

PROCEEDINGS OF SPIE

Multimodal Sensing and Artificial Intelligence: Technologies and Applications II

Ettore Stella

Editor

21–25 June 2021

Online Only, Germany

Sponsored by
SPIE

Cooperating Organisations
European Optical Society
German Scientific Laser Society (Wissenschaftliche Gesellschaft Lasertechnik e.V.)

Published by
SPIE

Volume 11785

Proceedings of SPIE 0277-786X, V. 11785

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

Multimodal Sensing and Artificial Intelligence: Technologies and Applications II
edited by Ettore Stella, Proc. of SPIE Vol. 11785, 1178501 · © 2021 SPIE
CCC code: 0277-786X/21/\$21 · doi: 10.1117/12.2603211

Proc. of SPIE Vol. 11785 1178501-1

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 *Multimodal Sensing and Artificial Intelligence: Technologies and Applications II*, edited by Ettore Stella, Proc. of SPIE 11785, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

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

ISBN: 9781510644045
ISBN: 9781510644052 (electronic)

Published by
SPIE
P.O. Box 10, Bellingham, Washington 98227-0010 USA
Telephone +1 360 676 3290 (Pacific Time)
SPIE.org
Copyright © 2021 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

SPECIAL FOCUS: KEYNOTE SESSION II

11785 03 **Recent progresses of near-eye display for AR/VR (Invited Paper)** [11785-34]

MULTIMODAL SENSING FOR INFRASTRUCTURE MONITORING

11785 05 **Investigation of a low-cost weigh-in-motion vehicle characterization system** [11785-2]

11785 06 **Lattice Boltzmann method for mathematical morphology: application to porous media**
[11785-3]

11785 07 **Multimodal sensing for sustainable structural health monitoring of critical infrastructures and built environment** [11785-4]

11785 08 **Experimental investigation of structural modal identification using pixels intensity and motion signals from video-based imaging devices: performance, comparison and analysis** [11785-5]

MULTIMODAL SENSING TECHNOLOGY

11785 0B **Characterization of an RFID reader in saltwater** [11785-8]

11785 0C **A self-calibration approach for multi-view RGB-D sensing** [11785-9]

11785 0D **A robust method for 2D occupancy map building for indoor robot navigation** [11785-10]

11785 0E **Investigation of the influence of plasma treatment of flax fiber fabrics on the mechanical properties of polypropylene-based composites** [11785-11]

HUMAN POSE AND OBJECT TRACKING

11785 0F **Real-time multimodal 3D imaging system for remote estimation of vital signs** [11785-12]

11785 0G **Motion capture and myoelectric multimodal measurements during static and dynamic bending tasks using a back-assisting exoskeleton: a preliminary study (Invited Paper)**
[11785-13]

11785 0H **A low-complexity approach for visible light positioning and space-resolved human activity recognition** [11785-14]

- 11785 OI **Deep learning for 3D scene reconstruction and segmentation from stereo images** [11785-15]
- 11785 OJ **Towards real-time monocular depth estimation for mobile systems** [11785-16]

MULTIMODAL IMAGES FOR REMOTE SENSING

- 11785 OL **Small-UAV radar imaging for cultural heritage inspections: results from multiple measurements lines** [11785-18]
- 11785 OO **Satellite and drone-borne synthetic aperture radar data for ground deformation monitoring over the Vazante area (Brazil) (Invited Paper)** [11785-21]

MACHINE LEARNING APPLICATIONS

- 11785 OQ **An investigation on deep learning approaches for diatoms classification** [11785-23]
- 11785 OR **Metrological investigation of the localization uncertainty of object detection methodologies** [11785-24]
- 11785 OS **Semantic segmentation of multimodal point clouds from the railway context** [11785-25]
- 11785 OT **Learning and prediction of vehicle-terrain interaction from 3D vision** [11785-26]
- 11785 OU **Automatic stitching and segmentation of roots images for the generation of labelled deep learning-ready data** [11785-27]

MULTIMODAL SENSING APPLICATIONS

- 11785 OV **Development of a laser cleaning robot system for the processing of 3D surfaces (Invited Paper)** [11785-28]
- 11785 OX **Post assembly quality inspection using multimodal sensing in aircraft manufacturing** [11785-30]
- 11785 OY **Multimodal image inpainting for an autonomous robot navigation application** [11785-31]
- 11785 OZ **UKF vision-based mobile platform kinematic parameters calibration** [11785-32]
- 11785 10 **Combining visual and force feedback for the precise robotic manipulation of bulky components** [11785-33]

MULTIMODAL SENSING FOR ENVIRONMENTAL MONITORING

- 11785 11 **Full-field NDT methods for investigation of paintings on poplar [11785-35]**
- 11785 12 **Development of a high-speed, high-resolution multispectral camera system for airborne applications [11785-36]**
- 11785 13 **Concept for a novel airborne LiDAR system combining high-resolution snow height mapping with co-registered spatial information on the water content of the snowpack [11785-37]**

