Resilience of Complex Systems	**82601011493**
		Special Session 10 Modeling, Assessing and Optimizing Critical Systems for Reliability and Safety Enhancement	**83316564428**
		Special Session 11 High-reliability Distributed Control, Estimation and Optimization of Networked Systems	83845807802
	12:00-14:00	Lunch	
	14:00-16:15	**Special Session 12** Novel Operation and Maintenance Solutions for Complicated Systems	**82601011493**
		Session 1 System Fault Analysis and Condition Monitoring	**83316564428**
		Session 2 System Model Design and Stability Evaluation	83845807802
	16:40-16:50	Closing Ceremony	82601011493

Keynote Speech I

Prof. Yunfei En

The Fifth Electronics Research Institute of the Ministry of Industry and

Information Technology (CEPREI)

Biography: Yunfei En is a researcher professor and the chief executive engineer of the Fifth Electronics Research Institute of the Ministry of Industry and Information Technology. She received her Ph.D in semiconductor devices and microelectronics from Xidian University. She is a fellow of the Chinese Institute of Electronics and a senior member of IEEE. She is the Principal Investigator (PI) of more than 20 government projects including the project in National Key R&D Program of China. Her research areas include reliability evaluation of electronic components, failure analysis, reliability design verification, prognostics and health management of electronic systems, with a particular focus on integrated circuit reliability and electromagnetic compatibility. She is author or coauthor of more than 30 publications in international journals, such as IEEE Transactions on Electron Devices, Applied Physics Letters and so on. And she has won a number of national and provincial science and technology awards..

Title: *Reliability and failure mechanism of SiC power MOSFETs*

Abstract: Silicon carbide (SiC) power metal-oxide semiconductor field-effect transistors (MOSFETs) are the centre of attention for wide bandgap (WBG) device development in recent years because they can enable power systems of high frequency, high efficiency, and high density due to the superior properties of SiC material. Therefore, SiC MOSFETs are attractive alternatives to Si devices for a wide spectrum of power electronics systems, including photovoltaic systems, electric vehicles, charging piles, UPS power supply and so on. Although SiC MOSFETs have superior performances to Si devices, obvious differences between the properties of SiC and Si materials and devices provide challenges to the ruggedness and reliability of SiC MOSFETs. There are a number of potential reliability issues associated with SiC power MOSFETs, including threshold voltage stability, gate-oxide reliability, body-diode robustness, short-circuit current robustness, and radiation effects. Extensive characterization studies of SiC MOSFETs' endurance capability under harsh conditions including unclamped inductive-switching (UIS), short-circuit (SC), transmission line pulse (TLP), power cycling (PC) high-temperature gate bias stress (HTRB) and radiation effects have been reported by our team. The reliability issues and the degradation mechanism of SiC MOSFETs under different conditions have been discussed here.

Keynote Speech II
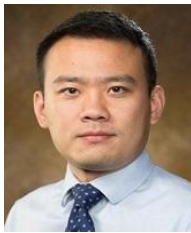
Prof. Xiao Liu

University of Arkansas

Biography: Xiao Liu is an Assistant Professor at the Department of Industrial Engineering, University of Arkansas. Before that, he was a Research Staff Member (RSM) at IBM Thomas J. Watson Research Center, New York (2015~2017), and IBM Smarter Cities Research Collaboratory Singapore (2012~2015). From 2013 to 2016, he served as an Adjunct Assistant Professor at the Department of Industrial and Systems Engineering, National University of Singapore. Dr. Liu's research focuses on Physics-Informed and Domain-Aware Data-Driven Methodologies for various engineering applications, and has published on premium journals in the fields of Industrial Engineering and Applied Statistics, such as Journal of the American Statistical Association (JASA), Technometrics, IISE Transactions, Annals of Applied Statistics (AOAS), Journal of Quality Technology (JQT), RESS, etc. Dr. Liu's research is currently supported by the U.S. National Science Foundation (including NSF CAREER) and industry.

Title: Regression Trees on Grassmann Manifold for Adapting Reduced-Order Models

Abstract: Low-dimensional and computationally less-expensive reduced-order models (ROMs) have been widely used to capture the dominant behaviors of high-4dimensional systems. An ROM can be obtained, using the well-known proper orthogonal decomposition (POD), by projecting the full-order model to a subspace spanned by modal basis modes that are learned from experimental, simulated, or observational data, i.e., training data. However, the optimal basis can change with the parameter settings. When an ROM, constructed using the POD basis obtained from training data, is applied to new parameter settings, the model often lacks robustness against the change of parameters in design, control, and other real-time operation problems. This work proposes to use regression trees on Grassmann manifold to learn the mapping between parameters and POD bases that span the low-dimensional subspaces onto which full-order models are projected. Motivated by the observation that a subspace spanned by a POD basis can be viewed as a point in the Grassmann manifold, we propose to grow a tree by repeatedly splitting the tree node to maximize the Riemannian distance between the two subspaces spanned by the predicted POD bases on the left and right daughter nodes. Numerical examples are presented to comprehensively demonstrate the performance of the proposed method, and compare the proposed tree-based method to the existing interpolation method for POD basis and the use of global POD basis. The results show that the proposed tree-based method is capable of establishing the mapping between parameters and POD bases, and thus adapt ROMs for new parameters.

Keynote Speech III

Prof. Yu Liu

University of Electronic Science and Technology of China

Biography: Yu Liu is the Dean and Full Professor of the School of Mechanical and Electrical Engineering at the University of Electronic Science and Technology of China. He received his PhD degree in Mechatronics Engineering from the University of Electronic Science and Technology of China. He was a Visiting Pre-doctoral Fellow in the Department of Mechanical Engineering at Northwestern University, Evanston, U.S.A. from 2008 to 2010, and a Postdoctoral Research Fellow in the Department of Mechanical Engineering, at the University of Alberta, Edmonton, Canada from 2012 to 2013. He has published over 70 peer-reviewed papers in international journals, such as IEEE Transactions on Reliability, IISE Transactions, European Journal of Operational Research, Reliability Engineering and System Safety. He has been recognized as one of the Most Cited Chinese Researchers by Elsevier since 2016 and the World's Top 2% Scientists since 2020. He was a recipient of the National Science Fund for Excellent Young Scholars. He serves as an Associate Editor of IISE Transactions and IEEE Transactions on Reliability, the Vice President of the Reliability Committee of Operations Research Society of China. He is an ISEAM Fellow and a senior member of IEEE Reliability Society..

Title: Selective Maintenance Strategy under Uncertainty

Abstract: Due to limited maintenance resources, such as budget, time, manpower, etc., selective maintenance has widespread applications in both industry and military environments. By selective maintenance strategy, a subset of feasible maintenance actions for a repairable system can be chosen to be performed so as to ensure the success of the subsequent mission. However, in reality, various uncertainties are inevitable in selective maintenance optimziation. In addition to a comprehensive review on the existing selective maintenance models under uncertainties, this talk will introduce new selective maintenance models by taking account of the uncertainty of the durations of breaks and maintenance actions and the uncertainty caused by imperfect observations. Illustrative examples are presented to demonstrate the effectiveness of the proposed models.

Keynote Speech V

Prof. Carlos Guedes Soares

Universidade de Lisboa

Biography: Carlos Guedes Soares is a Distinguished Professor of the Engineering Faculty (Instituto Superior Técnico) of the University of Lisbon and Scientific Coordinator of the Centre for Marine Technology and Ocean Engineering (CENTEC), which is a research centre of the University of Lisbon that is rated as "Excellent" and funded by the Portuguese Foundation for Science and Technology. He concluded his postgraduate studies at the Massachusetts Institute of Technology, USA in 1976, and at the Norwegian Institute of Technology of the University of Trondheim, in 1984 and has since then been at the University of Lisbon (Technical University of Lisbon until 2013). He has supervised more than 75 PhD students and has co-authored more than 900 journal papers and several more in Conferences. He has been Chair or Co-Chair of various conferences in the series of OMAE, ESREL, IMAM, ISSC, ICCGS, MARSTRUCT, MARTECH and RENEW Conferences. He is a Fellow of SNAME, RINA, IMarEST, ASME, Ordem dos Engenheiros, Member of ASCE, AGU and SRA and a Member of the Portuguese Academy of Engineering. He has been Editor of the Reliability Engineering and Systems Reliability Journal for about 30 years, the last 10 of which as Editor-in-Chief.

Title:

Abstract:

Keynote Speech V

Prof. Yanfu Li

Tsinghua University

Biography: Yan-Fu Li is currently the Deputy-Director of the Institute for Quality & Reliability and a full professor at the Department of Industrial Engineering (IE), Tsinghua University. He received his Ph.D in Industrial Engineering from National University of Singapore in 2010. He was a faculty member at Laboratory of Industrial Engineering at CentraleSupélec, France, from 2011 to 2016. His research areas include RAMS (reliability, availability, maintainability, safety) assessment and optimization with the applications onto energy systems, transportation systems, computing systems, etc.

Dr. Li has published more than 100 research papers, including more than 50 peer-reviewed international journal papers with H-index 26. He is currently an Associate Editor of IEEE Transactions on Reliability, a member of IEEE Reliability Society AdCom, a senior member of IEEE and IISE and a member of INFORMS. He is a vice president of the System Reliability Chapter of System Engineering Society of China. He is an expert examiner of funding agencies include NSFC, Dutch Research Council (NWO).

He is the Principal Investigator (PI) of several government projects including the key project funded by National Natural Science Foundation of China, the project in National Key R&D Program of China, and participated in several projects supported by EU or French funding bodies. He is also experienced in industrial research, the partners include Huawei, China Railway, Volkswagen, Mitsubishi Heavy Industries, EDF, ALSTOM, etc. The total amount of funding exceeds 10 million CNY.

Title:

Abstract:

Invite Speech I

Prof. Xuerong Ye

Harbin Institute of Technology

Biography: Professor Xuerong Ye is the Vice Dean of School of Electrical Engineering and Automation, Harbin Institute of Technology. He is also the Vice Director of the Key Laboratory of Electric Apparatus and Electronics Reliability Technology of Heilongjiang Province. Now, he is a Fellow of IET, the associate editor of IEEE Access and Journal of Power Electronics. He received his Ph.D. degree in electrical engineering in 2009 from Harbin Institute of Technology. His main research interests include failure analysis, reliability assessment and robust design of electric apparatus and electronics. He has won the first and second award of the ministerial Science and Technology Progress in 2021 and 2018, respectively. He has also been awarded national youth talent. He has chaired 20 research projects, published more than 100 papers, and owned more than 40 authorized patents.

Title: A New Class of Multi-stress Acceleration Models with Interaction Effects and Its Extension to Accelerated Degradation Modelling

Abstract: Most products operate under multiple stresses. The influences of multi-stress factors on products are commonly not independent and promote a more violent degradation through interactions, referred to as stress interaction effects. This presentation brings a new class of multi-stress acceleration models with interaction effects to extrapolate more accurate reliability metrics under multi-stress operating conditions. Furthermore, this multi-stress acceleration model is extended to an accelerated degradation model by integrating a generalized Wiener process with nonlinear time scale functions and random effects. The acceleration factor constant principle is utilized to identify the stress-dependent parameters, facilitating a more appropriate model development. A real-world case is performed to validate the effectiveness and practical values of the proposed model in reliability assessment under multi-stress operating conditions.

Invite Speech II

Prof. Jingyuan Shen

Nanjing University of Science and Technology

Biography: Jingyuan Shen is an associate professor in the School of Economics & Management at Nanjing University of Science & Technology. She received her B.S. degree in Information and Computing Science from Minzu University of China in 2012 and Ph.D. degree in the School of Management & Economics from Beijing Institute of Technology of China in 2018. She was a research fellow with the Department of Industrial Systems Engineering and Management, National University of Singapore from 2018 to 2019. Her research interests include system reliability, maintenance optimization, stochastic modeling and applications of probability. Her work has appeared in journals including IISE Transactions, IEEE Transactions on Reliability, Reliability Engineering & System Safety.

Title: Reliability models and Maintenance Planning for Systems with Dependent Auxiliary Components

Abstract: In many engineering systems, aside from the main components fulfilling the essential functions, some components are configured to protect the main components and improve the reliability of the system. Failures of these protective components (named as auxiliary components) do not halt the system directly like the main components, but may influence the failure process of the main components or even the auxiliary subsystem itself. Such dependence is commonly observed but has seen limited research. In this talk, recent studies on the systems with dependent auxiliary components are introduced. Firstly, mechanism of the system dynamic features and dependence abstracted from the actual background and the existing literature is discussed. Based on the discussions, two reliability models are developed: In model I the auxiliary components are regarded as a whole and only the dependence between the main and auxiliary subsystems are taken into consideration, while in Model II the structure of the auxiliary components and their dependence are further considered. Mathematical methods are proposed to evaluate the system reliability of such systems. Moreover, considering most of the auxiliary component failures are hidden, different inspection and maintenance policies are designed for such systems, based on which some optimization problems are formulated and solved. Finally, some numerical examples, together with sensitivity studies of some model parameters, are presented to show the efficiency of the models and how the evolution of the parameters influences the optimal strategies.

Invite Speech III

Prof. Zhigang Tian

University of Alberta

Biography: Dr. Tian's research is focused on Prognostics, Pipeline integrity management, Reliability, Condition based maintenance, Renewable energy systems, Condition monitoring, Signal processing, and Finite element modeling. His research papers have appeared in IEEE Transactions on Reliability, Mechanical Systems and Signal Processing, Renewable Energy, and IIE Transactions, among others. He received the Best Paper Award of "Quality Control and Reliability" in the 2005 IIE Industrial Engineering Research Conference. He is also the recipient of the 2011 Petro-Canada Young Innovator Award (Technology, Industry, and the Environment).

Title: Condition Based Maintenance Optimization for Wind Power Systems

Abstract: By utilizing condition monitoring and prediction information for wind turbines, condition based maintenance (CBM) strategy can be used to reduce the operation and maintenance costs and enhance system reliability. There are economic dependencies among wind turbines and their subassemblies. That is, once a maintenance team is sent to the wind farm, it may be more economical to take the opportunity to maintain multiple turbines, and when a turbine is stopped for maintenance, it may be more cost-effective to simultaneously maintain multiple subassemblies which show relatively high risks. A CBM approach is presented to consider the economic dependency. Furthermore, a CBM approach is developed considering component level repairs and economic dependency. There are multiple components in a subassembly, e.g. the generator consists of components like generator rotor, generator bearings, contactor, etc. Component level major and minor repairs and their costs can be modeled explicitly in a more realistic and accurate way. Examples are used to demonstrate the proposed approach.

Invite Speech IV

Prof. Zhiqiang Cai

Northwestern Polytechnical University

Biography: Mr. Zhiqiang Cai received B.S. degree (2003), M.S. degree (2006), and Ph.D. degree (2010) from Northwestern Polytechnical University (NPU) in China, with 1-year joint doctoral study in Ecole Centrale Paris, France (2007-2008) under China Scholarship Council. Currently, he is the Professor and Chair of Department of Industrial Engineering (NPU), the secretary-general of Industrial Engineering and Management Branch (Shaanxi Provincial Institute of Mechanical Engineering).

Dr. Cai's research focuses on reliability modelling, importance measures and reliability

optimization for complex systems. He have launched a research group as principal investigator under the support of National Natural Science Foundation of China, Foreign Experts Project of Ministry of Science and Technology, Aeronautical Science Foundation of China, Key R&D Program of Shaanxi Province and Basic Research Project of Natural Science of Shaanxi Province. In recent 5 years, he has published more than 40 papers in top international journals, including ITR, RESS, TII, AMM and AMC. He has also been granted 8 Chinese invention patents and awarded the Best Paper of 2022 IEEE PHM, the Outstanding Paper of 2019 IEEE IEEM, and the Best Paper of 2019 QR2MSE.

Title: Recent Works in System Reliability Optimization Driven by Importance Measures

Abstract: Reliability optimization has been widely discussed for complex systems to maximize system reliability with resource constraints. However, it is usually a NP-hard combinatorial optimization problem which is difficult to find the optimal assignment within reasonable time. Importance measure (IM) is a well-known method for evaluating the effect of component reliability on system reliability. Many IMs are proposed for binary, multistate, and continuous systems by considering different points of interest. Recently, these IMs have been applied in allocating limited resources to the component to optimize system performance. The optimization rules for simple systems are summarized which enhance system reliability by using IMs ranking directly. The optimization algorithms for complex or large-scale systems are also developed to obtain remarkable solutions by introducing IMs-based local search. Finally, a general framework for reliability optimization driven by IM is established and some practical applications are demonstrated. Furthermore, some challenges in system reliability optimization that need to be solved in the future are presented.

Special Session 4 A

		High Safety, High Reliability and High Intelligence in Nuclear Energy
		15:30-18:15, Dec. 16 | ZOOM ID: 82601011493
		Chair: Ming Yang, Shenzhen University
		Jipu Wang, Shenzhen University
15:30-15:45	**S4001**	*A Multilevel Flow Models based Diagnosis Method for Multiple Faults in Nuclear Power Plant* **Presenter:** Yang Ming Shenzhen University
15:45-16:00	**S4010**	Review and Application of Cognitive Workload and Situational Awareness in Human Safety Demonstration of NPP **Presenter:** Zhi-hui Xu Harbin Engineering University
16:00-16:15	**S4011**	Research and Practice of Medium Voltage Cabinets in Nuclear Power Plants Based on Prognostics and Health Management Technology **Presenter:** Zhijian Wang China Nuclear Power Engineering Co., Ltd.
16:15-16:30	**S4017**	Integrated Management Platform for Spent Nuclear Fuel Storage and Transportation **Presenter:** Zuokai Chen Shenzhen University
16:30-16:45	**SR029**	A Novel Framework for Comprehensive PPS Effectiveness Evaluation in 3D Modeled Environment **Presenter:** Haoming Ma South China Unitversity of Technology
16:45-17:00	**SR016**	A Simulation-based Learning Method for Automatic Dynamic Event Tree Model Generation and Analysis **Presenter:** Chenyu Jiang South China University of Technology
17:00-17:15	**SR033**	Research on Intelligent Identification Method of Primary Loop Transient in Nuclear Power Plant **Presenter:** Runze Zhang Suzhou Nuclear Power Research Institute Co, Ltd.
17:15-17:30	**SR039**	Research and Application of Intelligent Alarm Management Method for Petrochemical Plants in the Context of Industrial Internet **Presenter:** Xiaomiao Song China University of Petroleum (East China)
17:30-17:45	**SR053**	Application of PSA Technology in Technical Requirements Optimization of Nuclear Power Plant **Presenter:** Xipeng Yu Suzhou Nuclear Power Research Institute
17:45-18:00	**SR054**	Concepts and Framework of Automatic Identification Technology for Secondary Device in Substations **Presenter:** Biao Tang Electric Power Research Institute Yunnan Power Grid Co., Ltd

Special Session 4 A

18:00-18:15	SR077	Summary of Collecting and Processing Methods for Common Cause Failure Data of PSA Components in Nuclear Power Plant **Presenter:** Hongwei Dai Suzhou Nuclear Power Research Institute

Special Session 4 B

High Safety, High Reliability and High Intelligence in Nuclear Energy 15:30-17:15, Dec. 16 | ZOOM ID: 83316564428 Chair: Wei Li, Nuclear Power Institute of China Jun Yang, South China University of Technology		
15:30-15:45	**S4002**	Human Performance Detection Using Operator Action Log of Nuclear Power Plant **Presenter:** Xinyu Dai Harbin Engineering University
15:45-16:00	**S4003**	Design of an Online Operational Task Reliability Analysis System in Nuclear Power Plant **Presenter:** Wei Li Nuclear Power Institute of China (NPIC)
16:00-16:15	**S4004**	Research on the Prediction of LOCA Accident Condition in Nuclear Power Plants Based on GRU Cyclist Neural Network **Presenter:** Dong Xiaomeng Shenzhen University
16:15-16:30	**S4005**	Research of Risk-informed Human Factors Engineering Implementation Methodology **Presenter:** Deng Shiguang China Nuclear Power Engineering Corporation
16:30-16:45	**S4007**	Fault Diagnosis Analysis of Complex Controlled Process Based on Multilayer Flow Model **Presenter:** Xu Zhihui Harbin Engineering University
16:45-17:00	**S4013**	Risk-informed Safety Margin Evaluation Approach of Nuclear Power Plant integrated with Adaptive Dynamic Event Tree Algorithm **Presenter:** Anqi Xu Shenzhen University
17:00-17:15	**S4015**	Research on Risk Situation Awareness and Prediction Method of Industrial Control Systems **Presenter:** Sijuan Chen Shenzhen University
17:15-17:30	**S4018**	A GO-FLOW Model Updating Method Adapting to the Scenario Change in Nuclear Power Plants **Presenter:** Xinyu Dai Harbin Engineering University Harbin

Special Session 2

		Education Technology and Learning Mode 13:30-15:45, Dec. 17 | ZOOM ID: 82601011493 Chair: Rui Peng, Beijing University of Technology
13:30-13:45	**S0001-A**	Preventive replacement policy of a two-component series system considering masked causes of failure **Presenter:** Yun Huang University of Electronic Science and Technology of China
13:45-14:00	**S2001-A**	An Excellence Level Evaluation Model of Intelligent Manufacturing Unit **Presenter:** An Wu Northwestern Polytechnical University
14:00-14:15	**S2002-A**	Optimizing Dynamic Performance of a Two-dimensional Sliding Window System with Phased Missions and Warm Standby Elements **Presenter:** Kunxiang Yi Hunan University of Technology and Business
14:15-14:30	**S2003-A**	Phase Combination for Reliability Analysis of Dynamic k-out-of-n Phase-AND Mission Systems Shenghui Luo Jinan University
14:30-14:45	**SR050**	A Reliability Evaluation and Inspection-Based Replacement Optimization Policy Considering Measurement Variability and State Variations **Presenter:** Fanping Wei Beihang University
14:45-15:00	**SR013**	Reliability Optimization of the Filling and Discharging System for Lead-based Fast Reactor **Presenter:** Ming Sun Hefei Institutes of Physical Science, Chinese Academy of Sciences
15:00-15:15	**SR062**	Reliability Assessment of Performance-based Balanced Systems With Common Bus Performance Sharing Subjected to Epistemic Uncertainty **Presenter:** Tianzi Tian Beihang University
15:15-15:30	**SR086**	The Study of Activation Energy of Electromigration at Different Temperature **Presenter:** Li Ning South China University of Technology
15:30-15:45	**SR084**	Research on the Classification Method of Reliability Critical Parts and Important Parts **Presenter:** Chenxi Li Beihang University

Special Session 3

Machine Learning and Data Analytics in Reliability Modeling, Warranty Optimization, and Degradation Data Analysis 13:30-15:45, Dec. 17 | ZOOM ID: 83316564428 Chair: Yudong Wang, National University of Singapore		
13:30-13:45	**S3002-A**	Robust Degradation State Identification in the Presence of Parameter Uncertainty and Outliers **Presenter:** Xingchen Liu City University of Hong Kong
13:45-14:00	**S3003**	Early Prediction Method for Remaining Useful Life of Retired Batteries in Second-life Applications **Presenter:** Yuyi Tan Sun Yat-sen University
14:00-14:15	**S3004-A**	Spare Parts Provision with Warranted Base Information: An Integrated Forecasting and Stocking Approach **Presenter:** Xiao-Lin Wang Sichuan University
14:15-14:30	**S3006-A**	A Performance-based Warranty Policy Design with Replacement-repair Strategy Based on Cumulative Repair-cost Threshold **Presenter:** Xin Wang Shanghai Jiao Tong University
14:30-14:45	**S3007**	Capacity and RUL Prediction of Retired Batteries using Machine Learning Features **Presenter:** Qingcheng Yang Sun Yat-sen University
14:45-15:00	**S3008-A**	Reliability Modelling of Power Electronic Component by Integrating Physical Mechanisms and Degradation Data Analysis **Presenter:** Yifan Hu Harbin Institute of Technology
15:00-15:15	**SR025**	Research on Accelerated Test Method Based on Reliability Simulation and Arrhenius Model **Presenter:** Bai-Mao Lei The Fifth Electronics Research Institute of Ministry of Industry and Information Technology (China CEPREI Laboratory)
15:15-15:30	**SR100**	Some Extended Geometric Processes and Their Estimation Methods **Presenter:** Jiaqi Yin University of Kent
15:30-15:45	**S3101**	Degradation Index-based Prediction for Remaining Useful Life Using Multivariate Sensor Data **Presenter:** Piao Chen Delft University of Technology

Special Session 5

		Resilience and Maintenance Modeling of Complex Systems 13:30-15:30, Dec. 17 | Zoom ID: 83845807802 Chair: Jian Zhou, Nanjing University of Science and Technology
13:30-13:45	**S5001-A**	An Implicit Method for Reliability Analysis of Systems Subject to Cascading Probabilistic Common Cause Failures **Presenter:** Yingxi Lie Jinan University
13:45-14:00	**S5002**	Condition-based Maintenance for Two-component Series Systems Considering Component Reallocation **Presenter:** Yating Yang Beijing Foreign Studies University
14:00-14:15	**S5003-A**	Reliability Evaluations for a Multi-state k-out-of-n: F System with M Subsystems Supported by Multiple Protective Devices **Presenter:** Ru Ning Beijing Technology and Business University
14:15-14:30	**S5004-A**	Data-driven Condition-based Maintenance for Deteriorating Systems Subject to Parameter Uncertainty **Presenter:** Yue Shi Wuhan University
14:30-14:45	**S5005**	Resilience Modeling of Interdependent Supply Chain Networks with Company Collaboration against Ripple Effects **Presenter:** Lei Zhang Nanjing University of Science and Technology
14:45-15:00	**S5006**	Random Forest Approach to Resilience-Oriented Infrastructure Post-Disruption Repair Optimization **Presenter:** Lijuan Shen Singapore-ETH Centre
15:00-15:15	**SR035**	A Prognostic Driven Predictive Maintenance Framework Based on Bayesian Deep Learning **Presenter:** Liangliang Zhuang Zhejiang Gongshang University
15:15-15:30	**SR044**	Research on the Construction Method of System Off-nominal States Model Based on Ontology Model **Presenter:** Zhang Jinhui China Aerospace Academy of Systems Science and Engineering

Special Session 6

		Reliability Estimation from Degradation Data Analysis 16:15-18:30, Dec. 17 | Zoom ID: 82601011493 Chair: Lijuan Shen, Future Resilient Systems in Singapore-ETH Centre
16:15-16:30	**S6001-A**	Planning Accelerated Degradation Tests with Two Stress Variables **Presenter:** Guanqi Fang Zhejiang Gongshang University
16:30-16:45	**S6002-A**	Stochastic Multi-phase Modeling and Health Assessment for Systems Based on Degradation Branching Processes **Presenter:** Han Wang Beihang University
16:45-17:00	**S6004**	Degradation Modeling Under Dual Time Scales Based on an Autoregressive Model **Presenter:** Qingqing Zhai Shanghai University
17:00-17:15	**S6005**	Protection Current Degradation Modeling and Life Evaluation Method of Sacrificial Anodes for Marine Structures **Presenter:** Haodi Ji Beihang University
17:15-17:30	**S6101**	A Study on Accelerated Life Evaluation of Prefabricated Target of Deuterium-Tritium Neutron Tubes **Presenter:** Bai-Mao Lei The Fifth Electronics Research Institute of Ministry of Industry and Information Technology (China CEPREI Laboratory)
17:30-17:45	**SR058**	Health Indictor Construction Method of Gun Anti-Recoil Device Based on Dynamic Degradation Distance **Presenter:** Jianfeng Wei Beijing Institute of Technology
17:45-18:00	**SR060**	A Novel Hybrid Neural Network with Attentive Feature Selection for Degradation Status Identification of Aircraft Self-locking Nuts **Presenter:** Yulin Ma Beihang University
18:00-18:15	**SR093-A**	Early Prediction for Knee Point and Knee Capacity of Fast-charging Lithium-ion Battery Degradation with Uncertainty Quantification and Calibration **Presenter:** Yuqi Ke Sun Yat-sen University

Special Session 7

		Reliability Centered Studies on Optimization, Statistics and Application 16:00-18:30, Dec. 17 | Zoom ID: 83316564428 Chair:		

16:15-16:30	**S7001-A**	Importance Analysis and Optimization of Repairable System for Mission Success **Presenter:** Haibao Li Northwestern Polytechnical University
16:30-16:45	**S7101**	A Movable Component Signal Identification Technology for Loose Particles Detection Based on Pulse Trajectory Tracking Algorithm **Presenter:** Pengfei Li Harbin Institute of Technology
16:45-17:00	**S7102**	On Modeling of Repairable Systems with Multi-Output Gaussian Convolution Process **Presenter:** Qiuzhuang Sun National University of Singapore
17:00-17:15	**SR018**	Optimal (τ, T) Opportunistic Maintenance Policy for Series Systems Considering Maintenance Time **Presenter:** Kentaro Fujioka University of Electro-Communications
17:15-17:30	**SR028**	Failure Analysis of Dielectric Material Related-Defects inside IGBT Chips **Presenter:** Zongbei Dai The Fifth Electronics Research Institute of the Ministry of Industry and Information Technology
17:30-17:45	**SR072**	Research on State Safety Programme Maturity Assessment Model of Civil Aviation **Presenter:** Lin Diao China Academy of Civil Aviation Science and Technology
17:45-18:00	**SR096**	Reliability Risks from Counterfeit Electronics **Presenter:** Giovanna Mura University of Cagliari
18:00-18:15	**SR1001**	Remaining Useful Life Prediction for Heterogeneous-wearing Cutting Tools Based on Gamma Process and Bayesian Inference **Presenter:** Ke Zou Nanjing University of Aeronautics And Astronautics
18:15-18:30	**SR1004**	Study on Construction Safety Risk Classification Method of Bridge Engineering **Presenter:** Xianke Ji Jiangsu Kexing Project Management Co., Ltd.

Special Session 8

Data-driven Approaches in Reliability and Operations Management		
16:00-18:30, Dec. 17 | Zoom ID: 83845807802 Chair: Yudong Wang, National University of Singapore Yifan Hu, Harbin Institute of Technology		
16:15-16:30	**S8003-A**	Location-allocation Problem of Emergency Service Systems in the Light Traffic Regime: Application to Lift-Trap Rescue System **Presenter:** Xin Wang National University of Singapore
16:30-16:45	**S8002-A**	Dimensioning Customer Contact Centers with Gig Agents: On-Demand Is in Demand **Presenter:** Weiliang Liu National University of Singapore
16:45-17:00	**SR019**	A Data Model for Quantitative Analysis of Fire Risk in Social Units **Presenter:** Jianqi Zhang Beijing Institute of Technology
17:00-17:15	**SR066**	Prediction of Cognitive Errors Based on EEG Data Mining **Presenter:** Changbo Yu Beihang University
17:15-17:30	**S8001-A**	Likelihood-based Inference Under Non-convex Boundary Constraints **Presenter:** Jinyang Wang National University of Singapore
17:30-17:45	**SR078**	A Theoretical Framework of COTS Components Space Application Based on "Risk Information Entropy" **Presenter:** Wen Zhang Technology and Engineering Center for Space Utilization, Chinese Academy of Sciences
17:45-18:00	**S8004**	Analysis of Failure Data with Missing Labels **Presenter:** Jiaxiang Cai National University of Singapore
18:00-18:15	**SR079**	Regrouping Method of Retired Lithium-ion Battery Based on Historical Data and Application Scenarios **Presenter:** Yuhang Du Harbin Institute of Technology
18:15-18:30	**SR091**	An Evaluation Model for Continuous Operating Time Based on Minimum Order Statistic **Presenter:** Renqing Li CEPREI Laboratory

Special Session 9

		Reliability and Resilience of Complex Systems 10:00-12:00, Dec. 18 | Zoom ID: 82601011493 Chair: Chunling Luo, Hangzhou Normal University
10:00-10:15	**S9101**	An Improved Approach Based on Linear Programming Model for Assessing Rail Transit System Resilience Under Disruptions **Presenter:** Gong Xuanjing HangZhou Normal University
10:15-10:30	**SR004**	Reliability Analysis and Health Management of the Radar Range based on Belief Reliability Theory **Presenter:** Jipeng Wu Nanjing Research Institute of Electronics Technology
10:30-10:45	**SR012**	Put theory into practice Knowledge Graph Based Aviation Quality Reliability Knowledge System **Presenter:** Youhui Yang AVIC China Aero-polytechnology Establishment
10:45-11:00	**SR023**	Abnormal Discharge Detection Method of Satellite Battery System Based on FPgrowth-RF **Presenter:** Xing Cui Beijing Sun Wise Space Technology Ltd
11:00-11:15	**SR041-A**	Fault Detection for Steam Turbines based on Non-stationary and Autocorrelated Time Series with Non-Gaussian Noise **Presenter:** Wei Yujie Shanghai Jiao Tong University
11:15-11:30	**SR043**	Loose Particle Localization Method for Sealed Electronic Equipment Based on Improved Random Forest **Presenter:** Zhigang Sun Harbin Institute of Technology
11:30-11:45	**SR082**	An XOR-based Pico-Physically Unclonable Function for Securing IoT Devices **Presenter:** Junjun Wang Xidian University
11:45-12:00	**SR1003**	Uncertainty Analysis Technology of Complex System Based on Evidence Theory **Presenter:** Lingjie Zhang CEPREI

Special Session 10

		Modeling, Assessing and Optimizing Critical Systems for Reliability and Safety Enhancement 10:00-12:00, Dec. 18 | Zoom ID: 83316564428 Chair: Jiaxiang Cai, National University of Singapore		
10:00-10:15	**S1001-A**	Resilient Consensus-based AC Optimal Power Flow against Data Integrity Attacks Using PLC Yang Yang National University of Singapore
10:15-10:30	**S1002-A**	Risk Aversion in a Data-driven Multi-period Inventory Control Problem **Presenter:** Xianghua Jiang National University of Singapore
10:30-10:45	**S1004-A**	Forward Intensity Model for Remaining Useful Life Prediction **Presenter:** Peihong Xiao National University of Singapore
10:45-11:00	**SR024**	Reliability Assessment of Man-machine Systems Subject to Probabilistic Common Cause Errors **Presenter:** Li KeHui Beihang University
11:00-11:15	**SR049**	Research on Reliability Quantitative Evaluation Method of Stepping Stress Strengthening Test for Electronic Equipment **Presenter:** Hong Wang Nanjing Research Institute of Electronics Technology
11:15-11:30	**SR1006**	Application of Software Reliability in Civil Aircraft Airborne Software Development **Presenter:** Haiwei Li Shanghai Aircraft Design and Research Institute
11:30-11:45	**SR1007**	Reliability Modeling and Analysis for Space Phased-mission System **Presenter:** Guoqiang Liu Beijing Institute of Spacecraft System Engineering
11:45-12:00	**SR1008**	Leveraging ground test data for aero-engine thrust estimation **Presenter:** Jianqiu Zhang University of Electronic Science and Technology of China

Special Session 11

High-reliability Distributed Control, Estimation and Optimization of Networked Systems 10:00-12:00, Dec. 18 | Zoom ID: 83845807802 Chair:		
10:00-10:15	**S1103**	Reliability Analysis of Information System with Software Definition Based on GO Oriented Method **Presenter:** Chenhao Xu Beijing Institute of Technology
10:15-10:30	**S1104**	Intermittent Fault of Solder Joints: A Review **Presenter:** Gen Liu Beijing Institute of Technology
10:30-10:45	**S1105**	Large-Scale Weapon Target Assignment Based on Improved MOEA/D Algorithm **Presenter:** Huiyang Yu Beijing Institute of Technology
10:45-11:00	**S1107**	Overview of The Application of Knowledge Graph in Anomaly Detection and Fault Diagnosis **Presenter:** Peizheng Huang Beijing Institute of Technology
11:00-11:15	**SR032**	Modeling and Analysis of Multi-layer Networks with Redundancy and Cascading Failures **Presenter:** Heping Jia North China Electric Power University
11:15-11:30	**SR056**	Critical Infrastructure Network Maintenance Scheduling Optimization Based on Random Resource Requirement **Presenter:** Zilin Zhang Beijing University of Technology
11:30-11:45	**SR065-A**	Composite Likelihood Method in Network Autoregressive NHPP Model **Presenter:** Jianxiang Wang National University of Singapore
11:45-12:00	**SR068**	A Resilience-based Routing Planning and Scheduling Model for Post-disaster Transportation Network Recovery with Multiple Repair Teams **Presenter:** Yanan Cheng Beijing University of Technology

Special Session 12

High-reliability Distributed Control, Estimation and Optimization of Networked Systems 14:00-16:15, Dec. 18 | Zoom ID: 82601011493 Chair:		
14:00-14:15	**S1201-A**	Intelligent Operation and Maintenance Technology of Belt Conveyor System in Ports **Presenter:** Mengzhen Li Wuhan University of Technology
14:15-14:30	**S1202-A**	A Hybrid Reliability Assessment Method for Drilling Pumps Based on CA-transformer Network and Wiener Process **Presenter:** Junyu Guo Southwest Petroleum University
14:30-14:45	**S1204-A**	Critical Cabin Identification of Cruise Ships Under Fire Conditions **Presenter:** Peng Huang Jiangxi University of Science and Technology
14:45-15:00	**S1205-A**	Bayesian Transfer Learning with Active Querying for Intelligent Cross-machine Fault Prognosis Under Limited Data **Presenter:** Cheng-Geng Huang Sun Yat-Sen University
15:00-15:15	**SR002**	A Dynamic Fire Risk Assessment Framework of Critical UHV Converter Transformer **Presenter:** Jian Rui Feng University of Science and Technology of China
15:15-15:30	**SR040**	Research on the Safety of New Energy Vehicle Charging Operation Based on Dissipative Structure Theory **Presenter:** Yang Menghua Qingdao University of Technology
15:30-15:45	**SR061**	Safety Risk Research during Military Aircraft Crossing Civil Airway Based on EVENT Model **Presenter:** Jian Zhang Civil Aviation University of China
15:45-16:00	**SR063**	Human-machine Trust and Calibration Based on Human-in-the-loop Experiment **Presenter:** Yifan Wang Beihang University
16:00-16:15	**SR092**	Causes of Chinese Mainland's Major Chemicals-related Accidents from 2015 to 2020: A Review Based on Complex Network Theory **Presenter:** Pengchao Wang Beijing University of Chemical Technology

Session 1

	System Fault Analysis and Condition Monitoring 14:00-16:15, Dec. 18 | Zoom ID: 83316564428 Chair:		
14:00-14:15	**SR011**	Fatigue Process Monitoring of Aluminum Alloy Materials Based on AE Technology **Presenter:** Liang Haoyang Beihang University	
14:15-14:30	**SR014**	Research on the Integrated Design Technology of Performance Verification and Qualification Test **Presenter:** Chenxi Li Beihang University	
14:30-14:45	**SR020**	Fault Excitation Test Method and Application Based on Switching Transistor **Presenter:** Tao Yang CRRC ZIC Research Institute of Electrical Technology & Material	
14:45-15:00	**SR070**	Indexes and Methods of Multi-dimensional Comprehensive Evaluation of Relay Protection **Presenter:** Peng Guo China Electric Power Research Institute	
15:00-15:15	**SR074**	An LSTM Autoencoder-based Framework for Satellite Telemetry Anomaly Detection **Presenter:** Zhaoping Xu National University of Defense Technology	
15:15-15:30	**SR076**	Remaining Useful Life Prediction of Aero-engine Using CNN-LSTM and mRMR Eeature Selection **Presenter:** Zhikun Zhou University of Science and Technology Beijing	
15:30-15:45	**SR080**	Medium-weight Impact Test Response Data Analysis **Presenter:** Sun Yuyu The 716th Institute of CSSC	
15:45-16:00	**SR097**	Ensemble of DAEs for Fault Detection of Gas Turbine Engines **Presenter:** Shuai Ma Northwestern polytechnical university	
16:00-16:15	**SR1005**	Failure Mode Analysis of High-pressure Duct Bleed Air Leakage **Presenter:** Kuang Wei Shanghai Aircraft Design & Research Institute	

Session 2

		System Model Design and Stability Evaluation 14:00-16:15, Dec. 18 | Zoom ID: 83845807802 Chair:
14:00-14:15	**SR001**	Optimal Periodic Inspection for Multi-Auxiliary Component Systems Subject to Load-Sharing Dependence **Presenter:** Xiayu Cai Nanjing University of Science and Technology
14:15-14:30	**SR008**	Research and Implementation of Reinforcement Technology of Integrated Monitoring Platform Based on Container **Presenter:** Li Yi State Grid Sichuan Electric Power Co., Ltd.
14:30-14:45	**SR027**	Mental Workload Modeling of Time-critical Tasks in Autonomous Driving Based on a Multi-source Information Fusion Approach **Presenter:** Yaonan Ding Beihang University
14:45-15:00	**SR042**	Joint Optimization for the Spare Part Support System Location-inventory-allocation Problem Under (T, S) Policy **Presenter:** Peixuan Li Beihang University
15:00-15:15	**SR071**	Comparative Analysis of Adaptive Sampling Method Optimization **Presenter:** Haoyin Chen Harbin Engineering University
15:15-15:30	**SR081**	Visualization Simulation of Mission Planning Schemes for Remote Sensing Satellites **Presenter:** Xin Wang Zhejiang University
15:30-15:45	**SR087**	Research on Performance Model of Radial Foil Air Bearings for Aeronautical Cooling Turbine Unit **Presenter:** Chao Song China Aero poly-technology Establishment
15:45-16:00	**SR094**	The Characterization Research on Atmospheric Environmental Corrosion of Aluminum Alloy **Presenter:** Zhu Yuqin Southwest Technology and Engineering Research Institute
16:00-16:15	**SR095**	Evaluation of the Performance of Autonomous Visual Perception Units in Challenging Environments **Presenter:** Xingge Li National University of Defense Technology