

PROCEEDINGS OF SPIE

Situation Awareness in Degraded Environments 2020

John (Jack) N. Sanders-Reed
Jarvis (Trey) J. Arthur III
Editors

27 April – 8 May 2020
Online Only, United States

Sponsored and Published by
SPIE

Volume 11424

Proceedings of SPIE 0277-786X, V. 11424

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 *Situation Awareness in Degraded Environments 2020*, edited by John (Jack) N. Sanders-Reed, Jarvis (Trey) J. Arthur III, Proceedings of SPIE Vol. 11424 (SPIE, Bellingham, WA, 2020) Seven-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510636255

ISBN: 9781510636262 (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

SPIEDigitalLibrary.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

DVE SENSING I

- 11424 04 **A short range millimeter wave radar for rotorcraft DVE operations [11424-19]**

DVE SENSING II

- 11424 05 **Towards computational imaging for intelligence in highly scattering aerosols (Invited Paper) [11424-7]**

GPS DENIED AND ARCHITECTURES

- 11424 06 **A comparison of SWaP-limited, visual-inertial odometry systems for GPS-denied navigation (Invited Paper) [11424-9]**
- 11424 08 **Migration from monolith to microservices with legacy compatibility (Invited Paper) [11424-11]**

DISPLAYS AND HMI

- 11424 09 **A low-latency, low-throughput graphical architecture for multi-sensor pilotage displays (Invited Paper) [11424-13]**
- 11424 0B **Monocular augmented reality devices: does the choice of eye matter? (Invited Paper) [11424-15]**

POSTER SESSION

- 11424 0D **Dengue early warning systems using environmental remote sensing data (Invited Paper) [11424-17]**