

2025 11th International Symposium on System Security, Safety, and Reliability (ISSSR 2025)

**Guiyang, China
12-13 April 2025**



**IEEE Catalog Number: CFP25J16-POD
ISBN: 979-8-3315-0125-9**

**Copyright © 2025 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

| | |
|-------------------------|-------------------|
| IEEE Catalog Number: | CFP25J16-POD |
| ISBN (Print-On-Demand): | 979-8-3315-0125-9 |
| ISBN (Online): | 979-8-3315-0124-2 |
| ISSN: | 2835-2831 |

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

2025 11th International Symposium on System Security, Safety, and Reliability (ISSSR) ISSSR 2025

Table of Contents

| | |
|---|------|
| Message from the Symposium Chairs | xiv |
| Organizing Committee | xvi |
| Program Committee | xvii |
| Steering Committee | xix |
| Keynote I | xx |
| Keynote II | xxi |
| Keynote III | xxii |
| Keynote IV | xxiv |

AI, Machine Learning & Deep Learning I

| | |
|--|----|
| Unsupervised Log Parsing Based on Large Language Models and Entropy | 1 |
| <i>Yiqi Duan (Ocean University of China, China), Jianliang Xu (Ocean University of China, China), Changyu Fan (Ocean University of China, China), and Zixin Liu (Ocean University of China, China)</i> | |
| Exploration of AI-Based Network Attack and Defense Platform Construction | 11 |
| <i>Hanjie Zhang (Anshun University, China)</i> | |
| LDM-Phys: A Lightweight Physics-Constrained Diffusion Model for Anomaly Detection in Safety-Critical Cyber-Physical Systems | 22 |
| <i>Bingwu Fang (Chaohu University, China; Process Industry Digital Service Engineering Research Center of Anhui Province, China), Zhenyu Liu (Chaohu University, China; Process Industry Digital Service Engineering Research Center of Anhui Province, China), and Qilin Wu (Chaohu University, China; Process Industry Digital Service Engineering Research Center of Anhui Province, China)</i> | |
| A Richly Attributed Dataset for Talent Intelligence Evaluation | 32 |
| <i>Ying Liu (Xinjiang Normal University, China), Yong Li (Xinjiang Normal University, China), Fangqi Shen (University of Leeds, United Kingdom), and Ming Wen (Xinjiang Electronic Research Institute, China)</i> | |
| Exploring AI-Integrated Curriculum Reform in University Computer Science Program | 41 |
| <i>Hanjie Zhang (Anshun University, China)</i> | |

| | |
|--|----|
| CAAD: A High-Level Customizable-Agent Gym for Dependable Autonomous Driving | 51 |
| <i>Junze Li (University of Chinese Academy of Sciences, China; Chinese Academy of Sciences, China), Zili Nie (University of Chinese Academy of Sciences, China; Chinese Academy of Sciences, China), Jingyu Chen (Chinese Academy of Sciences, China), Qian Dong (Chinese Academy of Sciences, China), and Yunzhi Xue (Chinese Academy of Sciences, China)</i> | |
| Fault Diagnosis of Aero-Engine Bearings in Comprehensive Noise Environments Based on Multi-Scale Convolution Networks | 60 |
| <i>HongBo Ran (University of Electronic Science and Technology of China, China), JianXin Zhang (Department of SRM Design Shanghai Space Propulsion Technology Research Institute, China), and JinHua Mi (University of Electronic Science and Technology of China, China)</i> | |

AI, Machine Learning & Deep Learning II

| | |
|--|-----|
| An Improved Clonal Selection Algorithm for Optimizing PWM Switching Sequences of Inverters.... | 68 |
| <i>Huihong Wu (Anshun University, China), Huihui He (No. 1 Middle School of Kaiyang County, China), Hangjie Zhang (Anshun University, China), Shuqu Qian (Anshun University, China), and Hui Li (Anshun University, China)</i> | |
| An End-to-End Watermarking Framework Integrates Matrix Decomposition and Deep Networks ... | 76 |
| <i>Xiaojie Tian (Ludong University, China), Yu Xia (Ludong University, China), and Qingtang Su (Ludong University, China)</i> | |
| Reinforcement Learning Algorithm for Organizational Decision Making in Air Defense Kill Networks | 83 |
| <i>Zewen Chen (Wuhan University of Technology, China) and Liuchang Shen (Wuhan University of Technology, China)</i> | |
| Vehicle State Recognition Based on Improved YOLOv5 | 90 |
| <i>Jun Ma (Jiangxi Jiaotou Maintenance Technology Group CO., LTD., China), Ming Li (Jiangxi Jiaotou Maintenance Technology Group CO., LTD., China), Fengjun Yu (Jiangxi Jiaotou Maintenance Technology Group CO., LTD., China), Peixin He (Nanchang Hangkong University, China), and Pengliu Tan (Nanchang Hangkong University, China)</i> | |
| Metal Surface Defect Detection Based on Transformer Merging Edge Information | 96 |
| <i>Jun Ling (Suzhou University, P.R. China), Chengfang Tan (Suzhou University, P.R. China), and Lin Cui (Suzhou University, P.R. China)</i> | |
| Intelligent Recommendation Algorithm Based on Nonnegative Matrix Factorization and Bipartite Graph | 101 |
| <i>Jing Wang (Anhui Polytechnic University, China), Ganyi Tang (Anhui Polytechnic University, China), and Yong Wang (Anhui Polytechnic University, China)</i> | |
| Analyzing Exposure in Generative Adversarial Networks: Advancing Security Against AI-Synthesized Voice Threats | 106 |
| <i>Geda Wakene (Vanderbilt University, United States), Zizhao Chen (The University of Texas at Dallas, United States), W. Eric Wong (The University of Texas at Dallas, United States), and Chih-Wei Hsu (The University of Texas at Dallas, United States)</i> | |

Modeling and Optimization I

| | |
|--|-----|
| Optimization of Selective Maintenance for Critical Infrastructures Considering Dynamic Environments | 112 |
| <i>Xiaolu Huai (Beijing University of Technology, China)</i> | |
| Reliability Modeling and Optimization Based on Master-Supporter Unmanned Aerial Vehicle Networks | 123 |
| <i>Fan Xu (Central University of Finance and Economics, China), Jinting Wang (Central University of Finance and Economics, China), Lingjiao Zhang (Central University of Finance and Economics, China), and Yujie Xie (Central University of Finance and Economics, China)</i> | |
| Optimizing Mission Safety: Integrated Abort and Spare Support Policy | 133 |
| <i>Fanping Wei (Beihang University, China), Xiaobing Ma (Beihang University, China), and Li Yang (Beihang University, China)</i> | |
| A Method for Aircraft Structural Corrosion Process Modeling and Maintenance Planning Considering Multi-Source Environmental Coupling Effects | 141 |
| <i>Bin Wang (Beihang University, China) and Yu Zhao (Beihang University, China)</i> | |
| A Quantitative Analysis Framework for Contributory Factors of Production Safety Accidents in Urban Gas Pipeline Networks of China | 149 |
| <i>Yilin Sun (Southwest Petroleum University, China; Key Laboratory of Energy Security and Low-Carbon Development of Sichuan Province, China; Southwest Petroleum University, China) and Xiaoqiang Zheng (Southwest Petroleum University, China; Key Laboratory of Energy Security and Low-Carbon Development of Sichuan Province, China; Southwest Petroleum University, China)</i> | |
| A Novel Approach for Analyzing Censored Lifetime Data from Designed Reliability Improvement Experiments | 161 |
| <i>Renyan Jiang (Wenzhou University, China), Ruhai Zhang (Xingji Electric Group Co. Ltd, P.R. China), Haicheng Yu (Xingji Electric Group Co. Ltd, P.R. China), and Jiawei Xiang (Wenzhou University, China)</i> | |

Modeling and Optimization II

| | |
|---|-----|
| Enhancing Video Smoothness in Cloud Desktops: An Improved Compression Framework with Adaptive Fast Search Algorithm | 169 |
| <i>Jingxin Zhou (Southwest Jiaotong University, China) and Sa Meng (Southwest Jiaotong University, China)</i> | |
| An Availability-Oriented Dynamic Group Order-Maintenance Scheduling Policy | 177 |
| <i>Chen Yi (Beihang University, China), Ma Xiaobing (Beihang University, China), Zhao Yu (Beihang University, China), and Yang Li (Beihang University, China)</i> | |
| Research on Multi-Objective Distribution Vehicle Routing Problem for Spare Parts with Pick-Up and Delivery | 184 |
| <i>Yanyan Jin (Beihang University, China), Boping Xiao (Beihang University, China), and Fengqi Huang (Beihang University, China)</i> | |

| | |
|---|-----|
| Reliability Assessment Method for the Underwater Motion Process of a Rigid Body | 193 |
| <i>Han Li (Beihang University, China), Jingjing Cui (The System Design Institute of Mechanical-Electrical Engineering, China), Xiaoning Zheng (Beihang University, China), and Meilin Wen (Beihang University, China)</i> | |
| A Risk-Centered Mission Reliability Model Managing System Health Deterioration and Environmental Shock Effects | 200 |
| <i>Zijian Kang (Beihang University, China), Fanping Wei (Beihang University, China), Xiaobing Ma (Beihang University, China), and Li Yang (Beihang University, China)</i> | |

Measurement, Estimation, and Prediction

| | |
|--|-----|
| A Multi-Phase Resilience Evaluation Method for Cross-Domain Unmanned Swarms | 205 |
| <i>Heyuan Li (National University of Defense Technology, China), Hao Li (Department 75852, China), Mingxin Hou (Guangdong Ocean University, China), Xiaohui Yang (Nanchang University, China), and Guanghan Bai (National University of Defense Technology, China)</i> | |
| Reliability Modeling and Evaluation of Circuit Boards Considering Key Design Factors | 216 |
| <i>Hailu Hu (Beihang University, China), Jianguo Wu (Beijing Institute of Structure and Environment Engineering, China), Ruihao Zhang (Beihang University, China), and Menlin Wen (Beihang University, China)</i> | |
| SOTM : A Simulation-Oriented Trustworthiness Measurement Method for Intelligent Unmanned System | 227 |
| <i>Mengcen Jiang (Shenyang Aircraft Design and Research Institute Aviation Industry Corporation of China, LTD, China), Youdi Gong (Institute of Software Chinese Academy of Sciences, China), Guang Yang (Institute of Software Chinese Academy of Sciences, China), Lingzhong Meng (Institute of Software Chinese Academy of Sciences, China), and Yuxi Ma (Institute of Software Chinese Academy of Sciences, China)</i> | |
| Research of Travel Time Reliability Evaluation Method for Road Network Considering Vehicle Coordination under Unexpected Events | 236 |
| <i>Baoqi He (Beihang University, China) and Ruiying Li (Science and Technology on Reliability and Environmental Engineering Laboratory, China)</i> | |
| A Collaborative Replacement-Spare Provision Policy for Three-State System Considering Inspection Errors | 242 |
| <i>Jiantai Wang (Beihang University, China), Yu Zhao (Beihang University, China), Xiaobing Ma (Beihang University, China), and Li Yang (Beihang University, China)</i> | |
| Adaptive Constraints-Based Instantaneous Frequency Estimation for Overlapped Multicomponent Signals | 248 |
| <i>Du Li (South China University of Technology, China), Penghong Lu (South China University of Technology, China), Yingjie Zhang (South China University of Technology, China), and Gang Chen (South China University of Technology, China)</i> | |

Testing and Quality Assurance

| | |
|---|-----|
| Prior Distribution Screening and Risk Calculation for Reliability Qualification Test of the Exponential Product | 254 |
| <i>Yunlei Tan (University of Defense Technology, China) and Ping Jiang (University of Defense Technology, China)</i> | |
| Fault Diagnosis of Mechanical Transmission Components with Siam-GNN under Few-Shot Noisy Conditions | 262 |
| <i>Zhiguo Wang (University of Electronic Science and Technology of China, China), Shengjie Yin (Department of SRM Design Shanghai Space Propulsion Technology Research Institute, China), and Jinhua Mi (University of Electronic Science and Technology of China, China)</i> | |
| ARIMA Residual Correction Energy System Grey Prediction Model and its Application | 269 |
| <i>Hui Li (Anshun University, China), Wenjian Shi (Anshun University, China), and Hanjie Zhang (Anshun University, China)</i> | |
| Evaluating Large Language Models via Multi-Modal User Knowledge Graphs: A Comprehensive Assessment Framework | 278 |
| <i>Pan Liu (Shanghai Business School, Shanghai; Institute of Network Technology (Yantai), China), Zizhao Chen (The University of Texas at Dallas, USA), Yihao Li (Ludong University, China; Institute of Network Technology (Yantai), China), and W. Eric Wong (The University of Texas at Dallas, USA)</i> | |
| Research on Blockchain Privacy Preservation in Healthcare Systems | 286 |
| <i>Keke Wang (Suzhou University, China), Pengfei Lu (Suzhou University, China), and Zhenghua Xin (Suzhou University, China)</i> | |

Analysis, Simulation, and Validation

| | |
|---|-----|
| ACACABCD Model: Implementation and Comparative Performance Study | 291 |
| <i>Tanjila Mawla (Tennessee Tech University, USA), Lopamudra Praharaj (Tennessee Tech University, USA), James Benson (University of Texas at San Antonio, USA), and Maanak Gupta (Tennessee Tech University, USA)</i> | |
| Reliability Analysis Method Based on Pre-Interpolation-Active Learning Kriging | 303 |
| <i>Junnan Dai (Jiangsu University of Technology, China) and Jinyu Zhou (Jinling Institute of Technology, China)</i> | |
| Reliability Assessment of Planetary Pin Position Errors in Large-Scale Aerospace Planetary Systems Based on the Kriging Model | 313 |
| <i>Ming Li (Shenyang Aerospace University, China), Puzheng Ji (Shenyang Aerospace University, China), Chengjun Shi (Shenyang Aerospace University, China), and Liyang Xie (Northeastern University, China)</i> | |
| Research on Gear Bending Fatigue Test and Probabilistic Life Prediction Method | 321 |
| <i>Ming Li (Shenyang Aerospace University, China), Chengjun Shi (Shenyang Aerospace University, China), Puzheng Ji (Shenyang Aerospace University, China), and Liyang Xie (Northeastern University, China)</i> | |

| | |
|--|-----|
| Working State Simulation, Weakness Analysis and Life Estimation of the Aerospace Ultrasonic Motor | 329 |
| <i>Taichun Qin (Beijing Institute of Spacecraft Environment Engineering, China; Tianjin Key Laboratory of Space Environment Simulation, China), Fang Hu (Beijing Institute of Spacecraft Environment Engineering, China; Tianjin Key Laboratory of Space Environment Simulation, China), Hua Shao (Beijing Institute of Spacecraft Environment Engineering, China), Yuege Zhou (Beijing Institute of Spacecraft Environment Engineering, China; Tianjin Key Laboratory of Space Environment Simulation, China), and Shouqing Huang (Beijing Institute of Spacecraft Environment Engineering, China; Tianjin Key Laboratory of Space Environment Simulation, China)</i> | |

Intelligent Algorithms for Reliable and Scalable System Operations

| | |
|--|-----|
| Boosting Service Workflow Reliability through Enhanced Detection of Artifact Anomalies | 335 |
| <i>Mahmoud M. Abouzied (National Yang Ming Chiao Tung University, Taiwan), Yi Chen (National Yang Ming Chiao Tung University, Taiwan), and Feng-Jian Wang (National Yang Ming Chiao Tung University, Taiwan)</i> | |
| Dynamic Scalable PBFT Consensus Algorithm Based on Binary K-Means | 347 |
| <i>Pengliu Tan (Nanchang Hangkong University, China), Ruoxin Tu (Nanchang Hangkong University, China), Xue Li (Nanchang Hangkong University, China), and Peixin He (Nanchang Hangkong University, China)</i> | |
| Resilience Assessment Method for Air Defense Kill Web Based on System Dynamics Model | 356 |
| <i>Liuchang Shen (Wuhan University of Technology, China), Xiaopan Zhang (Wuhan University of Technology, China), and Zewen Chen (Wuhan University of Technology, China)</i> | |

Computational Creativity and Human Interactions I

| | |
|--|-----|
| A Robust Machine Learning Framework for Estimating Crop Production using Ensemble and Quantile Techniques | 364 |
| <i>Lin Zou (De Montfort University, UK), Ke Han (Chinese Academy of Sciences, China; Jilin Agriculture University, China), and Sicong Ma (Chinese Academy of Sciences, China)</i> | |
| A Novel Algorithm for All Minimal Cut Vectors without Duplicates in Two-Terminal Multistate Networks | 376 |
| <i>Yi-fan Hu (Nanchang HangKong University, PR China), Bei Xu (Nanchang HangKong University, PR China), and Yan-ping Zhu (Nanchang HangKong University, PR China)</i> | |
| Increasing the Validity and Trustworthiness of Automated Facial Emotion Recognition Systems | 387 |
| <i>Phillip Zhang (University of Leicester, United Kingdom; Institute for Digital Culture, United Kingdom), Hongji Yang (University of Leicester, United Kingdom; Institute for Digital Culture, United Kingdom), and Zisen Zhou (University of Leicester, United Kingdom; Institute for Digital Culture, United Kingdom)</i> | |

| | |
|---|-----|
| Simultaneous Performance Across Two Locations: IoT-Based Motion Capture Integration in the Performing Arts | 397 |
| <i>He-Lin Luo (Tainan National University of the Arts, Taiwan), Pei-Ying Lin (Tainan National University of the Arts, Taiwan), Yi-Bing Lin (National Yang Ming Chiao Tung University, Taiwan; China Medical University, Taiwan), and Tin-Kai Chen (Tainan University of Technology, Taiwan)</i> | |
| Multi-Scenario Performance Simulation and Engineering Applications of Novel Swarm Intelligence Algorithms | 407 |
| <i>Jiali Chen (Longyan University, China) and Chong Zeng (University of Leicester, UK)</i> | |
| A Framework for Sustainable and Scalable Cultural Data Integration and Analysis: using the Large Dataset of the Museum Data Service | 417 |
| <i>Ross Parry (University of Leicester, United Kingdom), Stef De Sabbata (University of Leicester, United Kingdom), Andrew Ellis (Art UK, United Kingdom), Helen Hardy (Natural History Museum, United Kingdom), and Mia Ridge (The British Library, United Kingdom)</i> | |
| Simulating Emotion-Creativity Dynamics: A Default Mode Network Mediation Hypothesis Tested via Computational Approaches | 425 |
| <i>Yun Zhang (University of Leicester, United Kingdom), Hongji Yang (University of Leicester, United Kingdom), Chong Zeng (University of Leicester, United Kingdom), Yumo Guo (University of Leicester, United Kingdom), and Yanju Yao (University of Leicester, United Kingdom)</i> | |
| Applying Causal Forest of Machine Learning to Analyze the Heterogeneous Impact of China's Dual-Carbon Policy on Green Management Innovation | 433 |
| <i>Yuxuan Li (Liaoning University, China), Hua Zhang (Liaoning University, China), and Xiaohui Wang (Liaoning University, China)</i> | |

Computational Creativity and Human Interactions II

| | |
|---|-----|
| Unlocking the Potential of AI-Driven Tourism for Healing and Well-Being: A New Frontier in Digital Health | 441 |
| <i>Lu Zhang (Beijing Union University, China) and Meiyu Shi (Beijing Union University, China)</i> | |
| Advanced Computing Technologies and Digital Transformation: Analyzing Positive Sentiment Trends in Online Stock | 450 |
| <i>Xingyao Kang (Liaoning University, China), Man An (Liaoning University, China), Hua Zhang (Liaoning University, China), and Shulin Wang (Liaoning University, China)</i> | |
| An Artificial Intelligence Approach to Data Manipulation for Agricultural Curriculum Optimization Based on Factors of Industry, Research and Education | 459 |
| <i>Tian Liu (Henan Agricultural University, China), Zili Chen (Guizhou University of Engineering Science, China), Mingzhe Xu (Henan University of Animal Husbandry and Economy, China), Qingjie Wang (Henan Institute of Economics and Trade, China), and Xuezhu Zheng (Henan Agricultural University, China)</i> | |

| | |
|--|-----|
| The Feasibility of Applying Prompt Engineering Based on Large Language Models in the Public Domain | 467 |
| <i>Yu Gao (Xiamen University of Technology, China), Lei Xiao (Xiamen University of Technology, China), Yuxiang Shen (Xiamen University of Technology, China), and Rongshang Chen (Xiamen University of Technology, China)</i> | |
| An Ordering Heuristic for Reliability Evaluation of Multistate Networks | 469 |
| <i>Huangxiao Zhang (Nanchang HangKong University, China) and Bei Xu (Nanchang HangKong University, China)</i> | |
| Research on the Correlation Between Form Accuracy, Deformation, and Geometric Tolerances in Mechanical Design | 476 |
| <i>Cheng Wang (Jiangsu University of Technology, China) and Jinyu Zhou (Jinling Institute of Technology, China)</i> | |
| Low-Rank and Sparsity Co-Induced Tensor Singular Space Decomposition Model for Variable-Speed Rolling Bearings Fault Feature Extraction | 478 |
| <i>Jinzhou Tou (Zhejiang Zheneng Guodian Investment Shengsi Offshore Wind Power Generation Co., Ltd, China), Jiangbin Ye (Zhejiang Zheneng Guodian Investment Shengsi Offshore Wind Power Generation Co., Ltd, China), Wei Feng (Zhejiang Zheneng Guodian Investment Shengsi Offshore Wind Power Generation Co., Ltd, China), Feiyun Cong (Zhejiang University, China), and Huiming Jiang (University of Shanghai for Science and Technology, China)</i> | |
| Referred Segmentation on Single/ No Target Image | 480 |
| <i>Kexin Yao (The Australian National University, Australia) and Yi Zhu (Jiangsu Normal University, China)</i> | |
| Bridging Computer Science and English Education: A Curriculum Approach to Interdisciplinary Research and Teaching | 487 |
| <i>Zili Chen (Guizhou University of Engineering Science, China), Tian Liu (Henan Agricultural University, China), and Ronghua Hu (Guizhou University of Engineering Science, China)</i> | |
| Broken Access Control Detection Focused on Privilege Escalation Prevention using a Llama 3 LLM-Based Assistant | 492 |
| <i>Ethan Saenz (Midwestern State University, United States), Victor Marchesi (Midwestern State University, United States), Zizhao Chen (University of Texas at Dallas, United States), and W. Eric Wong (University of Texas at Dallas, United States)</i> | |
| Applications of Virtual Reality and Augmented Reality in Enhancing the Safety of Tai Chi | 494 |
| <i>Shaojun Ji (Beijing Union University, China) and Meiyu Shi (Beijing Union University, China)</i> | |

Industry Track & Fast Abstract

| | |
|--|-----|
| An Innovation Strategy for Solar-Energy Trucks | 499 |
| <i>Xipeng Liu (The University of York, UK)</i> | |

| | |
|--|------------|
| Electropulsing Treatment Technology: from Damage Repair to Lifetime Prolong for Long-Service-Cycle Machinery | 502 |
| <i>Ruxiang Ye (Zhejiang Energy State Power Investment Shengsi Offshore Wind Power Generation Co., Ltd, China), Feiyun Cong (Zhejiang University, China; Taizhou Institute of Zhejiang University, China), Zhengdong Chen (Zhejiang Energy State Power Investment Shengsi Offshore Wind Power Generation Co., Ltd, China), Hongwei Wu (Zhejiang Energy State Power Investment Shengsi Offshore Wind Power Generation Co., Ltd, China), and Zhijie Shi (Zhejiang Energy State Power Investment Shengsi Offshore Wind Power Generation Co., Ltd, China)</i> | |
| Author Index | 505 |