

PROCEEDINGS OF SPIE

# ***Second International Conference on Digital Society and Intelligent Systems (DSInS 2022)***

**Jie Hu  
Xin Yang**  
*Editors*

**2–4 December 2022  
Chengdu, China**

*Organized by*  
Southwest Jiaotong University (China)

*Sponsored by*  
Southwest University of Finance and Economics (China)  
Wuhan University of Technology (China)  
University of Technology Sydney (Australia)  
AEIC Academic Exchange Information Centre (China)

*Published by*  
SPIE

**Volume 12599**

Proceedings of SPIE 0277-786X, V. 12599

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

Second Intl. Conference on Digital Society and Intelligent Systems (DSInS 2022),  
edited by Jie Hu, Xin Yang, Proc. of SPIE Vol. 12599, 1259901  
© 2023 SPIE 0277-786X · doi: 10.1117/12.2679437

Proc. of SPIE Vol. 12599 1259901-1

The papers in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. Additional papers and presentation recordings may be available online in the SPIE Digital Library at [SPIDigitalLibrary.org](http://SPIDigitalLibrary.org).

The papers reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from these proceedings:  
Author(s), "Title of Paper," in *Second International Conference on Digital Society and Intelligent Systems (DSIS 2022)*, edited by Jie Hu, Xin Yang, Proc. of SPIE 12599, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X  
ISSN: 1996-756X (electronic)

ISBN: 9781510663244  
ISBN: 9781510663251 (electronic)

Published by  
**SPIE**  
P.O. Box 10, Bellingham, Washington 98227-0010 USA  
Telephone +1 360 676 3290 (Pacific Time)  
[SPIE.org](http://SPIE.org)  
Copyright © 2023 Society of Photo-Optical Instrumentation Engineers (SPIE).

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of fees. To obtain permission to use and share articles in this volume, visit Copyright Clearance Center at [copyright.com](http://copyright.com). Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher.

Printed in the United States of America by Curran Associates, Inc., under license from SPIE.

Publication of record for individual papers is online in the SPIE Digital Library.

**SPIE. DIGITAL LIBRARY**  
[SPIDigitalLibrary.org](http://SPIDigitalLibrary.org)

---

**Paper Numbering:** A unique citation identifier (CID) number is assigned to each article in the Proceedings of SPIE at the time of publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online and print versions of the publication. SPIE uses a seven-digit CID article numbering system structured as follows:

- The first five digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc. The CID Number appears on each page of the manuscript.

# Contents

ix *Conference Committees*

---

## INTELLIGENT SYSTEM AND PATTERN RECOGNITION

---

- 12599 02 **The role of DC/EP in improving the payment efficiency of payment systems: based on simplified model, taking university campuses as an example [12599-58]**
- 12599 03 **Development of the intelligent dispatching system for power grid: an example of the virtual dispatcher for the Lanzhou power grid [12599-71]**
- 12599 04 **Research on technology of electric energy centralized collection and metering system based on smart grid [12599-99]**
- 12599 05 **Research on decision support system of automobile service based on distributed data warehouse [12599-90]**
- 12599 06 **Research on construction and application of user growth system based on power industry [12599-98]**
- 12599 07 **Electricity price forecasting model based on MLP-Mixer [12599-120]**
- 12599 08 **A study of machine learning based credit card potential default customer identification [12599-95]**
- 12599 09 **Detection of false information in environment-based complaint reports based on graph convolution [12599-73]**
- 12599 0A **Construction of university fire safety facilities management information system based on WebGis [12599-38]**
- 12599 0B **Research on technology guarantee method of power system security protocol based on three-layer structure platform [12599-43]**
- 12599 0C **A study on the personalized recommendation of intelligent learning system based on user feature model analysis [12599-79]**
- 12599 0D **Indoor person behavior recognition based on deep learning and knowledge graph [12599-106]**
- 12599 0E **Thermal infrared face image data enhancement method based on deep learning [12599-18]**
- 12599 0F **A lightweight vehicle detection algorithm combining image enhancement and multi-scale feature fusion [12599-12]**

- 12599 OG **Dominance relation similarity measure based on fuzzy hypergraph dominance matrix**  
[12599-64]
- 12599 OH **Traveling-wave-based fault location error using modal components in electric distribution systems** [12599-93]
- 12599 OI **The development and enlightenment of the digitalization of American Naval combat system**  
[12599-96]
- 12599 OJ **Design and application of online performance management system for lightweight enterprises based on J2EE** [12599-37]
- 12599 OK **CChain: a high throughput blockchain system** [12599-5]
- 12599 OL **Design of expressway automatic toll collection system based on radio frequency technology**  
[12599-121]
- 12599 OM **Design of laboratory management systems in higher education** [12599-28]
- 12599 ON **Application of soil and water conservation online monitoring system in UHV transmission and transformation project** [12599-61]
- 12599 OO **Design and implementation of automatic listing function in dispatching automation system**  
[12599-123]
- 12599 OP **Remote web control of inkjet printers based on the Js framework design of the system** [12599-8]
- 12599 OQ **Research on on-line oil monitoring system for power plant based on condition assessment of oil-using equipment** [12599-102]
- 12599 OR **Research on the construction of college Chinese teaching system based on deep learning technology** [12599-114]
- 12599 OS **Design of virtual and real system of assembly platform based on digital twin** [12599-53]
- 12599 OT **Construction of intelligent financial platform for colleges and universities in the era of big data**  
[12599-49]
- 12599 OU **BIM-based tunnel structural monitoring data integration system during operation** [12599-6]
- 12599 OV **Remote closed-loop test method of safety and stability control system based on step-by-step implementation** [12599-59]
- 12599 OW **Smart system design for digital transformation of new retail** [12599-85]
- 12599 OX **Research on the collection system of foxtail millet phenotypic traits based on Android system**  
[12599-80]
- 12599 OY **Intelligent design of railway logistics financial operation mode and risk evaluation system**  
[12599-35]

- 12599 0Z     **Research on classroom evaluation system under the mode of educational informationization**  
[12599-21]
- 12599 10     **Transmission line icing forecasting based on characteristic graph structure** [12599-116]
- 12599 11     **Simulation study on the entrance taxiway operation mode for all day run multi-runway airport**  
[12599-34]

---

**DIGITAL SOCIETY AND INFRASTRUCTURE CONSTRUCTION**

---

- 12599 12     **Digital social cultural heritage digital space study and exploration** [12599-39]
- 12599 13     **Evaluation and analysis of collaborative experiment for determination of multi-element contents in gold adornment alloys by LA-ICP-MS** [12599-11]
- 12599 14     **Research on technical path and practice of digital transformation of colleges based on iPaaS**  
[12599-112]
- 12599 15     **A variable tolling scheme for highway tolls based on traffic forecasting** [12599-104]
- 12599 16     **Design of single lamp controller based on NB-IoT** [12599-20]
- 12599 17     **Simulation analysis of COVID-19 epidemic model in Wuhan based on SIR model** [12599-3]
- 12599 18     **Parametric technology is used for the design of weaving products** [12599-68]
- 12599 19     **SVM based sub-classification study of engineering waste glass** [12599-103]
- 12599 1A     **Research on national vulnerability and climate change based on FSI** [12599-32]
- 12599 1B     **Priority evaluation to multiple scenarios focus on V2X early warning of driving assist function**  
[12599-65]
- 12599 1C     **Bionic mechanical design for lake cleaning** [12599-108]
- 12599 1D     **Analysis of sensor technology application in Chengdu: a case study of LiDAR** [12599-45]
- 12599 1E     **Soil and water loss monitoring of UHV power transmission project based on monitoring data from meteorological stations** [12599-74]
- 12599 1F     **Optimal design and implementation of operation and maintenance of offshore wind power safety production management platform** [12599-113]
- 12599 1G     **Evaluation method of power grid construction project schedule management in the context of infrastructure digital management** [12599-92]

- 12599 1H **Study on cooperative scheduling control method of bulk cargo terminal** [12599-22]
- 12599 1I **Fine management of gas drainage in coal mine** [12599-4]
- 12599 1J **Study on mountain torrent warning method based on refined rainfall forecast** [12599-40]
- 12599 1K **Study on optimization and evaluation of traffic organization at urban road access** [12599-101]
- 12599 1L **Design of engineering quality inspection and evaluation system** [12599-57]
- 12599 1M **Research on tracking algorithm of milking robot arm based on improved SURF-KCF** [12599-66]
- 12599 1N **Port-based distribution centre site selection application study** [12599-2]
- 12599 1O **Research on operation interval simulation method of express/local trains for urban rail transit** [12599-10]
- 12599 1P **Indoor vibration of a high-rise frame structure office building near metro lines** [12599-7]
- 12599 1Q **Analysis of warship equipment prognostics and health management model under the background of civil-military integration** [12599-124]
- 12599 1R **New technologies and applications of product design and manufacturing in the manufacturing enterprises' digital transformation** [12599-75]
- 12599 1S **Research on anti single event transient multi-objective optimization technology based on sensitive flip-flop replacement** [12599-51]
- 12599 1T **Transcranial magnetic stimulation over posterior parietal cortex affects attentional function** [12599-107]

---

**INTELLIGENT NETWORK AND SIGNAL PROCESSING**

- 12599 1U **Research on security architecture design of smart campus platform based on SDN and active defense technology** [12599-78]
- 12599 1V **Low voltage user demand response management platform based on blockchain technology** [12599-41]
- 12599 1W **Application of hybrid neural network in data-driven flow field simulation** [12599-100]
- 12599 1X **Anomaly detection of large data stream in energy internet based on high-order statistical features** [12599-83]
- 12599 1Y **Fine-grained EEG classification using convolution neural network** [12599-56]

- 12599 1Z **One-to-many Image super resolution algorithm based on generative adversarial networks** [12599-23]
- 12599 20 **Application research of landmarks in path planning algorithms of mobile robots** [12599-25]
- 12599 21 **Research on machine analogy translation technology based on machine learning** [12599-60]
- 12599 22 **Fault Diagnosis and trend analysis testing program of TT and C antenna transmission chain** [12599-55]
- 12599 23 **Research and implementation of blockchain-based performance management platform for process manufacturing** [12599-31]
- 12599 24 **Video recording an automatic editing method based on artificial intelligence algorithm** [12599-19]
- 12599 25 **FaST-Net: Face Style Self-Transfer Network for masked face inpainting** [12599-44]
- 12599 26 **Research on characteristics of emergency logistics system based on interdependent network** [12599-118]
- 12599 27 **A big data based conflict analysis, control and resolution effect evaluation platform** [12599-105]
- 12599 28 **Research on LatticeLSTM model based on data enhancement and self-attention mechanism** [12599-63]
- 12599 29 **Radar signal recognition based on time-frequency feature extraction and convolutional neural network** [12599-89]
- 12599 2A **Intelligent regulation and testing of information metamaterials** [12599-119]
- 12599 2B **Research on fast semantic segmentation algorithm of road potholes under rain and snow** [12599-81]
- 12599 2C **Structure characteristics of spatial correlation network of industrial digitalization** [12599-52]
- 12599 2D **A comparative study of rolling bearing fault diagnosis based on tree models** [12599-36]
- 12599 2E **Comparable studies of Dos defense mechanism** [12599-109]
- 12599 2F **Remote sensing image registration of disaster-affected areas based on deep learning feature matching** [12599-26]
- 12599 2G **Research on optoelectronic platform stabilization technology based on active disturbance rejection control** [12599-9]
- 12599 2H **Research on terminal node localization in wireless sensor networks for precision agriculture** [12599-33]

- 12599 2I **A hand gestures recognition system for industrial robot control** [12599-14]
- 12599 2J **A new diagnosis and treatment platform for autism spectrum disorder based on artificial intelligence** [12599-50]
- 12599 2K **Using IoT to promote the construction of natural gas industry ecosystem** [12599-48]
- 12599 2L **ANP method for comprehensive energy service level evaluation** [12599-125]
- 12599 2M **Smart city data sharing and exchange platform based on ServiceGIS** [12599-97]
- 12599 2N **Service reputation assessment for power grid zero-trust security** [12599-84]
- 12599 2O **Design of monitoring and control system for unmanned ship based on FPGA** [12599-91]
- 12599 2P **Engineering practical management model of electricity balance considering the connections of priority generation and market contracts** [12599-72]
- 12599 2Q **Design of intelligent checking platform for stowage and segregation about dangerous goods container** [12599-29]
- 12599 2R **Research on the application of passive RFID technology in warehouse management** [12599-46]



# Conference Committee

## *Conference Chairs*

**Tianrui Li**, Southwest Jiaotong University (China)  
**Guandong Xu**, University of Technology Sydney (Australia)

## *Technical Program Committee Chair*

**Xin Yang**, Southwestern University of Finance and Economics (China)

## *Publication Chair*

**Lin Li**, Wuhan University of Technology (China)

## *Organizing Committee Members*

**Hongmei Chen**, Southwest Jiaotong University (China)  
**Jie Hu**, Southwest Jiaotong University (China)  
**Hongjun Wang**, Southwest Jiaotong University (China)  
**Shengdong Du**, Southwest Jiaotong University (China)  
**Chuan Luo**, Sichuan University (China)  
**Min Han**, Southwest Jiaotong University (China)

## *Technical Program Committee Members*

**Quan Bai**, University of Tasmania (Australia)  
**Wu He**, Old Dominion University (United States)  
**Qi Liu**, University of Science and Technology of China (China)  
**Chuan Luo**, Sichuan University (China)  
**Lin Qiu**, Nanyang Technological University (Singapore)  
**Imran Razzak**, Deakin University (Australia)  
**Yongjun Shen**, Southeast University (China)  
**Xiaohui Tao**, University of Southern Queensland (Australia)  
**Herwig Unger**, FernUniversität in Hagen (Germany)  
**Frédéric Vanderhaegen**, Université Polytechnique des Hauts-de-France  
(France)  
**Xintao Wu**, University of Arkansas (United States)  
**Feng Xia**, Federation University Australia (Australia)  
**Haoran Xie**, Lingnan University (China)  
**Haiqin Yang**, Ping an Insurance (Group) Company of China Ltd. (China)  
**Hongzhi Yin**, University of Queensland (Australia)  
**Xianyi Zeng**, École Nationale Supérieure des Arts et Industries Textiles  
(ENSIAT) (France)

