## PROCEEDINGS OF SPIE

# International Conference on Cloud Computing, Internet of Things, and Computer Applications (CICA 2022)

Warwick Powell Amr Tolba Editors

22–24 April 2022 Luoyang, China

Sponsored by AEIC Academic Exchange Information Center (China)

Organized by Queensland University of Technology (Australia)

Published by SPIE

> Volume 12303

Proceedings of SPIE 0277-786X, V. 12303

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

International Conference on Cloud Computing, Internet of Things, and Computer Applications (CICA 2022), edited by Warwick Powell and Amr Tolba, Proc. of SPIE Vol. 12303, 1230301 © 2022 SPIE · 0277-786X · doi: 10.1117/12.2646606

Proc. of SPIE Vol. 12303 1230301-1

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 SPIEDigitalLibrary.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 International Conference on Cloud Computing, Internet of Things, and Computer Applications (CICA 2022), edited by Warwick Powell and Amr Tolba, Proc. of SPIE 12303, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

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

ISBN: 9781510656673 ISBN: 9781510656680 (electronic)

Published by **SPIE** P.O. Box 10, Bellingham, Washington 98227-0010 USA Telephone +1 360 676 3290 (Pacific Time) SPIE.org Copyright © 2022 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. 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.



**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 Committee

#### CLOUD COMPUTING APPLICATION AND DATA ALGORITHM PROCESSING

12303 02 Genetic algorithm for resolving vehicle routing problem [12303-18] 12303 03 Discussion on reservoir numerical simulation of fracturing development of low-permeability reservoir [12303-97] 12303 04 Finite element calculation study on using carbon fiber reinforced plastics to reinforce concrete torsion column [12303-90] 12303 05 Design and implementation of GIS system of map service for transformation of scientific and technological achievements [12303-75] 12303 06 Optimizing distributed networking with big data scheduling and cloud computing [12303-21] 12303 07 On MM algorithms for Cox model with right-censored data [12303-121] 12303 08 Outlier detection of financial high frequency data based on fuzzy clustering algorithm [12303-125] 12303 09 Algorithm of ship maneuver scheme of multiple targets in marine environment [12303-122] 12303 0A Implementation of Bayesian high dimensional data analysis with SIR model program [12303-132] 12303 OB Research and implementation of the affinity scheduling algorithm of logical data block in big data analysis system [12303-72] 12303 OC A water resource allocation method based on configuration relationship matrix and Excel [12303-123] 12303 OD Construction of smart stores in automobile marketing system based on big data [12303-127] 12303 OE Privacy-preserving method of edge computing based on secret sharing and homomorphic **encryption** [12303-54] 12303 OF Large-scale data privacy-preserving method based on data perturbation [12303-52]

12303 0G	The design, development, and application of Chinese music grand ceremony database [12303-116]
12303 OH	Construction and research of system capability training system based on cloud computing [12303-113]
12303 01	Research on medical data protection based on differential privacy [12303-46]
12303 OJ	KubeRM: a distributed rule-based security management system in cloud native environment [12303-128]
12303 OK	Design and implementation of a decision tree classification algorithm for radar signal recognition [12303-57]
12303 OL	Identity-based one-pass key agreement and encryption protocol for secure IP [12303-48]
12303 OM	Delay optimization in UAV-enabled mobile-edge computing collaborative system [12303-33]
12303 ON	A heterogeneous data-oriented task engine in the National Earthquake Precursor Network [12303-55]
12303 00	Research on clustering algorithm of cognitive rehabilitation based on multi-dimensional objects [12303-42]
12303 OP	Efficient privacy-preserving k-nearest neighbors in cloud computing [12303-23]
12303 0Q	Sewage treatment process control method based on improved particle swarm algorithm [12303-114]
12303 OR	Research on resource allocation technology based on cloud computing [12303-135]
12303 OS	Research on resource optimization scheme based on cloud computing environment [12303-134]
12303 OT	Malicious code classification method based on API sequence and text-CNN [12303-49]
12303 0U	Visualized performance evaluation of 3D CAD software based on the characterization of test data by cloud model [12303-11]
12303 0V	Resistance to side-channel attacks of CPU based on random power consumption disturbance strategy [12303-14]
12303 OW	Optimal allocation of water resources based on genetic algorithms: a case study in the Colorado Basin, USA [12303-108]
12303 OX	Research on data security and privacy protection methods in cloud computing environment [12303-136]
12303 OY	Design and analysis of machine aided translation system in cloud computing mode [12303-74]

12303 OZ	Research on the optimal number of equipment maintenance personnel in enterprises [12303-67]
	ARTIFICIAL INTELLIGENCE TECHNOLOGY AND INTERNET OF THINGS APPLICATIONS
12303 10	Remote sensing monitoring of cyanobacteria density in Taihu Lake based on PIE-engine [12303-31]
12303 11	Decision-making method for railway emergency based on prospect theory [12303-70]
12303 12	Application and development of reservoir numerical simulation [12303-91]
12303 13	Research and application of the upgraded power dispatch strategy for complex AC/DC interconnected power grid [12303-124]
12303 14	Edge computing for the intelligent perception in energy interconnection [12303-137]
12303 15	Life prediction of power Internet of Things equipment based on improved genetic algorithm [12303-81]
12303 16	Accurate face swap using cycleGAN [12303-131]
12303 17	Sentiment analysis method based on CNN and attention mechanism [12303-66]
12303 18	A study on the intelligent optimization of subway security check space in the context of epidemic [12303-130]
12303 19	Architecture of discrete manufacturing system based on CPS [12303-92]
12303 1A	Research on blockchain-based crowdsourcing mechanism for knowledge system [12303-36]
12303 1B	Application of artificial intelligence-based video image processing technology in security industry [12303-117]
12303 1C	Application research of logistics warehousing system based on Internet of Things and artificial intelligence [12303-84]
12303 1D	Automatic identification and detection system of digital vernier caliper jumps based on CNN [12303-51]
12303 1E	Entry traceability technology based on requirement knowledge graph [12303-28]
12303 1F	Detection of pantograph-catch arc in urban rail transit based on correlation filtering [12303-60]
12303 1G	Military application of blockchain technology for future battlefield operations [12303-22]
12303 1H	A number theoretic transform accelerator with two parallel simplified butterfly units [12303-44]
	12303 10 12303 11 12303 12 12303 13 12303 14 12303 14 12303 16 12303 17 12303 17 12303 17 12303 18 12303 18 12303 1 12303 1 12303 1 12303 1 12303 1 12303 1 12303 1 12303 1 1

- 12303 11 Test methods for RFID tags on individual police equipment [12303-65]
- 12303 1J Application of recommendation algorithm combined with expert knowledge in apparel field [12303-61]
- 12303 1K Sentiment analysis of Chinese comments on OTA website using BERT and LSTM [12303-87]
- 12303 1L Frequency adjustable energy harvesting for autonomous wireless sensor nodes [12303-26]
- 12303 1M Research on employment quality improvement of college students under the perspective of artificial intelligence [12303-34]
- 12303 1N Design and promotion of cost-effective IOT-based heart rate monitoring [12303-115]
- 12303 10 Design and implementation of smart home system based on IOS platform [12303-25]
- 12303 1P A review of auxiliary hardware architectures supporting dynamic taint analysis [12303-109]
- 12303 1Q Research on the application of Internet of Things based on big data cloud computing platform [12303-98]
- 12303 1R Online Travel Agencies (OTAs): a new product of e-commerce [12303-35]
- 12303 1S Research on universal real-time architecture of spacecraft embedded software [12303-7]
- 12303 11 Campus static guide sign systems based on ergonomics [12303-9]
- 12303 10 On orbit maintenance of spacecraft software for connectionless based on ethernet method and application [12303-16]
- 12303 1V Exploring translators' perceptions of and editing actions on post-editing of machine translation [12303-6]
- 12303 1W Research on spatial and temporal characteristics of taxi based on improved K-means with entropy weight: a perspective combined with urban functional area [12303-77]
- 12303 1X Research and practice of JAVA virtual machine exception handling mechanism testing technology [12303-88]
- 12303 1Y Eagle: a complex event processing system [12303-103]

#### COMPUTER NETWORKS AND MODELING PREDICTIVE OPTIMIZATION

12303 1Z Freezing and thawing erosion test and particle flow simulation of caragana root-soil complex [12303-45]

12303 21	Numerical study on dynamic compression of concrete based on meso-scale particle element modeling and fractal theory [12303-40]
12303 22	Finite element analysis on through tied-arch bridge with inclined arch rib during construction stage [12303-80]
12303 23	Analysis of individual cases of foggy environment in Qiongzhou Strait based on numerical simulation [12303-53]
12303 24	A simulation model based on DCGAN to generate 2D animation avatars [12303-41]
12303 25	Research on binocular disparity computing technology of mobile terminal [12303-96]
12303 26	Ship video detection based on improved YOLOv4-Tiny [12303-129]
12303 27	Simulation research on drainage of Tangxun Lake Basin [12303-102]
12303 28	Android malware detection method based on new gray image and VGG [12303-32]
12303 29	Early fire smoke detection model based on YOLOv5 [12303-73]
12303 2A	A deep residual long short-term memory network model for traffic flow prediction [12303-58]
12303 2B	Dynamic law of migrant workers' urban integration based on Markov chain model: a case study of Xi'an city [12303-79]
12303 2C	Research on disk failure prediction based on random forest algorithm [12303-27]
12303 2D	Research on authenticity identification of Chinese painting based on computer technology [12303-120]
12303 2E	Simulation study on the spreading characteristics of fire smoke in underground cable trench [12303-56]
12303 2F	Rapid networking method of multi-task UAV swarm based on leader-follower model [12303-30]
12303 2G	Numerical simulation research on the correlation between bicycle drag and dynamic pressure [12303-39]
12303 2H	Research on automatic detection of text-oriented counterfactual statements [12303-47]
12303 21	Construction of real-time model of airport fire truck fire pump based on improved neural network with visual simulation [12303-95]
12303 2J	Identifying protein complexes based on core-attachment from weighted dynamic network [12303-69]

Numerical simulation of oblique single shear test of arbor taproot-soil composite [12303-99]

12303 20

12303 2K	Realization of garbage classification system based on WeChat mini program [12303-50]
12303 2L	Analysis of applied network information technology in physical education training system [12303-119]
12303 2M	Design and development of engineering supervision management information system [12303-71]
12303 2N	Research on financial loan default risk prediction based on integrated model [12303-89]
12303 20	Design and implementation of semi-object simulation system [12303-13]
12303 2P	Research on clock synchronization of time-triggered ethernet [12303-3]
12303 2Q	Accelerate bit manipulation in XiangShan processer using RISC-V B extension and instruction fusion [12303-5]
12303 2R	PIM-HBMSim: a processing in memory simulator based on high bandwidth memory [12303-10]
12303 2\$	A design of fetch target buffer implemented on XiangShan processor [12303-4]
12303 2T	High-performance and extensible architecture design of design resources integration and sharing platform [12303-8]
12303 20	Parameter control strategy of DC microgrid based on interconnected converter control [12303-138]
12303 2V	Design and implementation of predictive model for urban new energy charging equipment based on genetic algorithm optimized BP neural network [12303-100]
12303 2W	Power transaction optimization model based on new energy power prediction algorithm [12303-63]
12303 2X	Building and application of water-limited vegetation growth simulation model [12303-106]
12303 2Y	Desilting simulation and effect of the desilting tunnel in estuary of Taohe River in Liujiaxia reservoir [12303-64]
12303 2Z	Prediction of novel coronavirus pneumonia epidemic trend based on ARIMA model [12303-59]

## **Conference Committees**

#### Conference Chairman

Warwick Powell, Queensland University of Technology (Australia)

#### Program Committee

Marimuthu Palaniswami, The University of Melbourne (Australia)
Warwick Powell, Queensland University of Technology (Australia)
Amr Tolba, King Saud University (Saudi Arabia)
Nebojša Bačanin-Džakula, University Singidunum (Serbia)
Debasis Giri, Maulana Abul Kalam Azad University of Technology (India)
Shabir A. Parah, University of Kashmir (Pakistan)
Prathapchandran Kannimuthu, Nehru Arts and Science College-Autonomous (India)
Serin V. Simpson, APJ Abdul Kalam Technological University (India)
Sohaib Latif Butt, Anhui University of Science and Technology (China)
Praveen Kumar Donta, Technische Universität Wien (Austria)
Shoufeng Cao, Queensland University of Technology (Australia)
Reza Fotohi, Shahid Beheshti University (Iran)

#### Technical Program Committee

Venkateshwarlu Velde, Balaji Institute of Technology and Science (India)

Rubini. P, CMR University (India) Ahmad Alahmad, The American University of the Middle East (Kuwait) Priyanka Shinde, Government College of Engineering (India) Sarvesh Kumar, Babu Banarasi Das University (India) Sushma Jaiswal, Guru Ghasidas University (India) Shwet Ketu, Banaras Hindu University (India) Reza Fotohi, Shahid Beheshti University (India) Syed Muhammad Mohsin, COMSATS University Islamabad (Pakistan) K. Suresha, D.R.R. Government Polytechnic (India)