

PROCEEDINGS OF SPIE

3rd International Conference on Internet of Things and Smart City (IoTSC 2023)

Xiangjie Kong
Francisco Falcone
Editors

24–26 March 2023
Chongqing, China

Organized by
Universidad Pública de Navarra (Spain)

Sponsored by
AEIC Academic Exchange Information Center (China)

Published by
SPIE

Volume 12708

Proceedings of SPIE 0277-786X, V. 12708

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

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.

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 *3rd International Conference on Internet of Things and Smart City (IoTSC 2023)*, edited by Xiangjie Kong, Francisco Falcone, Proc. of SPIE 12708, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510666375

ISBN: 9781510666382 (electronic)

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time)

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. 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

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

xi *Conference Committee*

IOT BIG DATA AND SUPERCOMPUTING

- 12708 02 **Trajectory vector field calculation and visualization method for regional congestion evaluation** [12708-90]
- 12708 03 **Analysis of traffic safety risk state of highway reconstruction and expansion project based on dynamic Bayesian network** [12708-109]
- 12708 04 **A genetic algorithm based on calibration method of standard propagation model for urban environment** [12708-10]
- 12708 05 **Research on application scenarios of vehicles safety warning based on connected technology** [12708-141]
- 12708 06 **Study on the application of improved morphological component analysis method in the analysis of vehicle half-axle load** [12708-2]
- 12708 07 **Digital-twin-based job scheduling towards ship segment construction** [12708-4]
- 12708 08 **Dynamic partition strategy of warehouse area based on workload balance** [12708-70]
- 12708 09 **Research on multi-layer cybersecurity protection system of intelligent and connected vehicles** [12708-142]
- 12708 0A **Automatic generation of road network model for indoor floor plan navigation** [12708-103]
- 12708 0B **Based on the set-pair method and evaluation of the benefits of intersection vehicle arrival characteristics analysis** [12708-102]
- 12708 0C **Research on clothing personalized recommendation algorithm based on improved collaborative filtering algorithm** [12708-15]
- 12708 0D **Multi-objective optimization of single-line bus combinational scheduling considering passenger choice** [12708-28]
- 12708 0E **IoT device multi-classification using traffic behavior analysis** [12708-96]
- 12708 0F **Modelling multi-modal network based on hypergraph** [12708-63]
- 12708 0G **BIM electromechanical model data organisation method combined with instantiation techniques** [12708-17]

- 12708 0H **Research on intelligent construction method for traffic control scenarios based on traffic violation data mining** [12708-60]
- 12708 0I **Optimization method of Intersection signal control scheme based on heuristic algorithm** [12708-38]
- 12708 0J **Big data analysis and control of power construction equipment backstage based on Internet of Things** [12708-81]
- 12708 0K **Attack prediction in Internet of Things using knowledge graph** [12708-54]
- 12708 0L **Analysis of urban road network operation state based on GPS data of floating car** [12708-35]
- 12708 0M **Text data-based casual analysis of initial delay of high-speed trains** [12708-99]
- 12708 0N **Improved genetic particle swarm algorithm based single intersection signal timing optimization** [12708-98]
- 12708 0O **Design and implementation of Braille learning machine based on Internet of Things technology** [12708-116]
- 12708 0P **A study on the technique for recognizing IoT devices using FTP messages** [12708-82]
- 12708 0Q **The application of Internet of Things in intrusion detection model** [12708-125]
- 12708 0R **Identity authentication scheme for power distribution intelligent network based on dynamic token and identity-based cryptograph.** [12708-30]
- 12708 0S **Research on MAC layer protocol of vehicle Ad hoc network based on TDMA** [12708-88]
- 12708 0T **Ultra-wideband indoor localization method based on Kalman filtering and Taylor algorithm** [12708-119]
- 12708 0U **An efficient group key agreement protocol with administrator** [12708-13]
- 12708 0V **Research on target detection algorithm based on improved YOLOv4** [12708-117]
- 12708 0W **Blockchain-based public audit scheme for smart home data integrity** [12708-85]
- 12708 0X **Vulnerability analysis and protection of smart home gateway** [12708-53]
- 12708 0Y **An improved research of in-vehicle Internet of Things based on PID algorithm** [12708-47]
- 12708 0Z **Recent advances in locality-sensitive hashing and its performance in different applications** [12708-91]
- 12708 10 **Urban public transport commuting path planning method based on dynamic programming algorithm** [12708-111]

- 12708 11 **Multi-authority (t,n) threshold identity-based matchmaking encryption** [12708-121]
- 12708 12 **Application of Lora technology in smart home of Internet of Things** [12708-95]

SMART GRID SYSTEM AND WIRELESS COMMUNICATION

- 12708 13 **Research on blockchain-based electricity material management system** [12708-33]
- 12708 14 **Study on the spatial-temporal differentiation of road network density and its relationship with urban form in Greater Bay Area of Guangdong, Hong Kong and Macao** [12708-94]
- 12708 15 **Empirical verification of chain asymmetric behavior model: take Yingtian street in Nanjing as an example** [12708-52]
- 12708 16 **Investigating driving behavior and vehicle risk discrimination in expressway merging area** [12708-115]
- 12708 17 **Design and development of intelligent guide rod based on Arduino and IoT sensing technology** [12708-101]
- 12708 18 **Analysis of effects on the steering system of nose landing gear by towbarless traction** [12708-140]
- 12708 19 **A Graph-based multi view clustering approach for building group patterns recognition** [12708-6]
- 12708 1A **The design for data transmission and processing system for speed governor test-bed based on IOT** [12708-19]
- 12708 1B **Research on hovering control system of four rotor UAV in indoor environment** [12708-106]
- 12708 1C **Design of intelligent decision support system based on artificial intelligence** [12708-44]
- 12708 1D **Research on intelligent building equipment room operation and maintenance platform based on digital twins** [12708-55]
- 12708 1E **Distributed strain measurement method of bridge based on weak FBG sensing array** [12708-14]
- 12708 1F **Design of intelligent granary monitoring system based on OneNET** [12708-133]
- 12708 1G **CONGEST traffic signal control based on macroscopic fundamental diagram** [12708-113]
- 12708 1H **Visual localization and mapping based on road constraints** [12708-18]
- 12708 1I **Intelligent early warning system for power theft in distribution network based on IOT technology** [12708-41]

- 12708 1J **Design and application of intelligent pet feeding management control system** [12708-36]
- 12708 1K **Optimal dispatching control of distribution network based on IHHO algorithm** [12708-126]
- 12708 1L **Design of smart community access control system based on SSD and OneNET cloud platform** [12708-104]
- 12708 1M **Ordered charging control strategy of optical storage charging station based on peak-valley time division** [12708-32]
- 12708 1N **Interaction strength prediction based on neural networks of graph scrolls considering geographical features** [12708-129]
- 12708 1O **Design of the intelligent parking lot management system based on the user side and management side** [12708-39]
- 12708 1P **Dynamic scheduling algorithm of electric vehicles based on smart grid** [12708-5]
- 12708 1Q **Road surface defect detection based on large convolution kernel and YOLOv5** [12708-8]
- 12708 1R **Passenger satisfaction evaluation of high-speed railway station based on Bayesian network** [12708-51]
- 12708 1S **Design and implementation for virtual forest scene synthesis-editing system** [12708-45]
- 12708 1T **Research and application of smart home-based care system based on Internet of Things technology** [12708-123]
- 12708 1U **A web crawler-based method for collecting information on investment promotion enterprises** [12708-65]
- 12708 1V **Distributed data reception and storage of source network load full-view synchronized measurement system** [12708-42]
- 12708 1W **Evaluating the importance of nodes in the urban logistics UAV distribution network based on complex network theory** [12708-77]
- 12708 1X **Intelligent environmental monitoring system for power transformation and distribution station** [12708-138]
- 12708 1Y **Research on intelligent early warning of substation fire based on multi-sensor fusion algorithm** [12708-72]
- 12708 1Z **Distributed localization of wireless sensor networks in indoor environment** [12708-67]
- 12708 20 **Evaluation of the travel friendliness of children in a 15-min community life circle based on machine learning** [12708-84]
- 12708 21 **Design of intelligent deicing robot for high voltage transmission lines based on TRIZ theory** [12708-132]

- 12708 22 **Intelligent device identification based on traffic time-series features** [12708-87]
- 12708 23 **Design of single ring redundant network system based on S7-1200** [12708-49]

SMART CITY AND TRANSPORTATION MODELING

- 12708 24 **Driver decision prediction model in dilemma zones based on BP neural network** [12708-34]
- 12708 25 **A dynamic speed limiting control method of expressway based on the prevention of secondary traffic accidents** [12708-92]
- 12708 26 **Analysis on the traffic accessibility of county areas in Fuzhou City based on GIS** [12708-48]
- 12708 27 **Accident scenario analysis of expressway reconstruction and expansion project based on Bayesian network** [12708-22]
- 12708 28 **Flight schedule recovery based on the marginal benefits of airlines** [12708-20]
- 12708 29 **Evaluation of station layout of urban parking lot based on POI data** [12708-9]
- 12708 2A **Simulation and optimization of inbound passenger flow line in large-scale railway station** [12708-46]
- 12708 2B **A comprehensive evaluation method of urban rail transit operation plan based on G1 and anti-EWM** [12708-139]
- 12708 2C **Research on the braking risk threshold value for fully loaded medium trucks on long downgrade route sections of mountainous highways based on entropy weight method** [12708-25]
- 12708 2D **Study of traffic improvement planning and design assistant decision making system based on city brain** [12708-78]
- 12708 2E **Modelling of congestion carbon emission measurement based on multiple regression analysis for traffic flow** [12708-93]
- 12708 2F **Intelligent bus application solution based on 5G network** [12708-131]
- 12708 2G **BuildingMap-GAN: a map translator from road to building footprint** [12708-7]
- 12708 2H **Modeling and optimization of traffic flow** [12708-57]
- 12708 2I **Research of passenger-perceived service quality of urban public transportation system** [12708-3]
- 12708 2J **Research on the application of big data technology in smart city** [12708-97]

- 12708 2K **Spatio-temporal attention network for urban rail transit passenger flow prediction** [12708-40]
- 12708 2L **Research on long term parking node screening technology based on the threshold of freight vehicle parking speed** [12708-83]
- 12708 2M **Scheduling optimization of quay crane operation in container terminal considering container relocation in yard** [12708-12]
- 12708 2N **Optimization of electric vehicle distribution path considering profit distribution under the sharing economy** [12708-58]
- 12708 2O **An application of multi-source data in urban vitality estimation for urban renewal: based on Weifang, China** [12708-110]
- 12708 2P **Identification of critical stations and links in urban rail networks under urban bus connections** [12708-21]
- 12708 2Q **Optimization of low-carbon multimodal transport paths in an ambiguous demand environment** [12708-89]
- 12708 2R **The impact of conflict avoidance strategies of internal and external container trucks on the traffic scheduling in automated container terminals** [12708-66]
- 12708 2S **Study on dynamic assessment and early warning model of expressway traffic flow risk** [12708-59]
- 12708 2T **Airport vehicle scheduling and obstacle avoidance predictive control based on improved Q-learning and trajectory re-planning** [12708-50]
- 12708 2U **Locality-aware spatial-temporal attention neural network with contrast learning for traffic flow prediction** [12708-130]
- 12708 2V **Research on peak transport congestion control based on convolutional neural network** [12708-134]
- 12708 2W **Study on the optimization of intelligent transportation system for preventing the abuse of high beam** [12708-79]
- 12708 2X **Study on the optimization of emergency medical supplies distribution paths under public health emergencies** [12708-114]
- 12708 2Y **Selection of urban light pollution mitigation strategies based on reinforcement learning** [12708-16]
- 12708 2Z **Temporal and spatial variation characteristics of eco-environmental quality in Ningbo Hangzhou Bay New Area based on remote sensing ecological index model** [12708-86]
- 12708 30 **Light pollution control in cities based on cellular automata** [12708-68]
- 12708 31 **The application of UAV tilt photogrammetry technology in the construction of smart city: a case study of Zhongdu ancient town in Guangxi** [12708-11]

- 12708 32 **Research on classification of urban rail transit stations based on AFC data** [12708-31]
- 12708 33 **Research on the construction of smart city information security evaluation index system based on Delphi-DEMATEL** [12708-74]
- 12708 34 **Research on intelligent operation and maintenance system of urban traffic signal** [12708-108]
- 12708 35 **Reconstruction performance analysis of discriminative infinite fuzzy restricted Boltzmann machine** [12708-76]
- 12708 36 **Short-term vehicle trajectory prediction using attention mechanism integrated GRU network** [12708-118]