## PROCEEDINGS OF SPIE

## International Conference on Mechatronics and Intelligent Control (ICMIC 2023)

Kun Zhang Gheorghe Grigoras Editors

21–23 July 2023 Wuhan, China

Organized by Wuhan Kesheng Cultural Development Co., Ltd. (China)

Sponsored by
Korea Advanced Institute of Science & Technology (Korea, Republic of)
Capital Normal University (China)
Xi'an Jiaotong University (China)
Polish Academy of Sciences (Poland)

Published by SPIF

**Volume 12793** 

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 Mechatronics and Intelligent Control (ICMIC 2023)*, edited by Kun Zhang, Gheorghe Grigoras, Proc. of SPIE 12793, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510668393

ISBN: 9781510668409 (electronic)

Published by

SPIF

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.



**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

## INTERNATIONAL CONFERENCE ON MECHATRONICS AND INTELLIGENT CONTROL (ICMIC 2023)

12793 02	Research on the framework structure and application of computer network security [12793-1]
12793 03	Exploration of the application of UAV in overhead transmission line inspection [12793-2]
12793 04	Research on monitoring system of construction machinery based on Internet of Things [12793-3]
12793 05	Elevator fault diagnosis and maintenance method based on Internet of Things [12793-6]
12793 06	Design and experimental study of a laver delivery system based on the biomechanical properties of laver [12793-7]
12793 07	Research on real-time evaluation model of social work based on big data [12793-8]
12793 08	Study of graphene variable capacitance based on intelligent algorithm [12793-9]
12793 09	Investigation of quality management of construction projects based on BIM technology [12793-10]
12793 0A	Research on the application of artificial intelligence in civil engineering monitoring [12793-11]
12793 OB	Constructing the dataset for valid-configuration-related vulnerability [12793-12]
12793 OC	Research on application of big data in quality control of communication engineering products [12793-13]
12793 0D	An empirical study on configuration-related branch statements in database management systems [12793-14]
12793 OE	The key technology and application of autonomous maritime radio devices [12793-15]
12793 OF	Experiment study on forward propagation characteristics on the shock train in an annular isolator under steady back pressure [12793-16]
12793 OG	Application of workflow in new power load management system [12793-17]
12793 OH	Study on the application of attached lifting scaffolding in the construction of large projects [12793-18]

12793 OI	Automation and robots are developing in the field of tall buildings [12793-19]
12793 OJ	Computer simulation and equipment fabrication of LIU ultrasound in the treatment of knee joint degeneration [12793-20]
12793 OK	Research on satellite navigation and communication environment monitoring based on very low frequency [12793-21]
12793 OL	Energy-efficient RGB camera based virtual keyboard system [12793-22]
12793 OM	Research on the crack behaviors under rolling contact of oscillation applications in wind turbine bearings [12793-23]
12793 ON	Guidance and control method for autonomous obstacle avoidance soft landing of multi-vector engine aircraft [12793-24]
12793 00	Two kinematic behaviors of a Bose-Einstein condensate passing a Gaussian laser field [12793-25]
12793 OP	Research on scheme design and structure optimization of high speed and high precision vehicle contour detection platform [12793-26]
12793 0Q	A high sensitivity fiber optic acoustic sensor based on incident-angle sensing: application to detect snoring signals [12793-27]
12793 OR	Optimizing carbon emission reduction strategies through Al-enabled modeling: paving the way to a sustainable future [12793-28]
12793 OS	Data mining based clustering analysis algorithm and its practical research [12793-29]
12793 OT	Calculation methods of propeller signatures based on CFD [12793-30]
12793 OU	Force analysis and optimization of bolt cam part [12793-31]
12793 OV	Research on the application of big data technology in enterprise digital transformation [12793-32]
12793 OW	Digital twin-driven motion trajectory tracking control of electromagnetic linear actuator [12793-33]
12793 OX	Knowledge representation learning method based on background information and adaptive weight measurement [12793-34]
12793 OY	Mask YOLO: a fine-grid method for multi-scale targets detection [12793-35]
12793 OZ	Research on transmission control technology in computer wireless network communication [12793-36]
12793 10	Research on static calibration system of multi-dimensional force sensor [12793-37]

12793 11	Reliability analysis of thin-walled gear ring wear considering hardness gradient of carburized layer [12793-38]
12793 12	The application of the automation technology in mechanical control system is reflected [12793-40]
12793 13	Path planning method of unmanned ship based on PPO and DWA [12793-41]
12793 14	Investigation of the effect of thermal-oxidative again on the damaged 3D woven carbon fiber composite materials [12793-42]
12793 15	The impact of computer technology on the location of public hospitals in the context of emergency response: based on structure, conduct, and performance analysis [12793-43]
12793 16	Research on residual surface stresses and optimization of milling process parameters [12793-44]
12793 17	Research on improving safety management of port operations relevant to hazardous chemicals with intelligent technology [12793-45]
12793 18	Redistribution of residual stress in aluminum alloy plate and its effect on bending deformation [12793-46]
12793 19	Lightning performance of 35kV distribution network using lightning prevention composite insulator [12793-47]
12793 1A	Adaptive anti-lock braking control strategy of in wheel motor driven vehicle [12793-48]
12793 1B	Performance evaluation of quantum secure edge data center architecture [12793-49]
12793 1C	Vibration damping microcontroller architecture for multifunctional systems with stochastic input time [12793-50]
12793 1D	Bearing fault diagnosis based on TVF-EMD decomposition and random forest prediction [12793-51]
12793 1E	Research on the device for measuring the engagement depth of bottom guide of landing door [12793-52]
12793 1F	Research on the bearing performance of spiral anchors in muddy soil [12793-53]
12793 1G	Dynamic analysis of tension stringing system of UHV transmission line based on Adams [12793-54]
12793 1H	A review of few-shot network traffic classification based on deep learning [12793-55]
12793 11	Semi-physical simulation platform for helicopter protection and rescue system [12793-56]
12793 1J	Eigenvalue solution of sparse matrix based on MPETSc [12793-58]

12793 1K	Parameter identification of cable-stayed bridge with asymmetric double cantilever girder construction based on BP neural network [12793-59]
12793 1L	Research and practice of BIM technology in engineering quantity calculation of intercity railway design stage [12793-60]
12793 1M	Risk of civil aircraft development project based on big data analysis technology [12793-61]
12793 IN	Study on shear wave velocity of soil mass in Beijing urban area based on grey correlation and regression analysis [12793-62]
12793 10	Design and realization of final value prediction circuit of laser high power detector [12793-64]
12793 1P	Bio-inspired superhydrophobic surface based on hierarchical periodic surface structures of titanium by ultrafast laser [12793-65]
12793 1Q	Optimization of blockchain consensus mechanism based on DPOS [12793-66]
12793 1R	A new bearing fault diagnosis method based on multi-scale CNN and LSTM [12793-67]
12793 IS	Experimental study on hydrodynamic characteristics of anchored offshore test platform under wind wave current coupling [12793-68]
12793 1T	Construction of three-dimensional digital twin model for ultra-high voltage power transformers and bushings and its electric sensor device [12793-70]
12793 1U	Research and analysis on 3D visualization simulation of digital twin models for UHV power bushing equipment [12793-71]
12793 1V	Research on key technologies for rapid synchronization of large-scale digital twin network status [12793-72]
12793 1W	Research on prefabricated plate cable foundation [12793-73]
12793 1X	Analysis on the construction of horse cultural information resources under the background of artificial intelligence [12793-74]
12793 1Y	Automated test methods for standard products (communication protocols) for electric vehicle charging devices [12793-75]
12793 1Z	Research on communication protocol and interoperability test methods of ChaoJi charging devices [12793-76]
12793 20	Analysis on the factors of rural tourism development under the internet plus mode [12793-78]
12793 21	Study on simulation on bending behavior of electrosensitive hydrogel [12793-79]
12793 22	Application of fluid mechanics in flow meter principle analysis and process simulation [12793-80]

12793 23	Third-order plane stochastic tensor with a public pair: C-Eigenpair analysis [12793-81]
12793 24	Study on the spatial and temporal evolution system of the factors influencing electricity consumption in China [12793-82]
12793 25	Water quality monitoring and sustainable operation management of marine ranches based or sensors and image enhancement $[12793-83]$
12793 26	Enterprise ecological environment information management mechanism based on deep learning [12793-84]
12793 27	Real time image processing and operation management of multicultural communication platforms based on deep learning [12793-85]