

PROCEEDINGS OF SPIE

Fifteenth International Conference on Signal Processing Systems (ICSPS 2023)

Zhenkai Zhang
Cheng Li
Editors

17–19 November 2023
Xi'an, China

Organized by
Xi'an University of Posts and Telecommunications (China)

Co-organized by
Jiangsu University of Science and Technology (China)
Southwest Jiaotong University (China)

Assisted by
The Signal Processing Branch of the Chinese Institute of Electronics (China)

Technically Supported by
University of Chinese Academy of Sciences (China)

Published by
SPIE

Volume 13091

Proceedings of SPIE 0277-786X, V. 13091

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 *Fifteenth International Conference on Signal Processing Systems (ICSPS 2023)*, edited by Zhenkai Zhang, Cheng Li, Proc. of SPIE 13091, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510675056

ISBN: 9781510675063 (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

xi *Conference Committee*

DIGITAL SIGNAL TRANSFORMATION AND PROCESSING METHODS

- 13091 02 **New convolution and correlation theorems for the linear canonical wavelet transform**
[13091-90]
- 13091 03 **Nonlinear smoothing with multivariable skew-t noises** [13091-10]
- 13091 04 **An effective signal sorting algorithm based on the distribution analysis of the numbers of pulses**
[13091-99]
- 13091 05 **The short-time Wigner-Ville distribution associated with linear canonical transform** [13091-83]
- 13091 06 **Sparse array DOA estimation based on matrix completion** [13091-57]
- 13091 07 **Generalized monopulse angle measurement for conformal antenna arrays** [13091-82]
- 13091 08 **Design and performance analysis of inter-pulse frequency coded and intra-pulse linear frequency modulation composite waveform** [13091-109]
- 13091 09 **Two-dimensional linear canonical Stockwell transform** [13091-106]
- 13091 0A **A modified second-order synchroextracting transform** [13091-22]
- 13091 0B **MUSIC subspace pursuit algorithm for DOA estimation with single snapshot** [13091-95]
- 13091 0C **Sparse recovery space time adaptive processing based on log-determinant** [13091-41]
- 13091 0D **Long-time coherent integration of high-speed maneuvering targets** [13091-23]

SIGNAL FILTERING AND FILTERING ALGORITHMS

- 13091 0E **The joint optimization method of the graph filter design: the vertex sampling and the integration method** [13091-51]
- 13091 0F **Fractional power-based optimized consensus Kalman filtering algorithm** [13091-20]
- 13091 0G **An improved affine projection tanh algorithm for robust adaptive filtering** [13091-61]

- 13091 OH **An optimization algorithm for detection probability of constant false alarm of mean class based on adaptive filtering** [13091-5]
- 13091 OI **Multilayer deep feature integration framework for discriminative correlation filter tracking** [13091-7]
- 13091 OJ **Dynamic weighing algorithm for unmanned aerial vehicles based on filtering fusion** [13091-88]
- 13091 OK **Pulse compression sidelobe blanking for P3 polyphase coded waveform based on matched filter response characteristic** [13091-112]

BIOLOGICAL SIGNAL ANALYSIS AND MONITORING

- 13091 OL **A framework to improve the performance of heart rate estimation based on facial video during exercise** [13091-53]
- 13091 OM **A non-contact heart rate measurement method resistant to illumination changes based on fast wavelet transform and second-order blind identification in far-field environments** [13091-27]
- 13091 ON **Deep learning-based robust heart rate estimation using remote photoplethysmography under different illuminations** [13091-31]
- 13091 OO **Research on heartbeat recognition of millimeter wave radar based on LSTM** [13091-84]
- 13091 OP **An algorithm for removing the effect of premature beats on monitoring the degree of vascular access occlusion based on PPG waveform morphology** [13091-29]
- 13091 OQ **Illumination variation-resistant video-based heart rate measurement using recursive least squares and complete ensemble empirical mode decomposition with adaptive noise** [13091-43]
- 13091 OR **Adaptive projection plane and feature selection for robust non-contact heart rate detection** [13091-60]

RADAR SIGNAL ANALYSIS AND PROCESSING

- 13091 OS **Simulation of spatially-temporally correlated radar sea clutter with generalized inverse Gaussian texture** [13091-48]
- 13091 OT **A clutter suppression algorithm for water current velocity radar** [13091-102]
- 13091 OU **Research on 3D synthetic aperture radar imaging of frequency diversity array based on deconvolution algorithm** [13091-9]
- 13091 OV **A minimum description length CFAR algorithm based on sparse regularization** [13091-3]

- 13091 0W **Multi-person micro-Doppler signal decomposition based on millimeter wave radar** [13091-89]
- 13091 0X **Ground surveillance radar targets classification based on 2D multichannel adaptive weighted CNN** [13091-103]
- 13091 0Y **Research on radar-ultraviolet cooperative detection algorithm for lower RCS targets** [13091-98]
- 13091 0Z **Research on intelligent target classification algorithm for water flow velocity radar** [13091-72]
- 13091 10 **A closed-loop strategy for cognitive radar based on the estimation of clutter power spectrum** [13091-93]

RADAR BASED SIGNAL DETECTION AND MEASUREMENT

- 13091 11 **Adaptive CFAR detector based on CA/GO/OS three-dimensional fusion** [13091-2]
- 13091 12 **A robust fall detection approach based on 4D imaging millimeter-wave radar** [13091-18]
- 13091 13 **Long-time adaptive coherent detection of small targets in sea clutter using inversion of block tridiagonal covariance matrices** [13091-96]
- 13091 14 **Dual-polarimetric fusion MTD in sea clutter with inverse gamma texture** [13091-11]
- 13091 15 **A low-complexity sleep apnea detection method using millimeter-wave radar** [13091-50]
- 13091 16 **Multitarget detection for single-base co-prime MIMO radar** [13091-79]
- 13091 17 **Adaptive Bayesian detection for multistatic radar in compound-Gaussian clutter with inverse Gaussian texture** [13091-66]
- 13091 18 **Research on radar adaptive MTI based on zero assignment method** [13091-119]
- 13091 19 **MobileNet-V3-based sea-land segmentation for maritime search radars** [13091-46]
- 13091 1A **Sleep stage estimation method based on state transition using millimeter-wave radar** [13091-85]

RADAR BASED COMMUNICATION AWARENESS SYSTEM AND POSITIONING TECHNOLOGY

- 13091 1B **Learning-based sparse array optimization for dual function radar-communication system** [13091-13]
- 13091 1C **Joint path planning and beampattern design for multitarget tracking in airborne radar system** [13091-105]

- 13091 1D **An algebraic solution for moving target localization in distributed MIMO radar systems with clock synchronization errors** [13091-117]
- 13091 1E **An improved target demodulation method based on DDMA-MIMO millimeter wave radar** [13091-64]
- 13091 1F **Sparse Bayesian learning-based parameter estimation for PMCW-MIMO radars with few-bit quantization** [13091-104]
- 13091 1G **A graph-based target localization method in non-uniform frequency diversity array radar** [13091-59]
- 13091 1H **Signal design for integrated radar communication system based on constant envelope OFDM-Chirp** [13091-76]
- 13091 1I **Research on delay error of UAV swarm repeater deception against networked radar** [13091-108]
- 13091 1J **DSP implementation of signal processing system for millimeter wave flow velocity radar** [13091-78]

IMAGE DETECTION AND ALGORITHMS

- 13091 1K **A kernel-based moving target detection method in sequential SAR images** [13091-68]
- 13091 1L **A low-complexity rear vehicle detection approach based on a dual-channel millimeter-wave radar** [13091-49]
- 13091 1M **Metasurface stealth target detection based on time-frequency correlation matching** [13091-113]
- 13091 1N **Dynamic feature pyramid networks for object detection** [13091-24]
- 13091 1O **A novel two-step detection algorithm for range spread target** [13091-14]
- 13091 1P **YOLO-iCBAM: an improved YOLOv4 based on CBAM for defect detection** [13091-58]
- 13091 1Q **Human presence detection based on combination of long- and short-term micro-motion features using millimeter wave radar** [13091-77]
- 13091 1R **Improved SAF-FCOS detection algorithm for obstacles with radar and vision fusion** [13091-33]

IMAGE RECOGNITION AND PROCESSING TECHNOLOGY

- 13091 1S **Recognition of lawn weeds based on retinex algorithm with local density fusion** [13091-65]

- 13091 1T **Analysis of SSVEP frequency-spatial characteristics based on EhythmNet and its application in identity recognition** [13091-69]
- 13091 1U **Ship HRRP target recognition method based on transformer and convolutional attention network** [13091-39]
- 13091 1V **BiRAMNet: a selective lightweight model with bi-level routing attention for indoor human activity recognition** [13091-4]
- 13091 1W **SAR image despeckling based on gradient domain convolutional sparse coding** [13091-116]
- 13091 1X **SEP: stage-enhanced panoptic segmentation based on fully convolutional networks** [13091-56]
- 13091 1Y **Center region aware cross former for image forgery localization** [13091-110]
- 13091 1Z **An efficient method for estimating complex high-resolution range profiles of ships** [13091-8]

NEXT GENERATION COMMUNICATION NETWORK TECHNOLOGY AND FUTURE DEVELOPMENT

- 13091 20 **A channel estimation method based on transformer for OTFS system** [13091-25]
- 13091 21 **Indoor localization algorithm based on geometric deep learning** [13091-137]
- 13091 22 **Phase synchronization method in distributed coherent communication** [13091-86]
- 13091 23 **A closed-form solution for 3-D mm-Wave localization** [13091-45]
- 13091 24 **Optimization of artificial bee colony deployment based on rapid depth-first search** [13091-55]
- 13091 25 **Stability analysis of time-delay perturbed microgrids via a critical eigenvalue tracking method** [13091-12]
- 13091 26 **Analysis for the spoofing tampering of WeChat records on android smartphones** [13091-62]

MODERN SENSING TECHNOLOGY AND SENSOR APPLICATIONS

- 13091 27 **Direct mask printing of highly stretchable liquid metal electrodes for strain sensors** [13091-142]
- 13091 28 **A highly sensitive gas sensor for ethylene glycol: leveraging p-type NiO/ZnO composite and micro-hotplate structure** [13091-126]
- 13091 29 **Design of ultra-high-frequency sensor for partial discharge detection in cable accessories** [13091-130]

- 13091 2A **Hydrogen peroxide electrochemical biosensor constructed on the basis of Prussian blue/Au nanoparticles-chitosan nanocomposite membrane sensing interface** [13091-141]
- 13091 2B **Investigation of temperature, humidity and force-sensitive sensors for future smart bed pads** [13091-134]
- 13091 2C **Laser induced, cost-effective manufacturing of stretchable electrochemical sensor for glucose monitoring** [13091-145]
- 13091 2D **Research on recognition of physical activity types based on a single triaxial acceleration sensor** [13091-135]
- 13091 2E **Research on small current detection method for distribution network based on high-performance magnetic sensors** [13091-144]
- 13091 2F **Research on calibration model of light scattering sensor based on random forest** [13091-147]
- 13091 2G **Research on the mapping relationship between load current and cutting force of CNC machine tools** [13091-40]

MODERN ELECTRONIC INFORMATION TECHNOLOGY AND ENGINEERING APPLICATIONS

- 13091 2H **Development of program controlled constant amplitude low frequency phase shifter** [13091-125]
- 13091 2I **Predicting electromagnetic response of electromagnetic metasurface using deep learning** [13091-63]
- 13091 2J **Demonstration of a micro-hotplate chip with a good temperature uniformity** [13091-131]
- 13091 2K **The energy response of extended CT ionization chamber was studied by MCNP program and verified by experiment** [13091-122]
- 13091 2L **Application of scanning laser Doppler vibrometer in high temperature modal test** [13091-138]
- 13091 2M **Development of a thimble ionization chamber for high-energy x-ray dose distribution measurement in water** [13091-129]
- 13091 2N **A three-dimensional GPU-FDTD method for EM wave scattering from randomly rough surface** [13091-121]
- 13091 2O **Power system transient stability assessment based on improved graph attention broad learning system** [13091-16]
- 13091 2P **Development of a semiconductor detector for gamma knife small field measurement** [13091-133]

MODEL BASED INTELLIGENT CONTROL SYSTEM AND OPTIMIZATION

- 13091 2Q **Building end-to-end dialogue system with large language models** [13091-17]
- 13091 2R **Video analysis-based intelligent fire warning system for heat exchange stations** [13091-120]
- 13091 2S **A real-time global-search method for infrared UAV tracking** [13091-26]
- 13091 2T **Track segment association based on Gaussian regression analysis** [13091-97]
- 13091 2U **A word structure similarity framework for Wordle game** [13091-75]
- 13091 2V **Cooperative optimization of task allocation and trajectory planning for multimission in heterogeneous UAV cluster** [13091-67]