PROCEEDINGS OF SPIE

Advances in Display Technologies XIII

Jiun-Haw Lee
Qiong-Hua Wang
Tae-Hoon Yoon
Editors

30–31 January 2023
San Francisco, California, United States

Sponsored and Published by
SPIE

Volume 12443

Proceedings of SPIE 0277-786X, V. 12443
SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

Advances in Display Technologies XIII, edited by Jiun-Haw Lee, Qiong-Hua Wang,
Tae-Hoon Yoon, Proc. of SPIE Vol. 12443, 1244301 · © 2023 SPIE
0277-786X · doi: 10.1117/12.2678044

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 *Advances in Display Technologies XIII*, edited by Jiun-Haw Lee, Qiong-Hua Wang, Tae-Hoon Yoon, Proc. of SPIE 12443, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

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

ISBN: 9781510659919
ISBN: 9781510659926 (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
SPIEDigitalLibrary.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

v *Conference Committee*

SESSION 1 AUTOMOTIVE DISPLAY

12443 02 **RGB LED matrix display for augmented driving for higher traffic safety (Invited Paper)** [12443-1]

SESSION 2 LCD I

12443 03 **0.37-inch UHD, 11,800 PPI liquid crystal on silicon micro-display with embedded 4x up-scaler using micro-mirror space-interpolation pixel circuit for metaverse augmented reality glasses (Invited Paper)** [12443-4]

SESSION 3 LCD II

12443 04 **Challenges of 1.0 μm-pitch liquid crystal spatial light modulator for future high-quality electric holographic display (Invited Paper)** [12443-5]

12443 05 **Fast-switching speed image flipping technique using an SSD-LC drive mode for VR/AR/MR uses (Invited Paper)** [12443-6]

SESSION 4 AR/VR/MR

12443 06 **Intraocular augmented reality display with retinal prosthesis (Invited Paper)** [12443-9]

SESSION 6 HOLOGRAPHIC AND LIGHT-FIELD DISPLAYS

12443 07 **Vision transformer-based, high-fidelity, computer-generated holography** [12443-18]

12443 08 **Evaluation of a pixelated holographic display concept for a near-eye display: recent results and technological developments** [12443-19]

SESSION 7 3D DISPLAYS

12443 09 **Optical design of 3D seamless space viewer** [12443-22]

12443 0A **Advanced integral imaging display system based on high-resolution simplified light field image acquisition method** [12443-24]

SESSION 8 DISPLAY COMPONENTS AND NOVEL DISPLAYS

12443 0B **Development of high-refractive index materials including nanofiller with nanoimprint and gapfill property expected to be applied to AR** [12443-25]

12443 0C **Speckle mitigation techniques for laser point scanned displays in head-up display applications** [12443-26]

12443 0D **Effects of photophoretic trapping under varying wavelengths of light** [12443-29]

POSTER SESSION

12443 0E **Autostereoscopic 3D display with high-aperture-ratio parallax barrier for bright 3D images and 2D images with less image quality degradation** [12443-31]

12443 0F **Compact imaging system based on multi-variable focal lens system in AR display** [12443-33]

12443 0G **Implementation of varifocal occlusion using lens arrays and focus-tunable lenses** [12443-34]

12443 0H **Fast deep-trained transformation technique for computer-generated holograms** [12443-35]

12443 0I **Optimized design and manufacturing process of diffuse micro corner cubes for head up projection display applications** [12443-36]

12443 0J **Prevalence of oculomotor changes following the near work in stereoscopic augmented reality** [12443-40]

DIGITAL POSTER SESSION

12443 0K **Optimization of 3D light field display by neural network based image deconvolution algorithm** [12443-20]

12443 0L **Enlarged mid-air image display based on slim DOE waveguide** [12443-23]

12443 0M **Modeling and experiment on point spread function of refractive and metasurface microlens arrays used in 3D integral imaging light field displays** [12443-28]

12443 0N **Fast method for real-time holographic display with large size** [12443-37]

Conference Committee

Symposium Chairs

Sonia M. García-Blanco, Universiteit Twente (Netherlands)
Bernd Witzigmann, Friedrich-Alexander-Universität Erlangen-Nürnberg (Germany)

Symposium Co-Chairs

Ulrich T. Schwarz, Technische Universität Chemnitz (Germany)
Karin Hinzer, University of Ottawa (Canada)

Program Track Chairs

Liang-Chy Chien, Kent State University (United States)

Conference Chairs

Jiun-Haw Lee, National Taiwan University (Taiwan)
Qiong-Hua Wang, Beihang University (China)
Tae-Hoon Yoon, Pusan National University (Korea, Republic of)

Conference Program Committee

Karlheinz Blankenbach, Hochschule Pforzheim (Germany)
Pierre M. Boher, ELDIM (France)
Liangcai Cao, Tsinghua University (China)
Liang-Chy Chien, Kent State University (United States)
Tien-Lung Chiu, Yuan Ze University (Taiwan)
Nobuyuki Hashimoto, Citizen Watch Co., Ltd. (Japan)
Yi-Pai Huang, Apple Inc. (United States)
Byoungho Lee, Seoul National University (Korea, Republic of)
Sin-Doo Lee, Seoul National University (Korea, Republic of)
Yan Li, Shanghai Jiao Tong University (China)
Akihiro Mochizuki, i-CORE Technology, LLC (United States)
Fenglin Peng, Meta (United States)
Michael Wittek, Merck KGaA (Germany)