PROCEEDINGS OF SPIE

Electro-Optical Remote Sensing XIV

Gary W. Kamerman Ove Steinvall Editors

21 – 25 September 2020 Online Only, United Kingdom

Sponsored by SPIE

Cooperating Organisations European Optical Society Cranfield University (United Kingdom) Technology Scotland (United Kingdom) Visit Scotland (United Kingdom) CENSIS (United Kingdom)

Published by SPIE

Volume 11538

Proceedings of SPIE 0277-786X, V. 11538

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 *Electro-Optical Remote Sensing XIV*, edited by Gary W. Kamerman, Ove Steinvall, Proceedings of SPIE Vol. 11538 (SPIE, Bellingham, WA, 2020) Seven-digit Article CID Number.

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

ISBN: 9781510638891 ISBN: 9781510638907 (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.



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

LASER SENSING

11538 04	Automatic object recognition within point clouds in clustered or scattered scenes [11538-2]
11538 05	Characterization of an affordable and compact gated-viewing system for maritime search and rescue applications [11538-3]

Water optical properties in Scandinavian waters and airborne optical sensing [11538-4]

OPTICAL SENSING

11538 06

- 11538 07A multi-sensorial approach for the protection of operational vehicles by detection and
classification of small flying objects (Invited Paper) [11538-5]11538 09Laser ranging used for micro UAV localization: characteristics and limitations [11538-7]
- 11538 0A Measurement of spectral transmission through snow from SWIR to LWIR [11538-8]

OPTICAL SYSTEMS AND TECHNOLOGY

11538 OC	Laser sensing from small UAVs (Invited Paper) [11538-10]
11538 0D	In-operation calibration of clock-bias and intrinsic parameters for pan-tilt-zoom cameras based on keypoint tracking [11538-11]
11538 OE	A practical image-based measuring method of laser spot size [11538-12]
11538 OF	Birefringence influence on polarization changes and frequency on optical fiber [11538-13]
11538 0G	Range prediction for color imagers toward a joint TRM and human perceptual model [11538-14]