PROCEEDINGS OF SPIE

International Conference on Optical and Photonic Engineering (icOPEN 2023)

Haixia Wang Fang Cheng Cuong Dang Aaron Danner Qian Kemao Editors

27 November – 1 December 2023 Singapore

Organized by Optics and Photonics Society of Singapore (Singapore)

Co-Organized by The Advanced Remanufacturing and Technology Centre, A*STAR (Singapore) The Singapore Institute of Manufacturing Technology, A*STAR (Singapore) Nanjing University of Science and Technology, NJUST (China)

Sponsored by Axecon (Singapore) Shenzhen Anhua Optoelectronics Technology Company Ltd. (China) Meta-Bounds (China) Wavelength Opto-Electronic(s) Pte Ltd. (China)

Published by SPIE

Volume 13069

Proceedings of SPIE 0277-786X, V. 13069

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 SPIEDigitalLibrary.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 International Conference on Optical and Photonic Engineering (icOPEN 2023), edited by Haixia Wang, Fang Cheng, Cuong Dang, Aaron Danner, Qian Kemao, Proc. of SPIE 13069, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

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

ISBN: 9781510674561 ISBN: 9781510674578 (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.



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

3D MEASUREMENT

	COMPUTER VISION AND DEEP LEARNING
13069 OA	A calibration method for LED point light sources in near-field photometric stereo [13069-45]
13069 09	UAV-based 3D infrared imaging of terrestrial constructions [13069-48]
13069 08	Point cloud pair constraint registration algorithm based on directed distance function [13069-46]
13069 07	Body measurement based on a multiview structured light 3D imaging system [13069-53]
13069 06	Adaptive-resolution-based high-resolution indoor 3D perceiving in fringe projection profilometry [13069-35]
13069 05	Towards building information modeling based on FPP-SLAM [13069-34]
13069 04	Measurement depth modeling and extension for geometric constraint phase unwrapping method [13069-23]
13069 03	Real-time 3D acquisition method for light field 3D display [13069-81]
13069 02	Dataset enhancement training of diffraction model-driven neural networks and extension to generate multi-depth computer-generated holograms [13069-30]

13069 OB	Active thermal marker using thermal images of heated areas with visible semiconductor laser [13069-33]
13069 OC	Single-shot microscopic autofocus focusing on image detail features [13069-17]
13069 OD	CycleSR: unsupervised learning for 3D fingerprint super-resolution [13069-32]
13069 OE	Design of point cloud data structures for efficient processing of large-scale point clouds [13069-54]

13069 OF Research on dimension measurement based on 3D point cloud [13069-57]

13069 0G A two-stage deep learning method for foreign object detection and localization [13069-79]

DIGITAL HOLOGRAPHY AND MOIRÉ

13069 OH	Engineering axial resolution realtime and postrecording of incoherent holograms using hybridization techniques [13069-1]
13069 01	Digital holography with deep learning for algae identification and classification [13069-26]
13069 OJ	Multiple-image authentication scheme based on the phase-only holograms [13069-38]
13069 OK	Unpaired learning for digital holographic reconstruction and generation [13069-47]
13069 OL	Application of moiré method for defect detection and strain imaging of silicon single crystals [13069-64]
13069 OM	Microscale strain distribution measurement before and after crack and delamination occurrence in CFRP laminates by multiplication sampling moiré method [13069-66]
13069 ON	Validating the efficacy of deformation distribution measurement in CFRP laminates during three-point bending using the sampling moiré method [13069-69]
13069 00	Bridge deflection measurement by drone aerial photography using the sampling moiré method [13069-62]
	OPTICAL IMAGING
13069 OP	3D quantitative phase imaging of human red blood cells [13069-73]

- 13069 0QSecured optical data transmission through dynamic scattering media using pixel-to-plane
optical data encoding [13069-14]
- 13069 OR Optical pixel-to-plane encoding with neural network for ghost transmission through complex scattering media [13069-15]
- 13069 0S Random encoding with a modified Gerchberg-Saxton algorithm for accurate ghost transmission through complex scattering media [13069-16]
- 13069 0T An optical image encryption method based on Fourier single-pixel imaging and phase retrieval algorithm [13069-37]
- 13069 0U High-quality object reconstruction based on single-pixel imaging in highly dynamic scattering environments [13069-5]

OPTICAL MEASUREMENT

13069 OV	Suppression of speckle noise in laser Doppler vibrometry by signal diversity and dynamic ellipse fitting [13069-25]
13069 OW	Hyperspectral anomaly detection based on background purification and spectral feature extraction [13069-78]
13069 OX	Uncertainty analysis and optimization design of long-distance laser triangulation displacement sensor applied to dynamic object [13069-2]
13069 OY	3D measurement of large and complex parts based on phase matching and global marker points registration [13069-21]
13069 OZ	Quality inspection and assembly sequence optimization of revolved thin-walled parts based on point clouds [13069-56]
13069 10	Parametric studies of liquid LIBS for agricultural applications [13069-76]
	OPTICAL MEASUREMENT AND INSTRUMENTATION

- 13069 11 Development of a vision system for cast mould defect inspection under extreme high temperatures [13069-22]
- 13069 12Zernike polynomials fitting of arbitrary shape wavefront [13069-28]
- 13069 13 Speckle pattern interferometry excited by pulsed laser for crack size detection [13069-29]
- 13069 14Fast anti-turbidity underwater topography measurement based on rotating structured light
[13069-31]
- 13069 15 Stitching in fixed wide-field-of-view scenarios [13069-39]
- 13069 16 Phase retrieval by extracting Zernike coefficients from two random phase-shifting interferograms based on deep learning [13069-52]
- 13069 17 Phase shift error estimation based on deep learning [13069-80]

X-RAY OPTICS, NDT AND OTHERS

13069 18	X-ray optics development and metrology at Shanghai synchrotron radiation facility [13069-60]
13069 19	Transformer-based smart inspection for agricultural products via x-ray images [13069-71]

13069 1A	Development of stress-free Laue diffraction crystal for x-ray beam splitting [13069-8]
13069 1B	Feasibility of in-situ health monitoring for composite structure with embedded piezoelectric sensor networks [13069-24]
13069 1C	Improved video motion magnification method assisted by digital image correlation [13069-43]
13069 1D	A simulation on quasi-phase-matched high-harmonic generation in gas-filled hollow core waveguide [13069-27]
13069 1E	In-house developed ultra-sensitive laser stimulated fluorescence system for amino acid profiling [13069-74]

13069 1F Uniform LIPSS on copper created using zeroth-order femtosecond Bessel beam for SERS-based applications [13069-3]