

PROCEEDINGS OF SPIE

Fourth International Conference on High Performance Computing and Communication Engineering (HPCCE 2024)

Tai Fei
Editor

22–24 November 2024
Suzhou, China

Organized by
Southwest University of Science and Technology (China)

Sponsored by
AEIC—Academic Exchange Information Centre (China)

Published by
SPIE

Volume 13630

Proceedings of SPIE 0277-786X, V. 13630

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 *Fourth International Conference on High Performance Computing and Communication Engineering (HPCCE 2024)*, edited by Tai Fei, Proc. of SPIE 13630, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510691681

ISBN: 9781510691698 (electronic)

Published by

SPIE

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

Telephone +1 360 676 3290 (Pacific Time)

SPIE.org

Copyright © 2025 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

vii *Conference Committee*

ADVANCED COMPUTING METHODS AND ALGORITHM APPLICATION

- 13630 02 **A one-to-many authentication and key agreement scheme based on the sliding window**
[13630-65]
- 13630 03 **Research on collaborative adversarial strategies for drone swarms based on deep reinforcement learning** [13630-68]
- 13630 04 **Multi-strategy parameter adaptive differential evolution algorithm based on stage grouping** [13630-24]
- 13630 05 **APRK: an accelerated parallel randomized iterative algorithm for solving large-scale sparse overdetermined linear systems** [13630-26]
- 13630 06 **An efficient and lightweight pseudo-random number generator based on logistic map**
[13630-63]
- 13630 07 **A upper bound of the tweak length in tweakable block cipher** [13630-7]
- 13630 08 **Design and implementation of computing module based on GPU** [13630-67]
- 13630 09 **A collaborative filtering-based algorithm for music platform recommendations** [13630-14]
- 13630 0A **The fusion application of mathematical models and intelligent computing in data mining**
[13630-62]
- 13630 0B **Space SRCNN: lightweight spatial target super-resolution reconstruction algorithm**
[13630-13]
- 13630 0C **Cislunar space debris detection method based on binary projection matrix** [13630-38]
- 13630 0D **Research on dynamic spectrum allocation algorithm in cognitive radio networks** [13630-27]
- 13630 0E **A machine-learning-based approach for adaptive integration of virtual power plant resources** [13630-75]
- 13630 0F **Optimization of the diagonal incomplete Cholesky conjugate gradient method on GPU**
[13630-57]
- 13630 0G **Research on brightness temperature reconstruction of synthetic aperture based on Resnet**
[13630-2]

- 13630 OH **Research on multisource track fusion algorithm based on regional discriminant fusion**
[13630-36]
- 13630 OI **Design of multichannel data acquisition module based on FPGA** [13630-66]
- 13630 OJ **An improved simulated annealing-linear programming hybrid algorithm applied to the optimal planting plan of crops** [13630-58]
- 13630 OK **Design and implementation of high-performance heterogeneous computing module based on Loongson 3A5000** [13630-71]
- 13630 OL **Research on multivehicle cooperative control strategies for urban roads** [13630-32]

COMMUNICATION SYSTEM DESIGN AND INFORMATION PROCESSING TECHNOLOGY

- 13630 OM **Design of a code acquisition method for low-earth orbit satellites with high dynamics**
[13630-59]
- 13630 ON **Coverage optimization for 3D wireless sensor networks based on improved zebra optimization algorithm** [13630-19]
- 13630 OO **Digital nuclear security LoRa ad hoc network technology** [13630-39]
- 13630 OP **Multinode load balancing scheduling in Kubernetes business clusters under cross-room weak network conditions** [13630-43]
- 13630 OQ **Wearable antenna array for upper extremity sarcoma microwave hyperthermia** [13630-34]
- 13630 OR **swAHSpMV: an adaptive and heterogeneous optimization of SpMV for Hypre on SW26010-pro processor** [13630-29]
- 13630 OS **High-performance register file design for general-purpose graphics processing unit with multi-issue logic** [13630-8]
- 13630 OT **Sparsity of frequency modulation signals based on fractional Fourier transform and maximum dispersion** [13630-64]
- 13630 OU **Design and implementation of a multimode communication and networking system for marine internet** [13630-37]
- 13630 OV **Low-complexity carrier phase estimation algorithms for space coherent optical communication** [13630-10]
- 13630 OW **Multi-objective optimal control of lysine fed-batch based on reinforcement learning**
[13630-54]

- 13630 0X **A methodology for assessing the performance of communication interfaces for highway-based polymorphic energy fusion equipment** [13630-80]
- 13630 0Y **Research on automatic selection method of 5G communication link based on Bayesian network adaptive reasoning** [13630-46]
- 13630 0Z **Analysis of physical layer security enhancement in wireless communication systems under random mobility** [13630-9]
- 13630 10 **Research on interference identification technology in mobile communication networks based on GAN network** [13630-23]
- 13630 11 **Topology planning method of emergency communication network based on heuristic ant colony optimization** [13630-31]
- 13630 12 **Pseudocode-based laser time-frequency transfer tracking module design** [13630-6]
- 13630 13 **Research on time series data processing method for distributed IoT communication protocol based on rule engine** [13630-4]
- 13630 14 **Telecom carrier package recommendation system based on deep learning** [13630-81]
- 13630 15 **Design of a 5G redcap onboard terminal for UAVs** [13630-51]

ADVANCED INFORMATION TECHNOLOGY AND INFORMATION EVALUATION

- 13630 16 **Application of random forest models in the identification of Chinese herbal medicines** [13630-5]
- 13630 17 **Research on path optimization of multibeam sonar measurement** [13630-16]
- 13630 18 **Research on situation assessment and forecasting in multi-SDN integrated networks** [13630-3]
- 13630 19 **Radical quantitative acceleration and block-dimension quantization precision analysis for stable video diffusion** [13630-35]
- 13630 1A **Maximum posterior estimation and performance analysis of range in signal-target radar detection system** [13630-69]
- 13630 1B **Research and design of AMC based on SNR estimation in 5G scenarios** [13630-18]
- 13630 1C **Research on the reliability of a certain type of measurement and control computer** [13630-72]
- 13630 1D **Application and exploration of 5G+machine vision in the industrial field** [13630-47]

- 13630 1E **Direction measurement of radiation from leaky coaxial cables with GPS/BDS dual-mode simulator** [13630-22]
- 13630 1F **Automatic extraction technology of unstructured information from violation accident event database** [13630-77]
- 13630 1G **DOA estimation based on STFT and complex-valued CNN** [13630-25]
- 13630 1H **Liver tumor segmentation based on semi-supervised learning** [13630-11]
- 13630 1I **Design of a virtual simulation teaching platform for integrated energy optimization and configuration of electric power based on data visualization** [13630-41]
- 13630 1J **Polynomial interpolation-based anomaly detection in injection pumps** [13630-12]
- 13630 1K **Cascading failures dynamics model based on the road impedance and conditional Markov state** [13630-56]
- 13630 1L **The low SNR and high dynamic coarse frequency offset estimation method for helicopter-satellite communication** [13630-30]
- 13630 1M **A scale adaptation autoencoder model for anomaly detection** [13630-33]
- 13630 1N **Attribute mining of multisource and multimodal data from social media based on generalized scene graphs** [13630-76]
- 13630 1O **Detection limit of signal source for I-shaped array based on information theory** [13630-74]