

PROCEEDINGS OF SPIE

***Seventh International Conference
on Advanced Electronic Materials,
Computers, and Software
Engineering (AEMCSE 2024)***

Lvqing Yang
Editor

10–12 May 2024
Nanchang, China

Organized by
Nanchang Institute of Technology (China)

Published by
SPIE

Volume 13229

Proceedings of SPIE 0277-786X, V. 13229

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

Seventh International Conference on Advanced Electronic Materials, Computers, and
Software Engineering (AEMCSE 2024), edited by Lvqing Yang, Proc. of SPIE Vol.
13229, 1322901 · © 2024 SPIE · 0277-786X · doi: 10.1117/12.3045933

Proc. of SPIE Vol. 13229 1322901-1

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 *Seventh International Conference on Advanced Electronic Materials, Computers, and Software Engineering (AEMCSE 2024)*, edited by Lvqing Yang, Proc. of SPIE 13229, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

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

ISBN: 9781510681866
ISBN: 9781510681873 (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*

ADVANCED MATERIAL AND TECHNOLOGY APPLICATION RESEARCH

- 13229 02 **YOLOv8n-EMA-ODC wafer defect classification model** [13229-65]
- 13229 03 **Optimized design of LED switching power supplies** [13229-58]
- 13229 04 **Design and implementation of an intelligent manhole cover based on STM32** [13229-60]
- 13229 05 **Electromagnetic compatibility design based on LCTWT amplifier** [13229-90]
- 13229 06 **Liquid level detection technology based on degradation model restoration and edge detection technology** [13229-54]
- 13229 07 **Preparation and characterization of barium ferrite by self-propagating method** [13229-68]
- 13229 08 **Experimental study on heat transfer and flow resistance characteristics of rectangular block graphite heat exchanger** [13229-39]
- 13229 09 **Effect of Pr on the microstructure and hardness of hypereutectic Al-25%Si alloy** [13229-27]
- 13229 0A **Research on hydraulic characteristics of Daniel fishway and vertical-slot fishway based on CFD method** [13229-31]
- 13229 0B **A novel intelligent aircraft cable fault detection based on deep neural network** [13229-34]
- 13229 0C **Design of a low-temperature drift voltage reference based on parasitic capacitance startup** [13229-4]
- 13229 0D **Organic electrochemical synaptic transistors for neuromorphic vision sensor** [13229-75]
- 13229 0E **Design of a low power and low noise class-C LC voltage controlled oscillator** [13229-37]
- 13229 0F **A review of cable simulation for ship and marine engineering operations** [13229-9]
- 13229 0G **Research and application of high precision energy metering technology based on AD chip** [13229-59]
- 13229 0H **Research on GMM-based imaging enhancement technology for insulated gas leakage** [13229-89]

- 13229 OI **Research on prediction of tropospheric NO₂ column concentration based on machine learning** [13229-81]
- 13229 OJ **Electrical conductivity study of graphite composite bipolar plates** [13229-52]
- 13229 OK **Study on the electrocatalytic CO₂ reduction performance of shape-controlled bismuth nanowires** [13229-13]
- 13229 OL **Cascade detection algorithm for key parts of boats based on YOLOv7** [13229-11]
- 13229 OM **Quantum circuit autoencoders for anomalous image detection** [13229-1]
- 13229 ON **Carbon-based FET gas sensor with sensing gate electrode for hydrogen detection at room temperature** [13229-61]
- 13229 OO **A single-shot text detector base scale wise feature aggregation module** [13229-46]
- 13229 OP **Research on branch reconstruction method based on branch growth characteristics for apple picking** [13229-2]
- 13229 OQ **A study of graphene aerogel composites for modification applications in mainstream energy storage devices** [13229-123]
- 13229 OR **Control technology of highway closed-circuit television monitoring equipment based on improved expectation maximization algorithm** [13229-134]
- 13229 OS **Study on the influence of doping with metal ions on the photocatalytic performance of titanium dioxide-based nanofilms: cases of Ni, Mo, and Ag** [13229-117]
- 13229 OT **Masked self-supervised pre-training for steel corrosion recognition via vision transformer under limited sample conditions** [13229-131]
- 13229 OU **Regulation of the electric field on the fluorocarbon resin/SiC coating** [13229-113]
- 13229 OV **Research on fatigue driving detection based on deep learning face key point algorithm** [13229-115]
- 13229 OW **Application of deep learning-based wafer defect detection** [13229-139]
- 13229 OX **Rational design of Co-NC hollow nanoboxes as high-performance anode materials for sodium-ion battery** [13229-136]
- 13229 OY **Research on substation hazardous waste tracking and early warning based on big data** [13229-138]

COMPUTER COMMUNICATION AND GRID TECHNOLOGY

- 13229 0Z **An efficient and secure distributed scheme for SM2 decryption in Internet of Things** [13229-132]
- 13229 10 **A Pythagorean fuzzy set-based approach for evaluating power grid physical assets** [13229-92]
- 13229 11 **Prioritisation of mobile crowdsourced test reports based on text analytics** [13229-84]
- 13229 12 **Fall detection based on improved capsule network** [13229-86]
- 13229 13 **Realistic to abstract translation of pyramid attention networks** [13229-55]
- 13229 14 **Super-resolution reconstruction based on improved diffusion probabilistic model** [13229-76]
- 13229 15 **A spatio-temporal graph attention network classification model for multivariate time series**
[13229-78]
- 13229 16 **Analysis of undergraduate network learning based on K-means clustering and decision tree**
[13229-125]
- 13229 17 **Network rumor propagation model based on the principles of drought propagation** [13229-67]
- 13229 18 **Research on knowledge full-text retrieval engine technology based on Elasticsearch**
[13229-70]
- 13229 19 **Research on resource load forecasting of smart grid cloud computing center-based
multimodel fusion** [13229-96]
- 13229 1A **Computing power dispatching method of power grid cloud platform based on distributed
computing** [13229-98]
- 13229 1B **A fault diagnosis method for radar antenna pedestal based on VMD and energy entropy
reconstruction** [13229-35]
- 13229 1C **Exploring digital forensics and security through authenticity verification for DingTalk-based
communications** [13229-106]
- 13229 1D **Application of Kano model-based QFD analysis method in the classify of aircraft requirements**
[13229-38]
- 13229 1E **Triple extraction based on meta-type prompt learning and bidirectional relation
complementary attention** [13229-85]
- 13229 1F **Dynamic weighted identification method for energy big data anomalies based on optimal
sub-segment deep learning** [13229-45]
- 13229 1G **Research on reduction strategy based on propagation model and logistic model** [13229-83]

- 13229 1H **Spectral simplification of PCA inter-class distance evaluation: a case of artificial breeding and wild *Cordyceps sinensis* identification** [13229-19]
- 13229 1I **Research on autonomous mobile robot path planning based on improved A* algorithm** [13229-5]
- 13229 1J **Research on abnormal traffic detection in power grid network based on Naive Bayesian Gaussian model** [13229-63]
- 13229 1K **Enhancing UAV swarm mission planning with a weighted graph attention network-based genetic algorithm** [13229-91]
- 13229 1L **Emergency response information dissemination modeling and optimization of cross-border oil and gas pipeline** [13229-17]
- 13229 1M **Recovery method of lost data in online procurement of power grid materials based on local weighted reconstruction** [13229-133]
- 13229 1N **Application of BIM model based on Lidar point cloud technology in construction of power substations** [13229-104]
- 13229 1O **Overlapping chromosome segmentation model based on dual attention U-Net network** [13229-118]
- 13229 1P **Intelligent network security chip based on RISC-V: a next generation secure processing solution** [13229-114]

COMPUTER SYSTEM DESIGN AND PROGRAM DEVELOPMENT

- 13229 1Q **Techniques and methodological practices for developing single page applications based on VUE+MidwayJS+Prisma** [13229-94]
- 13229 1R **Research on highly reliable distributed message queue system** [13229-36]
- 13229 1S **Design of visitor information system for the Grand Canal National Cultural Park based on Java SE** [13229-82]
- 13229 1T **Designing method of real-time monitoring software for flight test based on template** [13229-73]
- 13229 1U **Smart cabin management system preliminary design based on MBSE** [13229-53]
- 13229 1V **Design of embedded intelligent management system for reinforced server** [13229-74]
- 13229 1W **Low-complexity PAPR-aware precoding for large-scale MIMO-OFDM downlink systems** [13229-80]
- 13229 1X **VR/AR-based reducer operational status monitoring and maintenance system** [13229-50]

- 13229 1Y **Research and application of software online upgrade technology based on TMS320F28235**
[13229-79]
- 13229 1Z **Wearable device Bluetooth data processing platform based on MATLAB App Designer**
[13229-66]
- 13229 20 **A BIM component element detection model based on machine learning** [13229-41]
- 13229 21 **Study on improved dung beetle optimization algorithm** [13229-62]
- 13229 22 **All-digital background adaptive calibration system for timing mismatch in time-interleaved ADCs** [13229-18]
- 13229 23 **A UAV swarm simulation system for operator cognitive analysis** [13229-47]
- 13229 24 **FPGA-based fall detection robot for ice and snow sports venues** [13229-30]
- 13229 25 **Research on the application of CPU control system based on ARM processor in power system**
[13229-21]
- 13229 26 **Value evaluation and automatic implementation of software prefetching in general program optimization** [13229-57]
- 13229 27 **A fast pansharpening method based on object-space-consistency and GPU parallel processing** [13229-87]
- 13229 28 **Design and research of cooperative command system for multidomain unmanned vehicle joint operations** [13229-15]
- 13229 29 **Handwritten text line detection based on vision transformer** [13229-7]
- 13229 2A **Multisource heterogeneous data fusion: multimodal modeling approach for intelligent safety driving assistance system** [13229-93]
- 13229 2B **Optimal design for uncertain structure with interval parameters using sparrow search algorithm**
[13229-22]
- 13229 2C **An intrusion detection system based on GWO-CNN-BiLSTM** [13229-32]
- 13229 2D **Sitting posture detection system based on pressure sensors** [13229-16]
- 13229 2E **The application of artificial intelligence in intelligent terminals on the edge of distribution station buildings** [13229-14]
- 13229 2F **Design of a high-performance parallel computing platform for spaceborne intelligent programmable PSOC** [13229-121]
- 13229 2G **Design of CNC machine tool condition monitoring system based on STM32** [13229-103]

- 13229 2H **Study and implement on 3D reservoir dynamic modelling and trace simulation system**
[13229-109]
- 13229 2I **Design and implementation of a music system based on WeChat applets and SpringBoot**
[13229-147]
- 13229 2J **Study on anaerobic dry fermentation system based on 5g and LoRa** [13229-110]
- 13229 2K **Upgrade and validation of the radio frequency magnetic probe array system on experimental advanced superconducting tokamak** [13229-116]

DEEP LEARNING AND INTELLIGENT INFORMATION PROCESSING

- 13229 2L **Unsupervised data imputation via matrix-variate variational autoencoders** [13229-6]
- 13229 2M **Research on sound recognition algorithm for home environment based on residual neural network** [13229-28]
- 13229 2N **Detecting information source in user-text coupled network: cases from Sina Weibo** [13229-33]
- 13229 2O **Cross modal sentiment analysis model based on modal representation learning** [13229-95]
- 13229 2P **Research on multipath planning problems based on an improved LPA* algorithm** [13229-102]
- 13229 2Q **Research on the improved LSTM for target trajectory prediction** [13229-101]
- 13229 2R **Fundus retinal vessel segmentation method fused with MLGWO and multi-grayscale improved PCNN** [13229-64]
- 13229 2S **Single-image super-resolution methods based on improved convolutional neural networks**
[13229-29]
- 13229 2T **Lightweight network based on the high-resolution structure for acoustic scene classification**
[13229-44]
- 13229 2U **A monocular visual multilevel detection algorithm for multimotion targets for ARM isomorphic processors** [13229-20]
- 13229 2V **An algorithm for recommendations that fuses graph representation learning and matrix factorization** [13229-3]
- 13229 2W **A Chinese short text entity linking approach based on data enhancement and multidimensional feature fusion** [13229-23]
- 13229 2X **FL-YOLOv8: a SAR ship detection model based on improved YOLOv8** [13229-26]
- 13229 2Y **Dialogue act classification based on pre-trained model** [13229-88]

- 13229 2Z **Real-time multitarget fall detection based on OpenPose** [13229-141]
- 13229 30 **URV-Net: multihead receptive field-based U-network and ViT conjugate medical image segmentation models** [13229-48]
- 13229 31 **Research on automatic segmentation of the left ventricular echocardiogram and calculation of ejection fraction** [13229-71]
- 13229 32 **DocPointNet: 3D text line detection method for point cloud** [13229-8]
- 13229 33 **Sentiment analysis of movie reviews based on logistic regression model** [13229-40]
- 13229 34 **K-index: a learned spatial index for cold-start queries** [13229-25]
- 13229 35 **Utilizing deep convolutional neural networks and transfer learning for bird species recognition** [13229-108]
- 13229 36 **Research on target detection algorithm for foggy weather based on YOLO-FOG** [13229-77]
- 13229 37 **Dynamic-static graph-based ranking contrastive learning for multivariate time series classification** [13229-10]
- 13229 38 **A method for evaluating the safety level of chemical equipment based on information entropy and time series** [13229-42]
- 13229 39 **Blockchain-based cipher-text data sharing scheme using ERC1155** [13229-150]
- 13229 3A **Research on AUV navigation state prediction method using multihead attention mechanism in a CNN-BiLSTM model** [13229-105]
- 13229 3B **Construction of mathematical model of tobacco roaster based on mechanism analysis** [13229-145]
- 13229 3C **MAML-BERT in addressing low-resource text classification tasks** [13229-112]
- 13229 3D **Research on testing methods for intelligent cockpit voice interaction performance based on speech and vision** [13229-135]
- 13229 3E **A study of empathic dialogue generation based on affective intention prediction** [13229-119]
- 13229 3F **ZK-CPABE: blockchain-based CP-ABE scheme via zero-knowledge proof** [13229-151]

Conference Committee

Conference General Chairs

Xiaolin Qiu, Nanchang Institute of Technology (China)
Wenjun Tan, Northeastern University (China)

Technical Program Committee Chair

Guandong Xu, The Education University of Hong Kong (China)

Organizing Committee Chair

Yanbin Fan, Nanchang Institute of Technology (China)

Publication Chair

Lvqing Yang, Xiamen University (China)

Organizing Committee

Keyong Shen, Nanchang Institute of Technology (China)
Rongchun Deng, Nanchang Institute of Technology (China)
Lushen Wu, Jiangxi Engineer Association (China)
Liangxi Ding, Nanchang Institute of Technology (China)
Baiqing He, Jiangxi Engineer Association (China)
Jin Zhang, Nanchang Institute of Technology (China)

Technical Program Committee

Zhiyi Fang, Jilin University (China)
M.A. Jabbar, Vardhaman College of Engineering (India)
Wen Li, North China University of Technology (China)
Jie Sun, Fuzhou University (China)
Yao Lu, Shenzhen MSU-BIT University (China)
Bin Liu, Dalian University of Technology (China)
Wendong Xiao, University of Science and Technology Beijing (China)
Xiaochun Cheng, Swansea University (United Kingdom)
Fadi Hage Chehade, Institut Supérieur du Bâtiment et des Travaux
Publics (France)
Giampiero Chiaselotti, University of Calabria (Italy)
Sitong Lu, North China University of Technology (China)
Guoxin Su, University of Wollongong (Australia)

Mohammad Arab Firoozjaee, University of Science and Technology of Mazandaran (Iran, Islamic Republic of)
David Chua Sing Ngie, University Malaysia Sarawak (Malaysia)
Vishnu Narayan Mishra, Indira Gandhi National Tribal University (India)
Sachin Kumar, SRM Institute of Science and Technology (India)
Jie Sun, Fuzhou University (China)
Yaobing Wang, Southwest University of Science and Technology (China)
Yan Liu, Shantou University (China)
Guokun Zeng, Harbin Institute of Technology (Shenzhen) (China)
Xin Zhang, Changchun University of Science and Technology (China)
Krisda Yingkayun, Rajamangala University of Technology Lanna (Thailand)
Liangshan Shao, Liaoning University of Technology (China)
Yu-Dong Zhang, University of Leicester (United Kingdom)
Tingdong Ye, Guangdong Polytechnic (China)
Li Guo, Hunan University (China)
Yasmina Belaroussi, Center for Development of Advanced Technologies (Algeria)
Chang Tang, China University of Geosciences (China)
Zhe Chen, Dalian University of Technology (China)
Sachin Kumar, Kyungpook National University (Korea, Republic of)
Banxiang Duan, Guangdong Institute of Science and Technology (China)
Emna Aridhi, University of Carthage (Tunisia)