

PROCEEDINGS OF SPIE

# ***Second International Conference on Electronic Information Technology (EIT 2023)***

**Wendong Xiao**  
**Lu Leng**  
*Editors*

**31 March – 2 April 2023**  
**Wuhan, China**

*Organized by*  
Chongqing University (China)

*Sponsored by*  
AEIC Academic Exchange Information Centre (China)

*Published by*  
SPIE

**Volume 12719**

Part One of Two Parts

Proceedings of SPIE 0277-786X, V. 12719

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](http://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 *Second International Conference on Electronic Information Technology (EIT 2023)*, edited by Wendong Xiao, Lu Leng, Proc. of SPIE 12719, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510666610

ISBN: 9781510666627 (electronic)

Published by

**SPIE**

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

Telephone +1 360 676 3290 (Pacific Time)

[SPIE.org](http://SPIE.org)

Copyright © 2023 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](http://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](http://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

xiii *Conference Committee*

## Part One

### INTEGRATED CIRCUIT AND DIGITAL ELECTRONICS TECHNOLOGY

---

- 12719 02 **Design of IC aging prediction method based on logic gate type** [12719-207]
- 12719 03 **Privacy protection technology for key information of power dispatching based on sensitive data** [12719-32]
- 12719 04 **Research on digital intelligent solution design for hotel industry** [12719-152]
- 12719 05 **Digitized status evaluation of secondary equipment in traction substation** [12719-197]
- 12719 06 **Study on preparation of conductive yarn and its application in wearable electronics** [12719-78]
- 12719 07 **Design of equipment health monitoring system based on digital twin** [12719-7]
- 12719 08 **Research progress of liquid cooling technology for high heat flux electronic equipment** [12719-59]
- 12719 09 **A noise reduction method based on PSR-fastICA for spectrum-induced polarization data** [12719-14]
- 12719 0A **Analysis of the principle and fault treatment analysis of the ZD6 type fork control circuit with dual-machine traction** [12719-12]
- 12719 0B **Research of SFP56 long range industrial-temperature optical transceiver based on digital signal processing** [12719-165]
- 12719 0C **Design and simulation of variable diameter pipe cleaning robots** [12719-74]
- 12719 0D **Method based on t-sne reduction and K-means clustering to identify the household-transformer relationship in low-voltage distribution network** [12719-177]
- 12719 0E **Design of wind turbine oil level recognition system based on YOLOv5** [12719-80]
- 12719 0F **Smart grid electricity abnormal diagnosis and control strategy** [12719-11]
- 12719 0G **Research on deep learning of meteorological sample data associated with power grid** [12719-102]

- 12719 0H **Design and verification of enhancement algorithm for small sample data of power grid meteorology based on neural network** [12719-99]
- 12719 0I **Research and application of 10kV cable condition assessment online monitoring device based on improved fuzzy theory** [12719-198]
- 12719 0J **Development of a new measuring instrument for switching power supply** [12719-34]
- 12719 0K **Research on circuits detection system based on reverse simulation** [12719-206]
- 12719 0L **Research on the deployment of 5G technology in the 700MHz band of radio and television network in the power system** [12719-154]
- 12719 0M **YAMMER: a yoga movement exercise system with UHF RFID** [12719-146]
- 12719 0N **A fast-transient response capacitor-less LDO regulator with undershoot/overshoot voltage detection and transient-current enhanced circuit** [12719-174]
- 12719 0O **Research on power equipment troubleshooting based on 5G technology** [12719-60]
- 12719 0P **Study on calibration of automatic catchweighing instrument** [12719-19]
- 12719 0Q **Status of power equipment in 10kV distribution network based on digital twin technology** [12719-135]
- 12719 0R **Design and implementation of wind resistance load testing system for electronic water pumps** [12719-114]
- 12719 0S **Requirement analysis of big complex electronic equipment health management system** [12719-47]
- 12719 0T **Research on PHM system evaluation of complex electronic equipment** [12719-199]
- 12719 0U **Demonstration system of reconfigurable multi-valued logic electronic processor** [12719-111]
- 12719 0V **Power load forecasting based on deep neural network** [12719-170]
- 12719 0W **Power line recognition method based on Hough and YOLO fusion** [12719-23]

---

#### INTERNET OF THINGS INFORMATION AND REMOTE SENSING IMAGING

- 12719 0X **On the method of address offset processing** [12719-15]
- 12719 0Y **Optimization of fresh food distribution in community group purchase considering customer satisfaction** [12719-46]

- 12719 0Z **Research on low-quality text image detection and recognition based on EDSR and improved ASTER** [12719-84]
- 12719 10 **Flight test domain knowledge graph construction and application** [12719-95]
- 12719 11 **Face attribute editing network based on style-content disentanglement and convolutional attention** [12719-31]
- 12719 12 **Few shot image segmentation with using U-net** [12719-112]
- 12719 13 **Digital image correlation strain measurement study based on smoothing displacement gradient field** [12719-27]
- 12719 14 **Technical knowledge evolution analysis and statistics based on patent complex network** [12719-36]
- 12719 15 **A fast target image acquisition method based on scale** [12719-50]
- 12719 16 **Research on multi-star and multi-link satellite channel access technology** [12719-43]
- 12719 17 **Design and implementation of a fast interrupt system based on RISC-V** [12719-39]
- 12719 18 **Research and application of intelligent invoicing and management system based on RPA technology** [12719-192]
- 12719 19 **Retinal vessel segmentation method based on improved U-Net** [12719-118]
- 12719 1A **Yin-yang pair algorithm based on cubic chaos and lens imaging learning** [12719-24]
- 12719 1B **Research and application in refrigerators of Local Interconnect Network (LIN) for multi-node** [12719-8]
- 12719 1C **Research on classification of weathered glass based on logistic regression** [12719-40]
- 12719 1D **Application research of RNN in text intelligent prediction scenario** [12719-167]
- 12719 1E **Design of a resource allocation management method based on TDMA system** [12719-51]
- 12719 1F **Pixel-level feature enhancement and weighted fusion for visual relationship detection** [12719-89]
- 12719 1G **IoT data clustering method based on parallelized subnetworks and PCA-K-means** [12719-171]
- 12719 1H **A fog-assisted revocable and auditable access control system** [12719-62]
- 12719 1I **Object detection based on image pyramid feature fusion and shared detection head** [12719-158]

- 12719 1J **Application of satellite remote sensing in the treatment of power transmission line unplanned construction operation** [12719-195]
- 12719 1K **KBMQA: medical question and answering model based on Knowledge Graph and BERT** [12719-188]
- 12719 1L **Blockchain-based MQTT communication access control scheme for the Internet of Things** [12719-159]
- 12719 1M **Improving the liquid sensing resolution via multiple transceiver pairs** [12719-29]
- 12719 1N **Visual transformer-based image retrieval with multiple loss fusion** [12719-127]
- 12719 1O **Internet of Vessels high-precision navigation positioning integrated equipment research** [12719-122]
- 12719 1P **Chinese text summarization generation based on transformer and temporal convolutional network** [12719-115]
- 12719 1Q **Scene text image correction based on transformer** [12719-175]
- 12719 1R **An image denoising method based on improved wavelet threshold and threshold function is presented** [12719-137]
- 12719 1S **Research advances in bionic polarized light navigation technology** [12719-125]
- 12719 1T **Design and implementation of Elasticsearch-based intelligent search for home shopping platform** [12719-155]
- 12719 1U **Improved method of dialogue model based on character and word fusion** [12719-69]
- 12719 1V **Discrepancy-guided dual-branch semantic segmentation** [12719-141]
- 12719 1W **Research on semi-trailer panoramic surround view system based on feature point matching** [12719-150]
- 12719 1X **Research on 5G network slicing technology for different scenarios** [12719-58]

---

#### WIRELESS COMMUNICATION AND SIGNAL TRANSMISSION SIMULATION

- 12719 1Y **Research on distance sum positioning method based on 5G external radiation source radar** [12719-208]
- 12719 1Z **UAV indoor multi-point localization based on optimal path planning** [12719-70]
- 12719 20 **Multivariate time series prediction based on quantum enhanced LSTM models** [12719-20]

- 12719 21 **Temperature prediction based on XGBoost-PredRNN++** [12719-94]
- 12719 22 **Research and subsystems of container ports along the Maritime Silk Road based on computer modeling techniques** [12719-178]
- 12719 23 **A vehicle re-identification method based on random occlusion** [12719-140]
- 12719 24 **A method for aggregating the features of bullet screen** [12719-76]
- 12719 25 **Modulation technology in ultra-wideband wireless communication** [12719-21]
- 12719 26 **Research on dispersion equalization technology in coherent optical communication** [12719-204]
- 12719 27 **Application of 5G mobile communication technology in power system** [12719-182]
- 12719 28 **A category-level 6D pose estimation method based on end-to-end fast and efficient heterogeneous feature fusion** [12719-63]
- 12719 29 **Unmanned aerial vehicle trajectory design in wireless sensor networks: a deep reinforcement learning method** [12719-117]
- 12719 2A **Permanent magnet synchronous motor drive system based on wireless power transmission technology** [12719-101]
- 12719 2B **Wireless microseismic monitoring technology based on cloud service platform** [12719-110]
- 12719 2C **A high order temperature compensated band gap reference source based on depletion mode transistor** [12719-45]
- 12719 2D **Hybrid precoding design for terahertz dynamic array-of-subarrays architecture** [12719-129]
- 12719 2E **Design of tri-band microstrip antenna with shared aperture on flexible single-layer** [12719-52]
- 12719 2F **Consensus protocol in heterogeneous opportunistic networks** [12719-5]
- 12719 2G **Research on generating text summaries based on improved transformer** [12719-55]

## **Part Two**

- 12719 2H **Offloading strategy for dependency-aware tasks in MEC system based on deep Q-network** [12719-147]
- 12719 2I **A low temperature drift and low noise bandgap voltage reference for 16 bit ADC** [12719-132]
- 12719 2J **Research and application of power communication network terminal based on 5G technology** [12719-202]

- 12719 2K **A high-power RF transmission line status monitoring method based on sound recognition** [12719-4]
- 12719 2L **Research on digital twin system for railway station signals** [12719-2]
- 12719 2M **Evolution of GPU virtualization to resource pooling** [12719-35]
- 12719 2N **A construction method for communication APP security portrait based on flawed API** [12719-200]
- 12719 2O **An efficient certificateless signature scheme on lattice** [12719-136]
- 12719 2P **PPT: pocket yoga personal training system** [12719-151]
- 12719 2Q **Joint entity and relation extraction with part-of-speech-aware attention and dependency parsing embedding** [12719-17]
- 12719 2R **Joint entity and relation extraction based on specific-relation attention mechanism and global features** [12719-53]
- 12719 2S **Environmental risk perception and warning strategy of power metering laboratory based on LSTM network** [12719-201]
- 12719 2T **Research on stress sensing demodulation technology and device of FBG** [12719-163]
- 12719 2U **Feature Selector: an effective module for robust high-voltage switchgear detection** [12719-33]
- 12719 2V **Research on closed-loop control strategy of VIENNA rectifier** [12719-203]
- 12719 2W **Power allocation algorithm based on channel capacity in cooperative communication** [12719-130]
- 12719 2X **Study on elbow erosion of rotation valve groups in shale gas well stations** [12719-153]

---

#### NETWORK SECURITY AND DATA MONITORING AND PROCESSING

- 12719 2Y **Secure encryption method of privacy set intersection based on homomorphic encryption algorithm** [12719-25]
- 12719 2Z **Data access security monitoring system based on zero trust mechanism** [12719-88]
- 12719 30 **Surface defect detection for nylon yarn package based on improved VGG model** [12719-71]
- 12719 31 **Analysis and research of teaching management system based on emotion detection** [12719-65]

- 12719 32 **A non-data-aided error vector magnitude adaptive algorithm in fading channels** [12719-145]
- 12719 33 **A hybrid approach for developer recommendation based on social network** [12719-37]
- 12719 34 **A method for the detection of electricity theft behavior based on Xavier weight initialization** [12719-108]
- 12719 35 **Data generalization processing and fusion machine translation system based on virtual reality technology** [12719-9]
- 12719 36 **Robustness evaluation of object detection models: a gradient attack method based on spatial sensitivity** [12719-16]
- 12719 37 **Change detection in Fangcheng Golden Camellia National Nature Reserve based on PCA and K-means clustering** [12719-169]
- 12719 38 **Forecast method of overhaul period of high-voltage circuit breaker based on FGSO-BP** [12719-79]
- 12719 39 **Research on text event inference techniques for security analysis scenarios** [12719-86]
- 12719 3A **Based on fractional Fourier transform-tunable Q-factor wavelet transform moving target detection technology** [12719-184]
- 12719 3B **DCL-CGAN: a co-modulation generative adversarial network combined with the dual contrastive loss function for image de-occlusion** [12719-61]
- 12719 3C **Research and implementation of modularization of embedded software for data chains** [12719-90]
- 12719 3D **A study on high precision source location error control method based on microseismic monitoring cloud service platform** [12719-109]
- 12719 3E **Research on automatic information extraction and combination based on semantic association analysis** [12719-205]
- 12719 3F **Based on point cloud data of the ski jump system modeling and trimming** [12719-144]
- 12719 3G **LOF-enhanced SMOTE algorithm for imbalanced dataset** [12719-173]
- 12719 3H **Research on automatic quality inspection for the basic data of Realistic 3D China Construction** [12719-13]
- 12719 3I **Wordle data mining based on deep learning** [12719-68]
- 12719 3J **Research on the security design of industrial control mobile terminal based on trusted software base** [12719-120]
- 12719 3K **Insulator detection based on improved YOLOv5s** [12719-92]

- 12719 3L **Research on virtual flower shape generation based on data mapping** [12719-54]
- 12719 3M **SLAM algorithm based on natural environment and reflective column information** [12719-93]
- 12719 3N **Improving fragment information recommendation via enhanced knowledge graph** [12719-128]
- 12719 3O **Research on low altitude electromagnetic environment monitoring based on unmanned aerial vehicle** [12719-87]
- 12719 3P **Study on the detection of egg cracks by frequency band energy method based on MALLAT decomposition** [12719-75]
- 12719 3Q **Recognition of expiry data on food packages based on deep learning** [12719-156]
- 12719 3R **Study on dust concentration detection technology based on ultrasound** [12719-73]
- 12719 3S **Helmet wearing detection method based on lightweight YOLOv5** [12719-157]
- 12719 3T **Application of recursive least squares method with variable forgetting factor in digital predistortion** [12719-113]
- 12719 3U **Design and implementation of seismic safety evaluation technical service system** [12719-133]
- 12719 3V **ECC-CS: a multi-label data classification algorithm for class imbalance based on cost-sensitive learning** [12719-160]
- 12719 3W **Advanced process library irradiation parameter modeling and analysis techniques** [12719-26]
- 12719 3X **Design of CNC constant current source based on incremental PID control** [12719-124]
- 12719 3Y **Incorporating chunking information for Chinese named entity recognition using neural networks** [12719-81]

---

#### COMPUTER ALGORITHM AND AUTOMATIC IDENTIFICATION

- 12719 3Z **Sensor-based gesture recognition with convolutional neural networks** [12719-85]
- 12719 40 **Human motion recognition of active contrast coding model based on self-attention** [12719-91]
- 12719 41 **Learning CenterNet model for wild animal detection** [12719-56]
- 12719 42 **Automatic count of wheat ears in field wheat by improved YOLOv7** [12719-48]
- 12719 43 **Enhanced Mask R-CNN blur instance segmentation based on generated adversarial network** [12719-38]

- 12719 44 **Natural scene text recognition based on artificial intelligence machine learning** [12719-64]
- 12719 45 **An utilization-efficient context memory design for reconfigurable processing array with locally shared strategy** [12719-82]
- 12719 46 **Fault diagnosis method of civil aircraft air conditioning cooling system based on WPA-BP neural network** [12719-181]
- 12719 47 **Adaptive neural network-based active disturbance rejection servo control of a phase change energy storage device** [12719-18]
- 12719 48 **Research on UAV path planning based on Voronoi map construction and improved ant colony algorithm** [12719-119]
- 12719 49 **Tower crane anti-collision algorithm design and simulation** [12719-28]
- 12719 4A **A systematical review on the control of lower-limb exoskeleton** [12719-30]
- 12719 4B **Research and exploration of simulation routing algorithm based on computer deep learning fuzzy logic** [12719-209]
- 12719 4C **Realization of position observation algorithm for permanent magnet synchronous motor based on fixed-point nonlinear flux model** [12719-139]
- 12719 4D **Distributed training for spatio-temporal neural networks** [12719-6]
- 12719 4E **Research on pure azimuth passive positioning of UAV based on iterative algorithm** [12719-190]
- 12719 4F **Design of DMS-RRIP replacement algorithm for L1-cache of RISC-V-based single-core embedded processor** [12719-143]
- 12719 4G **Application of small sample algorithm and meteorological disaster early warning in power grid** [12719-103]
- 12719 4H **Research on drug box fault detection based on improved YoLov4** [12719-194]
- 12719 4I **A particle swarm optimization algorithm with dynamic weights** [12719-142]
- 12719 4J **Lightweight object tracking algorithm based on sparse attention** [12719-116]
- 12719 4K **Design of subband-level MMSE transceiver for multiuser MIMO-OFDM uplink systems and neural network implementation** [12719-172]
- 12719 4L **IMUSHIELD: defending against inaudible attacks via IMUs on smartphones** [12719-22]
- 12719 4M **Audio classification based on audio WSOLA and CNN algorithm** [12719-179]

- 12719 4N **Efficient iterative decoding algorithm of RS-LDPC concatenated schemes with 5G-LDPC codes** [12719-149]
- 12719 4O **Research on model fusion algorithm based on CSI fingerprint localization** [12719-138]
- 12719 4P **Edge-computing-based multi-objective equilibrium task unloading of Internet of Vehicles** [12719-42]
- 12719 4Q **Adapting multi-task perception in autonomous driving to bird's-eye-view representation via multi-level guidance** [12719-186]
- 12719 4R **FNCSE: contrastive learning for unsupervised sentence embedding with false negative samples** [12719-49]
- 12719 4S **Design of a GD32-based universal expansion keyboard** [12719-41]
- 12719 4T **Robust adaptive beamforming method of frequency diverse array based minimum mean square error** [12719-126]
- 12719 4U **Application of neural network algorithm in electromechanical automatic control system** [12719-191]
- 12719 4V **A camouflage generation algorithm based on modified K-means clustering** [12719-123]
- 12719 4W **Research based on improved YOLOv5 algorithm in unmanned driving technology** [12719-176]
- 12719 4X **Research on grey wolf optimization algorithm based on dynamic weighting** [12719-134]
- 12719 4Y **Virtual network mapping algorithms based on multi-level reliability sorting in multiple domain networks** [12719-166]
- 12719 4Z **Handwritten digit recognition based on improved convolution neural network** [12719-161]