

PROCEEDINGS OF SPIE

***Third International Conference
on Computer Graphics, Image,
and Virtualization (ICCGIV 2023)***

Yulin Wang
Ata Jahangir Moshayedi
Editors

16–18 June 2023
Nanjing, China

Organized by
Chongqing University of Technology (China)

Sponsored by
AEIC—Academic Exchange Information Centre (China)

Published by
SPIE

Volume 12934

Proceedings of SPIE 0277-786X, V. 12934

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 *Third International Conference on Computer Graphics, Image, and Virtualization (ICCGIV 2023)*, edited by Yulin Wang, Ata Jahangir Moshayedi, Proc. of SPIE 12934, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510671720

ISBN: 9781510671737 (electronic)

Published by

SPIE

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

Telephone +1 360 676 3290 (Pacific Time)

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. 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

vii *Conference Committee*

GEOMETRIC MODELING AND COMPUTER VISION RESEARCH

- 12934 02 **Research on simulation method of Tibetan carpet based on physics properties** [12934-46]
- 12934 03 **Intelligent beaker with multimodal fusion based on speech and vision intent** [12934-11]
- 12934 04 **An algorithm for comprehension of motion intentions oriented to assisting the elderly** [12934-51]
- 12934 05 **A smart pen-oriented multimodal fusion auxiliary line intent detection algorithm** [12934-7]
- 12934 06 **Hash encoded neural radiance field with view-dependent mapping** [12934-21]
- 12934 07 **Research on polarization imaging target detection method based on multi-view** [12934-17]
- 12934 08 **User profiles and precision analysis based on Gen Z short video behavior with FP-Growth algorithm** [12934-66]
- 12934 09 **Research on target localization method based on binocular vision technology** [12934-4]
- 12934 0A **SLAM vision and repositioning system for autonomous inspection robots in power systems** [12934-63]
- 12934 0B **Pin defect detection based on sparse features in transmission lines** [12934-12]
- 12934 0C **Advanced manufacturing technology for static three-dimensional panoramic image** [12934-32]
- 12934 0D **Real-time peripheral vision metamer computing method** [12934-41]
- 12934 0E **A new FHDW based on improved YOLO-E** [12934-31]
- 12934 0F **Mainstreaming technology for research on large vehicle assisted driving technology in China** [12934-24]
- 12934 0G **Opening up the future field of Chinese written culture: the case of the Wordle game** [12934-70]
- 12934 0H **An analysis of the acoustic features of English intonation for English professionals by integrating image and video analysis** [12934-74]

- 12934 OI **Research on rocket engine pose measurement technology based on monocular vision** [12934-49]
- 12934 OJ **Overview of fabric defect detection techniques based on computer vision** [12934-27]
- 12934 OK **Differentiable transfer function optimization and local color transfer for volume rendering** [12934-39]
- 12934 OL **Semantic image synthesis with vision graph neural network** [12934-23]
- 12934 OM **A robust line segment detection method combining geometric properties of line segments** [12934-35]
- 12934 ON **Attention guided cross-modal multispectral object detection** [12934-60]

IMAGE FEATURE EXTRACTION AND PATTERN RECOGNITION

- 12934 OO **Research on MobileNet-based lightweight face recognition algorithm** [12934-40]
- 12934 OP **TransUNet for image forgery localization** [12934-72]
- 12934 OQ **Research and implementation of fast image style transfer** [12934-79]
- 12934 OR **Research on classification of hyperspectral image based on improved pixel-level and super-pixel-level feature fusion** [12934-13]
- 12934 OS **ResNet+LSTM-based gesture recognition method for elderly care robots** [12934-38]
- 12934 OT **Research on stitching technology based on enhanced images of substations** [12934-68]
- 12934 OU **Preprocessing high-definition images: interpretable feature extraction with pre-trained StyleGAN** [12934-33]
- 12934 OV **EFFNet: semantic segmentation network for enhanced feature fusion in traffic scenes** [12934-26]
- 12934 OW **Ischemic stroke outcome prediction based on the whole-brain features extracted from minimum intensity projection of DSC-PWI images by pre-trained Med3D network** [12934-59]
- 12934 OX **Scale normalization and lightweight FPN for small object detection in aerial images** [12934-64]
- 12934 OY **Ultrasonic lamb wave array defect localization imaging based on a modified total focusing method** [12934-47]
- 12934 OZ **Medical image fusion based on multi-scale co-occurrence filter and ResNet152** [12934-37]
- 12934 IO **A survey of the development of image captioning techniques** [12934-16]

- 12934 11 **Research on face recognition based on deep learning** [12934-80]
- 12934 12 **Summary of image caption methods** [12934-10]
- 12934 13 **Improved NBB cross-domain image matching algorithm based on SuperGlue** [12934-29]
- 12934 14 **Tibetan-Chinese bilingual text detection in scene images integrating spatial attention features** [12934-71]
- 12934 15 **Feature analysis of transmission line external breakage on remote sensing images and LiDAR** [12934-3]
- 12934 16 **Improved faster R-CNN algorithm for object detection in remote sensing image** [12934-2]
- 12934 17 **A dynamic gesture recognition method based on R(2+1)D-transformer network** [12934-57]
- 12934 18 **Research on mechanical parts classification and recognition technology based on improved convolutional neural network YOLOv5** [12934-54]
- 12934 19 **Underwater image saliency detection based on refined attentional feedback mechanism** [12934-25]
- 12934 1A **A study on gait recognition based on optimized GaitPart model across perspective** [12934-78]
- 12934 1B **Deep image acquisition technology based on deep learning** [12934-19]
- 12934 1C **Local and global feature fusion network for surface defect segmentation** [12934-61]

VIRTUAL REALITY TECHNOLOGY AND BIG DATA PROCESSING

- 12934 1D **Head-mounted display system based on Metaverse VR Technology** [12934-50]
- 12934 1E **Fast multilevel B-spline approximation for scattered data on GPU architecture using CUDA** [12934-69]
- 12934 1F **Research on 3D ink scene rendering design based on Unreal Engine 5** [12934-20]
- 12934 1G **Kinect-based virtual chemistry experiments** [12934-9]
- 12934 1H **Design and implementation of Chinese musical system based on virtual reality technology** [12934-77]
- 12934 1I **Design and simulation research of virtual reality grottoes display system** [12934-76]

- 12934 1J **Improved pedestrian detection based on YOLOv5s** [12934-28]
- 12934 1K **A fine virtual reconstruction algorithm for ancient buildings based on adaptive fusion model of multi angle LiDAR measurement data** [12934-5]
- 12934 1L **Improved normal distribution function for skin specular reflection rendering based on GGX distribution** [12934-30]
- 12934 1M **Double embedding reversible information hiding based on chunking** [12934-14]
- 12934 1N **Research progress on application of virtual reality technology in landscape architecture** [12934-8]
- 12934 1O **A foreign body intrusion detection method for power lines based on Transformer** [12934-36]
- 12934 1P **The automatic recognition algorithm for surface defects of ceramic insulators on transmission towers based on deformable U-Net network** [12934-34]
- 12934 1Q **Design of a multi-level domain knowledge graph reasoning framework based on temporal data** [12934-75]
- 12934 1R **Optimization of detection algorithm based on YOLOV5** [12934-65]
- 12934 1S **Fast and robust parallel simplification algorithm for triangular mesh** [12934-48]
- 12934 1T **Research and application of water shoreline extraction technology** [12934-18]
- 12934 1U **Target segmentation algorithm for Chinese traditional flower-and-bird paintings based on object detection** [12934-44]
- 12934 1V **Data augmentation techniques based on deep learning for Chinese paintings** [12934-43]
- 12934 1W **A reversible data hiding algorithm based on image region division** [12934-22]
- 12934 1X **Experiential ceramic art space design based on virtual reality technology** [12934-73]
- 12934 1Y **Color-enhanced lane line detection algorithm based on HSL color space** [12934-45]
- 12934 1Z **Adaptive effective class suppression loss for long-tailed object detection** [12934-58]