PROCEEDINGS OF SPIE

Fifth International Conference on Signal Processing and Computer Science (SPCS 2024)

Haiquan Zhao
Lei Chen
Editors

23–25 August 2024
Harbin, China

Organized by
Henan University (China)

Sponsored by
AEIC—Academic Exchange Information Centre (China)

Published by
SPIE

Volume 13442

Proceedings of SPIE 0277-786X, V. 13442

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 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 *Fifth International Conference on Signal Processing and Computer Science (SPCS 2024)*, edited by Haiquan Zhao, Lei Chen, Proc. of SPIE 13442, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

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

ISBN: 9781510686724
ISBN: 9781510686731 (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
SPIEDigitalLibrary.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 SIGNAL PROCESSING AND INFORMATION CLASSIFICATION

13442 02 **Review of identification technologies for stray animal governance** [13442-71]

13442 03 **FPAO: garbage classification via a multilayer network based on feature preference and attention optimization** [13442-39]

13442 04 **Accurate identification of the number of objects in noncontact closed containers based on acoustic signal analysis** [13442-32]

13442 05 **A dynamic analysis approach in racket sports** [13442-117]

13442 06 **SVM-based malware classification though deep learning method** [13442-82]

13442 07 **Study on the application of transfer learning in small sample image classification of military equipment** [13442-75]

13442 08 **Out-of-distribution data supervision towards biomedical semantic segmentation** [13442-33]

13442 09 **Method for extracting suspected bird nest areas on transmission lines using integrated depth and color information** [13442-127]

13442 0A **DFCRN: deep-learning-based audio denoising for bird monitoring** [13442-84]

13442 0B **Emotion classification based on EEG wavelet features and LSTM network** [13442-42]

13442 0C **Facial expression recognition algorithm based on deep learning** [13442-52]

13442 0D **An aircraft recovery method based on ALNS** [13442-94]

13442 0E **Vehicle classification method based on deep learning** [13442-79]

13442 0F **The impact of ephemeral data sharing on e-commerce supply chain product quality and service strategies under channel power change** [13442-15]

13442 0G **Application of conditional DDPM on the MNIST dataset** [13442-62]

13442 0H **SFD-SLAM: an improved sparse semi-direct method based on ORB-SLAM2** [13442-21]

13442 0I **Interpretability analysis of flight delay prediction based on KernelSHAP** [13442-13]

13442 0J **MVDR algorithm based on sample selection strategy** [13442-60]

13442 0K **Fast video stitching algorithm based on adaptive key frames extraction** [13442-31]

13442 0L **Based on structure and texture dual-stream network for ancient mural restoration** [13442-19]

13442 0M **DSSNet: a transformer-based network for dense scene text detection and recognition in complex environments** [13442-66]

13442 0N **A new method of cutting mapping weld extraction based on Gaussian function** [13442-118]

13442 0O **Research on modeling and feature extraction of maritime vessel targets based on micro-Doppler effect characteristics** [13442-77]

13442 0P **Fault diagnosis algorithm based on multivariate time series feature extraction** [13442-23]

13442 0Q **Robust audio watermarking based on a multi-band masking model using a DNN** [13442-47]

13442 0R **Transformer-based vehicle detection algorithm under foggy conditions** [13442-125]

13442 0S **An efficient multimodal fusion bird's-eye view 3D object detection algorithm** [13442-37]

13442 0T **Research on simulation of human brain neural network and signal processing technology** [13442-124]

13442 0U **Continuous wave mud pulse channel equalization method based on NARX neural network** [13442-114]

MOBILE COMMUNICATION TECHNOLOGY AND POWER GRID MODELING

13442 0V **5G communication architecture and key technologies** [13442-68]

13442 0W **Multidomain united antijamming algorithm for monopulse radar** [13442-85]

13442 0X **Research on waveform design of frequency diverse multiple-input multiple-output radar system** [13442-22]

13442 0Y **Unsupervised part extraction of substation equipment based on joint multilevel voxels' features of point clouds** [13442-64]

13442 0Z **Research on optimization scheme for maintaining consistency of high-speed railway belt benchmark station network** [13442-43]

13442 10 **Fault self-healing of ship distribution network based on improved genetic algorithm** [13442-6]

13442 11 **Discussion on the use of LoRa wireless communication technology in building electrification fire supervision system** [13442-116]

13442 12 **Privacy-preserving smart grid fault diagnosis method based on federated conditional model strategy** [13442-74]

13442 13 **Multiscale pansharpening method based on frequency feature guidance** [13442-29]

13442 14 **Research on a method of ship radiation noise pulse interference suppression based on VMD** [13442-81]

13442 15 **Optimizing acoustic field rendering through heterogeneous computing** [13442-17]

13442 16 **Underdetermined DOA estimation of wideband nonstationary signals based on ANM** [13442-113]

13442 17 **Underdetermined DOA estimation of wideband nonstationary signals with completely overlapped TFDs** [13442-111]

13442 18 **Design of a towed linear array sonar signal processing simulator** [13442-100]

13442 19 **Research on precise control and taming of frequency source based on digital phase-locked technology** [13442-95]

13442 1A **Self-attention-based multidimensional feature aggregation neural network for OFDM channel estimation** [13442-102]

13442 1B **Angle estimation based on coarray tensor completion for bistatic coprime MIMO radar** [13442-14]

13442 1C **Stereo vision and UWB-based multisensor fusion SLAM** [13442-10]

13442 1D **The study on the circuit architecture of reconfigurable physics-based unclonable technology** [13442-34]

13442 1E **Simulation analysis of higher harmonics of traction current and research on suppression scheme** [13442-63]

13442 1F **A transformer-based framework for non-Cartesian MRI reconstruction** [13442-24]

13442 1G **Analysis of PPP positioning performance based on BeiDou PPP-B2b service** [13442-105]

13442 1H **MLS's output frequency calibration method study** [13442-93]

13442 1I **Research on far-field high-precision direction estimation and error calibration method based on beamspace MUSIC algorithm** [13442-49]

13442 1J **Design and implementation of intermediate frequency (IF) downconversion and direct radio frequency (RF) sampling in AIS receivers** [13442-53]

13442 1K **Dynamic self-adaptive segmentation of wind speed interval prediction based on fuzzy information granulation** [13442-83]

13442 1L **Design of mine low power wireless movable column shrinkage sensor** [13442-40]

13442 1M **SHA: sparse adaptive head of attention** [13442-80]

13442 1N **Research on air interface interference recognition in mobile communication networks based on LSTM autoencoder** [13442-99]

ARTIFICIAL INTELLIGENCE AND COMPUTER SYSTEM DESIGN

13442 1O **A systematic research of text-to-audio generation with diffusion models** [13442-70]

13442 1P **Artificial-intelligence-based disinformation discovery for social networks** [13442-35]

13442 1Q **Research on an AXI to AHB bridge controller system** [13442-96]

13442 1R **Application of human-computer interaction-based virtual reality technology in virtual museums** [13442-121]

13442 1S **AC IRIG_B code demodulation for flight tests** [13442-18]

13442 1T **Application of residual convolutional neural network based on mixed attention mechanism to water quality inversion: a case study of the Yellow River basin in Ningxia** [13442-115]

13442 1U **A new fast parallel difference scheme for nonlinear time fractional reaction-diffusion equation on graded meshes** [13442-11]

13442 1V **Prediction of sea fog based on a bidirectional temporal convolutional and long short-term memory networks** [13442-28]

13442 1W **Application of deep transfer learning on UAV-based aerial images for forest fire detection** [13442-12]

13442 1X **ShadowStudio: a real-time interactive platform for digital shadow puppetry creation and sharing** [13442-4]

13442 1Y **A review of ADDoS attack mechanisms, amplification vulnerability discovery, and mitigation** [13442-86]

13442 1Z **Underwater revetment damage detection based on multivariate cooperative bathymetry technology** [13442-20]

13442 20 **Research on fault prediction optimization of CNC machine tools based on ensemble learning** [13442-30]

13442 21 **Research on agricultural residue detection and traceability system based on Internet of Things and blockchain** [13442-16]

13442 22 **Blockchain-based trusted facial expression recognition system** [13442-87]

13442 23 **CSGNet: a network with attention mechanism for automatic modulation recognition** [13442-25]

13442 24 **Modeling and simulation verification of movement authority generation function of C3+ATO system** [13442-69]

13442 25 **Analysis of the measurement accuracy of the SWOT water vapor radiometer based on Jason-3 and ERA5 models** [13442-108]

13442 26 **Fault diagnosis of train control vehicle equipment based on dual-channel feature fusion** [13442-89]

13442 27 **Visual inertial SLAM system based on ELSED point and line features** [13442-98]

13442 28 **Prediction of bearing remaining useful life based on an improved GRU** [13442-56]

13442 29 **A method for kill web operational viewpoint design based on Inf-ProA** [13442-44]

13442 2A **Design and implementation of the displacement sensor acquisition system using peak detection** [13442-41]

13442 2B **Lightweight real-time vehicle detection algorithm on edge computing platform** [13442-78]

13442 2C **Research on optimization techniques for thread-level parallelism implementation targeting the GCC compiler** [13442-107]

13442 2D **Selective sampling and temporal positional encoding for monocular video-based 3D human pose and shape estimation** [13442-90]

13442 2E **Research on improved dynamic window approach based on fuzzy logic for adaptive obstacle avoidance control in unmanned surface vehicles** [13442-123]

13442 2F **Research on factors influencing tennis winning probability using a LSTM model** [13442-110]

13442 2G **Practice and exploration of IP network capabilities opening based on PSR mode** [13442-36]

13442 2H **Design of intelligent teaching assistant for college English based on human-computer collaboration** [13442-67]