PROCEEDINGS OF SPIE

SPIDigitalLibrary.org/conference-proceedings-of-spie

Front Matter: Volume 11353

, "Front Matter: Volume 11353," Proc. SPIE 11353, Optics, Photonics and Digital Technologies for Imaging Applications VI, 1135301 (17 April 2020); doi: 10.1117/12.2571286

Event: SPIE Photonics Europe, 2020, Online Only

PROCEEDINGS OF SPIE

Optics, Photonics and Digital Technologies for Imaging Applications VI

Peter Schelkens
Tomasz Kozacki
Editors

6–10 April 2020
Online Only, France

Sponsored by
SPIE

Cosponsored by
City of Strasbourg (France)
Eurometropole (France)
CNRS (France)
Région Grand Est (France)
iCube (France)
Université de Strasbourg (France)

Cooperating Organisations
Photonics 21 (Germany)
EOS—European Optical Society (Germany)
Photonics Public Private Partnership (Belgium)
Photonics France (France)

Published by
SPIE

Volume 11353

Proceedings of SPIE 0277-786X, V. 11353

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

Optics, Photonics and Digital Technologies for Imaging Applications VI, edited by
Peter Schelkens, Tomasz Kozacki, Proc. of SPIE Vol. 11353, 1135301 · © 2020 SPIE
CCC code: 0277-786X/20/\$21 · doi: 10.1117/12.2571286

Proc. of SPIE Vol. 11353 1135301-1

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 *Optics, Photonics and Digital Technologies for Imaging Applications VI*, edited by Peter Schelkens, Tomasz Kozacki, Proceedings of SPIE Vol. 11353 (SPIE, Bellingham, WA, 2020) Seven-digit Article CID Number.

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

ISBN: 9781510634787
ISBN: 9781510634794 (electronic)

Published by
SPIE
P.O. Box 10, Bellingham, Washington 98227-0010 USA
Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445
SPIE.org
Copyright © 2020, Society of Photo-Optical Instrumentation Engineers.

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 copying fees. The Transactional Reporting Service base fee for this volume is \$21.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online 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. The CCC fee code is 0277-786X/20/\$21.00.

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: *Proceedings of SPIE* follow an e-First publication model. A unique citation identifier (CID) number is assigned to each article 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	<i>Authors</i>
ix	<i>Conference Committee</i>

COMPUTER-GENERATED HOLOGRAPHY

11353 03	Accelerating phase added stereogram calculations by coefficient grouping for digital holography [11353-2]
11353 04	Real-time computer-generated hologram calculation using pre-computed angular spectra [11353-3]
11353 05	Hologram calculation in sparse Fourier bases using fixed-point operations and its circuit architecture [11353-4]

DEEP LEARNING

11353 07	Active contours for multi-region segmentation with a convolutional neural network initialization [11353-6]
11353 08	Catheter tracking and data fusion for reducing the x-ray exposition in an interventional radiology procedure [11353-7]
11353 09	GANcoder: robust feature point matching using conditional adversarial auto-encoder [11353-8]

CULTURAL HERITAGE PRESERVATION

11353 0B	A two-stream neural network architecture for the detection and analysis of cracks in panel paintings [11353-10]
11353 0C	Imaging techniques and methodologies for acquisition, processing and distribution of multimodal image data from the oeuvre of Jan van Eyck [11353-11]
11353 0D	From a Belgian online image database to a European heritage science repository: the case of BALaT and HESCIDA (E-RIHS) [11353-12]
11353 0F	Noise characterization for historical documents with physical distortions [11353-14]
11353 0G	Pixel+: integrating and standardizing of various interactive single-camera, multi-light imagery [11353-15]

- 11353 OH **Assisting classical paintings restoration: efficient paint loss detection and descriptor-based inpainting using shared pretraining** [11353-16]

HOLOGRAPHIC DISPLAY

- 11353 OI **Color Fourier imaging for the tabletop holographic display (Invited Paper)** [11353-17]
- 11353 OK **Full bandwidth coarse integral holographic video displays with spatial tiling for scalability** [11353-19]
- 11353 OM **Reduction of switching time in ZnO nanoparticle-based reflective OASLM for holographic displays** [11353-21]

HOLOGRAPHIC IMAGING

- 11353 OO **Numerical reconstruction of large HPO Fourier holograms** [11353-23]
- 11353 OP **Improvement of image quality of phase-only hologram using random phase-free method: verification by simulation and optical experiments** [11353-24]
- 11353 OQ **Study on holographic special-purpose computer for wavefront printing technology** [11353-25]
- 11353 OR **Riesz transform-based digital four-step phase-shifting interferometer** [11353-26]

JPEG CODING I

- 11353 OS **Learning-based image coding: early solutions reviewing and subjective quality evaluation (Invited Paper)** [11353-27]
- 11353 OT **Adopting the JPEG systems layer to create interoperable imaging ecosystems** [11353-28]
- 11353 OU **Exploration of media block chain technologies for JPEG privacy and security** [11353-29]
- 11353 OV **Parameterization of the quality factor for the high throughput JPEG 2000** [11353-30]

JPEG CODING II

- 11353 OX **Benchmarking JPEG XL image compression** [11353-32]
- 11353 OY **An overview of the emerging JPEG Pleno standard, conformance testing and reference software** [11353-33]

- 11353 0Z **A comparison of hologram plane coding and object plane coding on different types of holograms [11353-34]**

IMAGE ACQUISITION AND COMPUTATIONAL IMAGING

- 11353 1I **Image processing system for vidicon-based radiation-resistant cameras [11353-37]**

PLENOPTIC SIGNAL PROCESSING

- 11353 13 **3D point cloud reconstruction from a single 4D light field image [11353-38]**
- 11353 14 **Eye safety considerations and performance comparison of flash- and MEMS-based lidar systems [11353-39]**
- 11353 15 **Automated point cloud acquisition system using multiple RGB-D cameras [11353-40]**
- 11353 16 **Highly parallelized rendering of the retinal image through a computer-simulated human eye for the design of virtual reality head-mounted displays [11353-41]**

SPECTROMETRY

- 11353 18 **A multi-channel spectral coding method for the coded aperture tunable filter spectral imager [11353-43]**
- 11353 1B **Real-time adaptive coded aperture: application to the compressive spectral imaging system [11353-47]**

POSTER SESSION

- 11353 1D **Use of machine learning approaches to improve non-invasive skin melanoma diagnostic method in spectral range 450 - 950nm [11353-48]**
- 11353 1E **Infrared and visible image fusion via NSST and PCNN in multiscale morphological gradient domain [11353-49]**
- 11353 1I **Peak-locking minimization by three adjustment methods [11353-53]**
- 11353 1L **Design of an integral field unit for a solar telescope [11353-56]**
- 11353 1M **Compact dual-view endoscope imaging system based on annularly stitched aspheres [11353-57]**

11353 1P	Design of micro-optics for display illumination [11353-60]
11353 1R	Optimizing rectangular shaped object tracking with subpixel resolution [11353-62]
11353 1S	A simulator based on LED technology to study daylight on architectural scale models [11353-63]
11353 1T	Use of image correlation to measure hygric swelling in rocks [11353-64]
11353 1V	High-speed video analysis of spontaneous and reflex to light blinking [11353-67]
11353 1W	Development and research of a waveguide for augmented reality systems with diffractive relief-phase gratings [11353-68]
11353 1Y	Study of color reproduction features of AR device based on optical waveguides [11353-70]
11353 1Z	Touchless interface interaction by hand tracking with a depth camera and a convolutional neural network [11353-71]
11353 21	Machine learning for scene 3D reconstruction using a single image [11353-73]
11353 22	Deep learning approach for cerebellum localization in prenatal ultrasound images [11353-76]
11353 23	Hermite transform-based superpixel for texture image segmentation [11353-77]
11353 29	Speckle denoising by the family of non-local means methods [11353-83]

Authors

Numbers in the index correspond to the last two digits of the seven-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first five digits reflect the volume number. Base 36 numbering is employed for the last two digits and indicates the order of articles within the volume. Numbers start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B...0Z, followed by 10-1Z, 20-2Z, etc.

Acker, Tanguy, 1Z	Fransen, Bart, 0C
Ahar, Ayyoub, 0V	Freitas, Pedro Garcia, 0Y
Akyazi, Pinar, 0S	Fremout, Wim, 0D
Alakuijala, Jyrki, 0X	Gao, Zhishan, 1M
Anoffo, Yari Mirko, 1S	Gilles, Antonin, 04
Arámbula Cosío, Fernando, 22	Gioia, Patrick, 04
Ascenso, João, 0S	Giusto, Daniele, 1S
Avendaño, Steve, 07	González, Germán, 23
Bakholdin, Alexey, 1L	Grabmaier, Anton, 14
Benavente, David, 1T	Grad, Ya. A., 1Y
Bhowmik, Deepayan, 0U	Grodzitsky, Lev, 09
Blandet, Thierry, 1S	Hameeuw, Hendrik, 0G
Blinder, David, 03, 05	Hao, Jianhua, 1B
Bliznuks, D., 1D	Hoerter, Nicolas, 1S
Bondarenko, A., 1D	Huang, Chen, 1B
Bordodymov, Artyom, 09	Huang, Shaoguang, 0H
Boukourt, Sami, 0X	Ichihashi, Yasuyuki, 0Q
Buelinckx, Erik, 0D	Ilic, Dejan, 0F
Burkard, Roman, 14	Ito, Tomoyoshi, 05, 0P, 0Q
Buyle, Stephanie, 0D	Jackin, Boaz J., 0Q
Cao, Xin, 1M	Kakue, Takashi, 05, 0P, 0Q
Carbajal-Degante, Erik, 07	Kim, Jinwoong, 0I
Chang, Xin, 0M	Kim, Juno, 13
Chen, Lu, 1M	Kliuchnikov, Evgenii, 0X
Cheng, Eva, 13	Kniaz, Vladimir V., 09
Chizhov, Y., 1D	Knyaz, Vladimir, 21
Chlipała, Maksymilian, 0I	Kolesnikova, Daria V., 11
Choi, Seungcheol, 0T	Konijn, Paul, 0G
Choo, Hyon-Gon, 0I	Kozacki, Tomasz, 0I, 0O
Chu, Daping, 0K, 0M	Kukołowicz, Rafał, 0O
Corda, Roberto, 0Z	Kumar, Manoj, 0R, 29
Cornelis, Bruno, 0B	Kuzma, Andy, 0T
Currie, Christina, 0C	Ledesma, Leonardo, 07
De Lastic, Hugues, 08	Lemmers, Frédéric, 0G
De Roock, Edwin, 0D	Leong-Hoi, Audrey, 1Z
Devolder, Bart, 0H	Li, Jin, 0K
Di Pretoro, Emmanuel, 0D	Lihachev, A., 1D
Domenech, Begoña, 1V	Lihacova, I., 1D
Dooms, Ann, 0F	Liotta, Antonio, 0Z
Dubois, Hélène, 0H	Lu, Tan, 0F
Ebrahimi, Touradj, 0S, 0U, 0X	Lushnikov, D. S., 1W
Erbilgin, Levin, 1S	Mahmoudpour, Saeed, 0V
Escalante-Ramírez, Boris, 07, 22, 23	Markin, V. V., 1W
Espinosa, Julián, 1R, 1V	Martens, Maximiliaan, 0H
Fan, Axin, 18	Martínez, Marina, 1V
Fan, Lintao Toni, 16	Martínez-Carranza, Juan, 0O
Farhood, Helia, 13	Mas, David, 1I, 1R, 1T, 1V
Ferrer, Belén, 1I, 1R, 1T	Matoba, Osamu, 0R, 29
Finke, Weronika, 0O	Medda, Daniele, 1S

Meeus, Laurens, 0B, 0H
 Mendoza-Santoyo, Fernando, 0R, 29
 Mizginov, Vladimir, 09
 Murat, Sarah, 1Z
 Nagahama, Yuki, 0P
 Nassim, Abdelkrim, 0R, 29
 Nikolaev, V. V., 1Y
 Oberle, Antoine, 08
 Odinkov, S. B., 1W, 1Y
 Oi, Ryutaro, 0Q
 Olveres, Jimena, 07, 22, 23
 Orekhova, Mariia, 1L
 Pan, Chenguang, 1B
 Pereira, Fernando, 0S, 0U
 Pérez, Jorge, 1R, 1V
 Perra, Cristian, 0Y, 0Z, 15
 Perry, Stuart, 13
 Petrov, Nikolai I., 1P
 Petrova, Galina N., 1P
 Pižurica, Aleksandra, 0B, 0H
 Proesmans, Marc, 0G
 Radoux, Jean-Pierre, 08, 1Z
 Ramos Díaz, Rodrigo, 22
 Ruskowski, Jennifer, 14
 Sattler, Quentin, 1Z
 Schelkens, Peter, 03, 05, 0T, 0U, 0V, 0Y
 Seidel, Ismael, 0Y
 Shimobaba, Tomosyoshi, 05, 0P, 0Q
 Shishova, M. V., 1W
 Shrestha, Pawan Kumar, 0M
 Siari, Ahmed, 0R
 Sizyakin, Roman, 0B
 Smithwick, Quinn, 0K
 Sneyers, Jon, 0X
 Solomashenko, A. B., 1W, 1Y
 Song, Wei, 0Z
 Stock, Simon C., 16
 Stork, Wilhelm, 16
 Tan, Wei, 1E
 Taubman, David, 0V
 Temmermans, Frederik, 0C, 0T, 0U
 Thitøn, William, 1E
 Tomás, María Baralida, 1I, 1T
 Tounsi, Yassine, 0R, 29
 Triana-Galeano, Vivian, 23
 Upenik, Evgeniy, 0X
 Uteshev, D., 1D
 Vandermeulen, Bruno, 0G
 Van der Perre, Athena, 0G
 Vandevenne, Lode, 0X
 Van Gool, Luc, 0G
 Vanweddingen, Vincent, 0G
 Vastenhoud, Chris, 0G
 Vázquez, Carmen, 1V
 Vergnes, Nicolas, 1S
 Versari, Luca, 0X
 Viga, Reinhard, 14
 Voronin, Viacheslav, 0B
 Voznesenskaya, Anna, 1L
 Vu, Con Tran, 16
 Wakunami, Koki, 0Q
 Wang, Xi, 18, 1B
 Wassenberg, Jan, 0X
 Watanabe, Osamu, 0V
 Watteeuw, Lieve, 0G
 Xiang, Pei, 1E
 Xie, Xianghui, 0H
 Xu, Chang, 18
 Xu, Ningyan, 1M
 Xu, Tingfa, 18, 1B
 Yamaguchi, Yumi, 0P
 Yamamoto, Yota, 0P
 Yasuki, Daiki, 05
 Yu, Yue, 18
 Yuan, Qun, 1M
 Zaperty, Weronika, 0I
 Zegarra Flores, Jesus, 08
 Zhang, Jiajia, 1E
 Zhang, Yuhua, 18, 1B
 Zherdev, A. Y., 1W
 Zhou, Huixin, 1E
 Žizakić, Nina, 0H

Conference Committee

Symposium Chairs

Francis Berghmans, Vrije Universiteit Brussel (Belgium)
Thierry Georges, Oxxius SA (France)
Paul Montgomery, Université de Strasbourg (France)
Lluís Torner, ICFO Barcelona (Spain)

Conference Chairs

Peter Schelkens, Vrije Universiteit Brussel (Belgium)
Tomasz Kozacki, Warsaw University of Technology (Poland)

Conference Programme Committee

Olivier Aubreton, Université de Bourgogne (France)
Jan T. Bosiers, Teledyne DALSA (Netherlands)
Daping Chu, University of Cambridge (United Kingdom)
Gabriel Cristóbal, Consejo Superior de Investigaciones Científicas (Spain)
Jana Dittmann, Otto-von-Guericke Universität Magdeburg (Germany)
Marek Domanski, University of Poznan (Poland)
Touradj Ebrahimi, Ecole Polytechnique Fédérale de Lausanne (Switzerland)
Boris Escalante-Ramírez, Universidad Nacional Autónoma de México (Mexico)
Pascuala García-Martínez, Universitat de València (Spain)
Laurent Jacques, Université Catholique de Louvain (Belgium)
Dragan Kukolj, RT-RK Institute for Computer Based Systems (Serbia)
Jukka-Tapani Mäkinen, VTT Technical Research Centre of Finland (Finland)
Maria S. Millán García-Varela, Universidad Politècnica de Catalunya (Spain)
Cristian Perra, Università degli Studi di Cagliari (Italy)
Stuart W. Perry, Canon Information Systems Research (Australia)
Pasi Saarikko, Oculus VR, LLC (United States)
Martin Schrader, Nokia Research Centre (Finland)
Tomoyoshi Shimobaba, Chiba University (Japan)
Lea Skorin-Kapov, University of Zagreb (Croatia)
Colin James Richard Sheppard, National University of Singapore (Singapore)
Athanassios N. Skodras, University of Patras (Greece)

Frédéric Truchetet, Université de Bourgogne (France)
Gerald Zauner, FH OÖ Forschungs & Entwicklungs GmbH (Austria)