

PROCEEDINGS OF SPIE

***Third International Conference
on Intelligent Mechanical and
Human-Computer Interaction
Technology (IHCIT 2024)***

**Xiangjie Kong
Xingjian Wang**
Editors

**5–7 July 2024
Hangzhou, China**

Organized by
Beihang University (China)

Sponsored by
AEIC—Academic Exchange Information Centre (China)

Published by
SPIE

Volume 13284

Proceedings of SPIE 0277-786X, V. 13284

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 *Third International Conference on Intelligent Mechanical and Human-Computer Interaction Technology (IHCIT 2024)*, edited by Xiangjie Kong, Xingjian Wang, Proc. of SPIE 13284, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510683105

ISBN: 9781510683112 (electronic)

Published by

SPIE

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

Telephone +1 360 676 3290 (Pacific Time)

SPIE.org

Copyright © 2024 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

ix *Conference Committee*

INTELLIGENT MACHINERY DESIGN AND CONTROL TECHNOLOGY

- 13284 02 **Research on trajectory planning of intelligent cooperative motion of two robotic arms**
[13284-92]
- 13284 03 **Study on the method of motor short-circuit fault based on the improved random forest**
[13284-41]
- 13284 04 **Particle swarm optimised fuzzy PID control method for hybrid magnetic bearings** [13284-27]
- 13284 05 **Linear active disturbance rejection control of brushless DC motor based on improved gray wolf optimization algorithm** [13284-48]
- 13284 06 **Cooperative control of slip rate of distributed drive electric vehicles based on modularization and multi-agent** [13284-39]
- 13284 07 **High-precision steel plate corrosion rate monitoring model based on dilated convolution**
[13284-81]
- 13284 08 **Development status and prospects of intelligent control methods for greenhouse environment** [13284-94]
- 13284 09 **Research on mechanical parts precision evaluation based on machine learning** [13284-97]
- 13284 0A **Lightweight design method of LPG tanker by using high-strength steel based on finite element analysis** [13284-64]
- 13284 0B **Cooperative guidance control design for multi-agent vehicles** [13284-18]
- 13284 0C **Design optimization of electric aircraft scheme for minimum life cycle cost** [13284-22]
- 13284 0D **Design of intelligent vehicle for thermal engine power based on OPENMV** [13284-8]
- 13284 0E **Precision compensation method of manipulator based on neural network and particle swarm optimization** [13284-80]
- 13284 0F **Study of the mechanism of bird flight formation: upstream blade affecting the aerodynamic performance of downstream blade** [13284-73]
- 13284 0G **Design and research of an intelligent dimming system for electronic table lamp based on 51 microcontroller** [13284-82]

- 13284 OH **Research on aging design of smart home control panel interface** [13284-32]
- 13284 OI **Research on sliding mode coordinated control of yaw stability of distributed drive electric wheel vehicle** [13284-90]
- 13284 OJ **Scheduling optimization for highly customized shop assembly production based on improved NSGA-II algorithm** [13284-13]
- 13284 OK **A review of intelligent dispatching methods for emergency rescue** [13284-20]
- 13284 OL **Fault diagnosis of electro-hydrostatic actuators based on CWT and CNN-transformer** [13284-77]
- 13284 OM **Research on laser vision tracking technology for automatic welding of thin plate** [13284-56]
- 13284 ON **Structural function and fault mode analysis of high-power nuclear power circulating pump gearbox** [13284-87]
- 13284 OO **Optimization design of motor driven by high-inertia load** [13284-46]
- 13284 OP **Research and design of a self-sensing processing device for the installation environment of high-voltage cross-linked cable accessories** [13284-38]
- 13284 OQ **Dynamic simulation analysis of constant speed valve based on AMESim** [13284-62]

ROBOT MODELING AND HUMAN-ROBOT INTERACTION SIMULATION

- 13284 OR **Influence of the conductivity of radiofrequency conducting medium on the temperature gradient of bipolar radiofrequency based on finite element analysis** [13284-15]
- 13284 OS **The effect of bipolar radiofrequency electrode diameters and spacing on subcutaneous temperature distribution based on finite element analysis** [13284-12]
- 13284 OT **Research and design of stage lighting simulation system based on unreal engine** [13284-23]
- 13284 OU **Dynamic prediction method for contour error of CNC machine tools driven by mechanism-data hybrid** [13284-24]
- 13284 OV **A review on application of motion sensing technology in human-computer interaction** [13284-79]
- 13284 OW **Overwhelmed: conceptual design of an interactive device for autism sensory overload experience** [13284-66]
- 13284 OX **Research on mixed reality multimodal interaction for information screening tasks** [13284-85]

- 13284 0Y **Construction of patent knowledge graph of the exoskeleton robot based on ontology**
[13284-30]
- 13284 0Z **Ergonomic design and evaluation of human-machine interaction on the display and control interface of full ocean-deep manned submersible cockpit** [13284-43]
- 13284 10 **A stress classification model based on physiological features in aviation operational tasks**
[13284-63]
- 13284 11 **Lower limb rehabilitation exoskeleton robots: a review of development directions**
[13284-78]
- 13284 12 **Power robot standardization status and outlook** [13284-19]
- 13284 13 **Research on lightweight design and control method of the front claw of intelligent transportation robots** [13284-65]
- 13284 14 **A novel transfer learning method based on multi-kernel MMD and domain adversarial for fault diagnosis of bearings in robots** [13284-7]
- 13284 15 **Empirical evaluation of reliability of ZPW-2000A track circuit system: application of FMEA and FTA method** [13284-55]
- 13284 16 **An improved A* path planning algorithm for mobile robots based on bilevel extension strategy** [13284-29]
- 13284 17 **Research on the steering of multi-legged wheeled robots** [13284-1]
- 13284 18 **Research on smooth control of process parameters for pipeline automatic welding robot**
[13284-71]
- 13284 19 **Mechanical-electrical co-simulation of vehicle-mounted two-degree-of-freedom pan-tilt**
[13284-34]
- 13284 1A **Research on industrial robot path planning based on improved RRT algorithm** [13284-84]
- 13284 1B **Design and realization of an autonomous dock for unmanned ships** [13284-75]
- 13284 1C **Terrain classification method for quadruped robots based on proprioception sensors**
[13284-59]
- 13284 1D **Analysis and design of an acupuncture robot system** [13284-99]

COMPUTER MODELING AND INFORMATION PROCESSING TECHNOLOGY

- 13284 1E **Multi-vehicle cooperative handling formation optimization method based on improved genetic algorithm** [13284-4]

- 13284 1F **MB-RSVP: multi-brain can improve accuracy of single-trial EEG-based object detection** [13284-67]
- 13284 1G **Construction and analysis of manufacturing data based on knowledge graph** [13284-45]
- 13284 1H **Exploring the cultivation of practical innovation ability of engineering students in application-oriented universities driven by scientific research projects: a case study of virtual Try-On software** [13284-31]
- 13284 1I **Short-time multi-target SSVEP recognition using perceiver and large kernel convolution network** [13284-53]
- 13284 1J **Analysis of factors influencing perceived urgency and auditory preference for auditory warning signals** [13284-26]
- 13284 1K **Simulating the three-dimensional morphology of rough surfaces based on Monte Carlo method** [13284-52]
- 13284 1L **Research on cybersecurity of CAN bus for ICV** [13284-58]
- 13284 1M **Research on EEG dataset construction and partitioning strategies for motor imagery decoding** [13284-44]
- 13284 1N **Improved dynamic window approach for USV path planning based on COLREGs** [13284-42]
- 13284 1O **Probing a novel dual-phase adaptive deep learning approach for dynamic flexible job shop scheduling** [13284-76]
- 13284 1P **A deep-learning-based method for reusing assembly processes of micro-components** [13284-86]
- 13284 1Q **Research on production line optimization based on NSGA-II algorithm** [13284-98]
- 13284 1R **A multi-agent system for indirect reciprocity with optional interaction** [13284-6]
- 13284 1S **MeshABS: mesh-based scheduling scheme for 6G IAB networks** [13284-16]
- 13284 1T **Planning of JPS algorithm based on direction region priority improvement** [13284-47]
- 13284 1U **Porting and driver design for embedded Linux device camera** [13284-3]
- 13284 1V **Design of an interactive installation for Chu music and dance based on image recognition** [13284-61]
- 13284 1W **Decoding an intuitive brain-computer interface combining speech and visual imagery using dual-branch network** [13284-2]

- 13284 1X **Steady-state visual evoked potentials-based 2D continuous control of brain-computer interface** [13284-70]
- 13284 1Y **Research on spatiotemporal graph convolutional networks for assembly personnel action recognition in open environments** [13284-5]
- 13284 1Z **Research on automatic generation of assembly process based on graph embedding** [13284-72]
- 13284 20 **Design and research of an interactive oil painting virtual reality game** [13284-69]
- 13284 21 **On-orbit identification algorithms for dynamics parameters of gravity satellite** [13284-9]