

# PROCEEDINGS OF SPIE

## **Optoelectronic Imaging and Multimedia Technology IX**

**Qionghai Dai  
Tsutomu Shimura  
Zhenrong Zheng**

*Editors*

**5–11 December 2022  
ONLINE, China**

*Sponsored by*  
SPIE  
COS—Chinese Optical Society

*Cooperating Organizations*

Tsinghua University (China) • Peking University (China) • University of Science and Technology of China (China) • Zhejiang University (China) • Tianjin University (China) • Beijing Institute of Technology (China) • Beijing University of Posts and Telecommunications (China) • Nankai University (China) • Changchun University of Science and Technology (China) • University of Shanghai for Science and Technology (China) • Capital Normal University (China) • Huazhong University of Science and Technology (China) • Beijing Jiaotong University (China) • China Jiliang University (China) • Shanghai Institute of Optics and Fine Mechanics, CAS (China) • Changchun Institute of Optics, Fine Mechanics and Physics, CAS (China) • Institute of Semiconductors, CAS (China) • Institute of Optics and Electronics, CAS (China) • Institute of Physics, CAS (China) • Shanghai Institute of Technical Physics, CAS (China) • China Instrument and Control Society (China) • Optical Society of Japan (Japan) • Optical Society of Korea (Republic of Korea) • Australian and New Zealand Optical Society • Optics and Photonics Society of Singapore (Singapore) • European Optical Society

*Supporting Organizations*

China Association for Science and Technology (CAST) (China)  
Department of Information of National Nature Science Foundation, China (NSFC) (China)

*Published by*  
SPIE

**Volume 12317**

Proceedings of SPIE 0277-786X, V. 12317

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 *Optoelectronic Imaging and Multimedia Technology IX*, edited by Qionghai Dai, Tsutomu Shimura, Zhenrong Zheng, Proc. of SPIE 12317, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510657007

ISBN: 9781510657014 (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 © 2022 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

vii *Symposium Committees*  
xi *Conference Committee*

---

## SESSION 1 COMPUTATIONAL IMAGING

---

- 12317 02 **Recent advances of deep learning for spectral snapshot compressive imaging (Invited Paper)** [12317-1]
- 12317 03 **Large-scale single-pixel imaging via deep learning** [12317-2]
- 12317 04 **Efficient sparse Fourier single-pixel imaging** [12317-3]
- 12317 05 **A novel calibration method for a uniaxial MEMS-based 3D reconstruction system** [12317-4]
- 12317 06 **Structured illumination microscopy with uncertainty quantification** [12317-5]
- 12317 07 **Self-supervised learning exposure correction via histogram equalization prior** [12317-6]
- 12317 08 **Conditional GAN-based deep network for seamless large-FOV imaging by camera array** [12317-7]

---

## SESSION 2 HYPERSPECTRAL IMAGING

---

- 12317 09 **Deep calibration for broadband multispectral filter array (Invited Paper)** [12317-8]
- 12317 0A **Deep-learning enables single-pixel spectral imaging** [12317-9]
- 12317 0B **Continuous-zoom bifocal metalens at visible wavelength** [12317-10]

---

## SESSION 3 COMPUTER VISION AND MACHINE LEARNING

---

- 12317 0E **Infrared small target detection method based on multidirectional derivative and local contrast difference** [12317-13]
- 12317 0F **A multi-source transfer learning-based weighted network for small sample defect inspection** [12317-14]

- 12317 0G **Learning-based ray sampling strategy for computation efficient neural radiance field generation** [12317-15]
- 12317 0I **Lightweight visible light camera technology for weak space target detection** [12317-17]

---

**POSTER SESSION**

- 12317 0K **Visual-inertial odometry based on tightly coupled encoder** [12317-19]
- 12317 0L **Super-resolution reconstruction for extremely low-light imaging by using intensified CCD or CMOS camera** [12317-20]
- 12317 0N **A fast facial expression recognition algorithm in the teaching and learning environments** [12317-23]
- 12317 0P **Point cloud projection based light-to-medium G-PCC-1 hole distortion repair method for colored point cloud** [12317-25]
- 12317 0Q **A video-rate hyperspectral imager for monitoring dynamic targets** [12317-26]
- 12317 0S **Study on vehicle color detection and recognition based on deep learning** [12317-28]
- 12317 0T **Head radiographic detection of feature aggregation networks with coordinated attention** [12317-29]
- 12317 0U **Snapshot compressive hyperspectral imaging via dual spectral filter array** [12317-30]
- 12317 0V **Inverse design of metasurfaces for end-to-end computational imaging** [12317-31]
- 12317 0X **An end-to-end deep convolutional neural network for image restoration of sparse aperture imaging system in geostationary orbit** [12317-33]
- 12317 0Y **Infrared image super-resolution reconstruction based on high-frequency prior convolutional neural network** [12317-35]
- 12317 0Z **A compact compressive hyperspectral imaging system based on metasurface** [12317-36]
- 12317 10 **Single-pixel multispectral imaging based on broadband spectrum multispectral filter arrays** [12317-37]
- 12317 11 **Efficient cosine similarity-based image correlation algorithm for object detection and localization** [12317-38]
- 12317 13 **Array camera crowd counting method based on YOLOv5** [12317-40]

- 12317 15 **Relational-based transfer learning for automatic optical inspection based on domain discrepancy** [12317-42]
- 12317 16 **A feature-based transfer-YOLOv5 model for rapid defect inspection in large mass magnetic tile manufacturing** [12317-43]
- 12317 17 **Geometric measurement error tests on full information of nanoscale surface with the use of scanning electron microscope** [12317-44]
- 12317 18 **Deep learning in tasks of interior objects recognition and 3D reconstruction** [12317-45]
- 12317 19 **Adaptive scanning methods for 3D scene reconstruction** [12317-46]
- 12317 1A **Adaptive vergence reconstruction method for mixed reality systems** [12317-47]
- 12317 1B **Deep learning approach for creating the natural vergence-accommodation conditions in virtual and mixed reality systems** [12317-48]
- 12317 1D **Preprocessing and data fusion of a complex image obtained by a pair of sensors with a free arrangement** [12317-50]
- 12317 1E **Parametric evaluation of observed objects from images based on perspective geometry methods and convolutional neural networks** [12317-51]
- 12317 1F **SOA-based nonlinear reservoir for echo-state networks** [12317-52]