PROCEEDINGS OF SPIE

Fifth International Conference on Digital Signal and Computer Communications (DSCC 2025)

Gordana Jovanovic-Dolecek Ke-Lin Du Editors

11–13 April 2025 Changchun, China

Organized by
Changchun University of Science and Technology (China)

Sponsored by
AEIC Academic Exchange Information Centre (China)

Published by SPIE

Volume 13653

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 Digital Signal and Computer Communications (DSCC 2025)*, edited by Gordana Jovanovic-Dolecek, Ke-Lin Du, Proc. of SPIE 13653, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510692190

ISBN: 9781510692206 (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.



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 COMMUNICATION TECHNOLOGY

13653 02	VDES signal direct up-conversion design [13653-121]
13653 03	High-Speed processing method for weak terahertz signals based on Dpll-Booth algorithm [13653-76]
13653 04	Adaptive threshold a-shapes algorithm for extracting boundary points of laser targets [13653-12]
13653 05	Research on vital sign detection methods based on improved regenerated phase-shifted sinusoid-assisted empirical mode decomposition [13653-56]
13653 06	Time-domain convolutional speech separation network with channel reconstruction and utterance weighting mechanism [13653-32]
13653 07	Research on signal processing methods for nighttime respiration and heartbeat monitoring using FMCW radar [13653-16]
13653 08	Mapping research on antenna technologies for wireless communication: from 2015-2025 [13653-7]
13653 09	Research on sliding mode active disturbance rejection control method of optoelectronic stabilization platform based on LM-RBF [13653-28]
13653 0A	Compressive-sensing-based grant-free access for large-scale distributed networks [13653-35]
13653 OB	Trajectory planning for a six-axis robotic arm based on improved particle swarm optimization algorithm [13653-79]
13653 OC	A signal enhancement algorithm of radio fuze based on adaptive parameter matching stochastic resonance [13653-84]
13653 0D	Research on channel estimation in visible light communication systems based on low-complexity neural networks [13653-42]
13653 OE	Research on end-to-end ranging algorithm based on Bluetooth [13653-83]
13653 OF	Research on FSO channel estimation technology based on machine learning [13653-47]
13653 0G	Study on noise reduction of high slope monitoring data based on CEEMD-PE-KF [13653-62]

13653 OH	Calibration of EDFA gain saturation effect on measurement errors in FLRDS system based on random forests [13653-23]
13653 01	Control of multi-degree-of-freedom manipulators based on improved super-helical sliding mode [13653-46]
13653 OJ	Design of a dual-band wearable monopole antenna using textile material [13653-94]
13653 OK	Research on underwater near-field noise source localization based on the joint of MVDR and FISTA $[13653-77]$
13653 OL	RTK integer ambiguity resolution method based on improved Black Kite algorithm [13653-50]
13653 OM	Design of a multi-network integrated data transmission circuit system (Beidou/Tiantong/4G) and its application in emergency mobile monitoring for remote inland river basins [13653-54]
13653 ON	A satellite file transmission algorithm based on packet erasure coding and negative acknowledgment [13653-61]
13653 00	Research on the commercial SAR satellite telemetry and telecontrol communication technology based on Beidou global short message [13653-106]
13653 OP	Research on intelligent transmission technology for high-resolution SAR satellite [13653-105]
13653 0Q	Modeling and analysis of magnetic core loss of magnetic components in circuit driven by data [13653-119]
	IMAGE PROCESSING AND PATTERN RECOGNITION
13653 OR	Research on automatic layout of cabin products based on DCGAN [13653-51]
13653 OS	Multi-scale crack extraction method based on improved U2-Net [13653-6]
13653 OT	An improved mask RCNN algorithm for abnormal identification of expressway traffic flow [13653-80]
13653 OU	Radiance field reconstruction from noisy multiview images for view synthesis [13653-69]
13653 OV	CGD-YOLO: an improved YOLOv11n-based object detection algorithm for UAV aerial imagery [13653-26]
13653 0W	Research on lightweight high-precision remote sensing image semantic segmentation method based on improved U-Net [13653-19]

13653 OX	Research on parallel two-branch intracranial hematoma segmentation algorithm based on improved deeplabv3+ [13653-53]
13653 OY	Infrared super-resolution reconstruction based on frequency domain metrics [13653-71]
13653 OZ	Research on dynamic S-box image encryption algorithm based on elliptic curve [13653-66]
13653 10	4DSGS:4D-scaffold Gaussian splatting for efficient novel view synthesis from dynamic scenes [13653-78]
13653 11	An improved YOLO11-based UAV infrared vehicle detection method with HS-FPN and CBAM mechanisms [13653-15]
13653 12	Forest fire detection algorithm based on improved YOLOv11 [13653-99]
13653 13	Driver and passenger seatbelt detection algorithm based on improved YOLOv11 [13653-31]
13653 14	Innovative breakthroughs in novel image synthesis techniques based on generative adversarial networks in 2025 [13653-29]
13653 15	YOLOv8-WD: improved YOLOv8 for wall defect detection [13653-14]
13653 16	High-fidelity virtual teacher generation [13653-57]
13653 17	Study on three-dimensional point cloud classification based on spatial awareness [13653-111]
13653 18	Medical entity boundary recognition combined with topological sequence [13653-10]
13653 19	A GLAC detection method based on malware image features [13653-49]
13653 1A	The point cloud segmentation algorithm based on SVM and weighted RF [13653-72]
13653 1B	Improved YOLOv8n-based infrared ship target detection algorithm [13653-97]
13653 1C	Nighttime vehicle detection using improved MobileViT for intelligent-transportation systems [13653-114]
13653 1D	Research on road crack detection based on improved YOLOv8 [13653-85]
13653 1E	Similarity-difference alignment network for radiology report generation [13653-22]
13653 1F	Improved YOLOv8-based real-time defect detection for additive manufacturing [13653-108]

COMMUNICATION NETWORKS AND INFORMATION SECURITY

13653 1G	Secure two-party queries with efficient sorting [13653-75]
13653 1H	Interference coupling suppression method for low voltage power carrier communication based on SSC algorithm $[13653-91]$
13653 11	Research on fault operation and maintenance monitoring technology for highway mechanical and electrical equipment integrating knowledge graph and xgboost [13653-92]
13653 1J	Large-scale semi-structured data storage method for smart grid under fully homomorphic encryption algorithm [13653-104]
13653 1K	A routing defence scheme against wormhole-like attack in BCube networks [13653-101]
13653 1L	Multi-objective optimization of power fiber optic communication network routing based or POA algorithm [13653-89]
13653 1M	BFRXOR: a load-aware DDR4 address mapping method [13653-27]
13653 1N	Video transmission optimization scheme based on the Guacamole protocol [13653-20]
13653 10	A combined epileptic EEG denoising method based on wavelet threshold denoising and time-frequency peak filtering [13653-44]
13653 1P	Design and implementation of an intelligent balance data acquisition system based on Bluetooth and DingTalk mini program [13653-38]
13653 1Q	The application of Python regular expressions in data cleaning and standardization of part inventory tables [13653-2]
13653 1R	Kanformer: a Kan-transformer-based method for motor imagery EEG recognition [13653-8]
13653 1\$	Network traffic prediction model based on SG-IDBO-GRU [13653-100]
13653 1T	Design of trust-aware recommendation algorithm for network dynamic interference monitoring [13653-63]
13653 1U	Research on low-power IoT detection system for smart cities based on LoRa [13653-107]
13653 1V	Dual-view personalized federated recommendation [13653-113]
13653 1W	Research on tight reservoir production prediction based on IGWO BiLSTM Attention [13653-60]
13653 1X	Deep reasoning and retrieval of documents by agents based on knowledge graphs [13653-123]

13653 1Y	UHomeWP: a noise reduction and enhancement scheme for home WiFi localization based on CSI signals [13653-118]
13653 1Z	Development of a domain-specific large language model for III-nitrides via Qwen-based architecture and fine-tuning optimization [13653-98]
13653 20	Deep-learning-based metro emergency material distribution node layout research [13653-95]
13653 21	FBCformer: a filter-bank convolutional transformer for EEG-based motor imagery decoding [13653-64]
13653 22	Research on hazard source accident prediction and risk assessment model based on XGBoost in the Yellow River Basin [13653-5]
13653 23	PoolMixer: a lightweight fault diagnosis model [13653-68]
13653 24	Deep-learning-based optimization of large language models for code generation [13653-110]
	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING APPLICATIONS
13653 25	Abnormal noise detection method based on feature fusion [13653-30]
13653 26	A target position estimation method based on composite whale optimization algorithm [13653-18]
13653 27	Implementation of improved SIFT for workpiece assembly interface positioning on FPGA [13653-11]
13653 28	MMF-YOLO-based intelligent coal gangue grabbing robotic arm under different illumination with multi-modal sensors [13653-48]
13653 29	Simultaneous spectral embedding and spectral rotation based with anchor graph [13653-125]
13653 2A	Graph convolutional network text classification method based on determinant point process [13653-120]
13653 2B	Evaluation model of college graduates' employment quality based on particle swarm optimization neural network [13653-102]
13653 2C	Non-invasive abnormal signal recognition algorithm of electricity meter based on 1DCNN-BP [13653-87]
13653 2D	The optimized sliding window layered decoding algorithm for SC LDPC codes [13653-74]

13653 2E	Multiscale Parkinson's speech classification study based on crown porcupine optimization algorithm [13653-117]
13653 2F	Research on visual and tactile interactive fusion method based on dynamic gating adjustment [13653-37]
13653 2G	EMF3D: efficient multi-sensor fusion for 3D object detection [13653-52]
13653 2H	DMSFusion: a dual-modal semantic-guided progressive network with cross-domain feature transfer for infrared and visible image fusion [13653-109]
13653 21	Multi-factor track initiation method based on modified Hough transformation [13653-93]
13653 2J	Combining attention mechanism and TextCNN neural network, current events point classification algorithm [13653-65]
13653 2K	Design of test-oriented satellite kinematics simulation software [13653-126]
13653 2L	An optimized learning recommendation method for the elderly integrating memory decay regulation and time-sensitive features [13653-17]
13653 2M	Modality-aligned fine-tuning of large models for stock prediction [13653-9]
13653 2N	A CNN-LSTM-based gas concentration prediction method for PAS in complex noise environments [13653-88]
13653 20	A lightweight unmanned aerial vehicle image small-object-detection algorithm combined with task alignment mechanism [13653-70]
13653 2P	Cross-branch feature guidance for weakly supervised semantic segmentation [13653-55]
13653 2Q	Dynamic weighted fusion of LSTM and non-stationary transformer for chaotic time series forecasting [13653-81]
13653 2R	Dual-stream interleaved learning for generalizable person re-identification [13653-39]
13653 2S	Deep reinforcement learning autonomous driving control algorithm integrating expert experience and LSTM prediction [13653-58]

Conference Committee

Conference Chairs

Yonghui Li, The University of Sydney (Australia)
Wenwu Wang, University of Surrey (United Kingdom)
Qun Hao, Changchun University of Science and Technology (China)
Yunqing Liu, Changchun University of Science and Technology
(China)

Technical Program Committee Chairs

Robert H. Morelos-Zaragoza, San José State University (United States)
Zhengang Jiang, Changchun University of Science and Technology (China)

Publication Chairs

Gordana Jovanovic Dolecek, National Institute of Astrophysics, Optics and Electronics (Mexico) Ke-Lin Du, Guangdong University of Science and Technology (China) Ming Fang, Changchun University of Science and Technology (China)

Organizing Chairs

Yulin Gong, Changchun University of Science and Technology (China)

Technical Program Committee Members

Dongdai Zhou, Northeast Normal University (China)
Shengxian Cao, Northeast Electric Power University (China)
Jianpo Li, Northeast Electric Power University (China)
Fengye Hu, Jilin University (China)
Weida Zhan, Changchun University of Science and Technology (China)

Marina Yusoff, Universiti Teknologi MARA (UiTM), Selangor (Malaysia)
M.Vijayalakshmi, Thiagrajar College of Engineering (India)
Aslina Baharum, Universiti Malaysia Sabah (UMS), (Malaysia)
Ariffin Nor Hapiza, Universiti Teknologi Mara, Selangor (Malaysia)
Wan Nor Shuhadan Wan Nik, Universiti Sulatan Zainal Abidin, Terengganu (Malaysia)

Committee Members

Chunyi Chen, Changchun University of Science and Technology (China)

Qi Li, Changchun University of Science and Technology (China)
Guangxing Li, Changchun University of Science and Technology
(China)