

PROCEEDINGS OF SPIE

# ***Detection and Sensing of Mines, Explosive Objects, and Obscured Targets XXV***

**Steven S. Bishop  
Jason C. Isaacs**  
*Editors*

**27 April – 8 May 2020  
Online Only, United States**

*Sponsored and Published by*  
SPIE

**Volume 11418**

Proceedings of SPIE 0277-786X, V. 11418

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

Detection and Sensing of Mines, Explosive Objects, and Obscured Targets XXV, edited by  
Steven S. Bishop, Jason C. Isaacs, Proc. of SPIE Vol. 11418, 1141801 · © 2020 SPIE  
CCC code: 0277-786X/20/\$21 · doi: 10.1117/12.2572778

Proc. of SPIE Vol. 11418 1141801-1

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 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 *Detection and Sensing of Mines, Explosive Objects, and Obscured Targets XXV*, edited by Steven S. Bishop, Jason C. Isaacs, Proceedings of SPIE Vol. 11418 (SPIE, Bellingham, WA, 2020) Seven-digit Article CID Number.

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

ISBN: 9781510636132  
ISBN: 9781510636149 (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](http://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](http://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

---

## ADVANCED ATR TECHNIQUES

---

- 11418 02 **Doing more with less: similarity neural nets and metrics for small class imbalanced data sets (Invited Paper)** [11418-1]
- 11418 03 **Extending deep learning to new classes without retraining** [11418-2]

---

## DETECTION STRATEGIES USING GPR

---

- 11418 06 **Alternative cost function for full waveform inversion of GPR data** [11418-6]
- 11418 07 **A false alarm reduction method for GPR sensor moving at varying heights** [11418-28]

---

## SOIL AND BURIED TARGET INTERACTIONS

---

- 11418 09 **Effects of soil properties, emplacement depth, and object composition on thermal signature** [11418-15]
- 11418 0A **Massively parallel synthetic sensor-based infrared image generation for object detection** [11418-17]

---

## DETECTION STRATEGIES OF SMALL AIRBORNE PLATFORMS

---

- 11418 0B **Improving detection of acoustic sources by coiling fiber optic cable (Invited Paper)** [11418-18]

---

## AIRBORNE/REMOTE SENSING

---

- 11418 0D **Detecting underground structures in vegetation indices time series using histograms** [11418-21]
- 11418 0E **Using simple ratio (SR) vegetation index to detect deep man-made infrastructures in Cyprus** [11418-22]
- 11418 0F **The ERATOSTHENES Centre of Excellence (ECoE) as a digital innovation hub for Earth observation** [11418-29]

**SENSING MELANGE**

---

11418 0G    **Vibration-enhanced underground sensing** [11418-23]

11418 0I    **A novel standoff simultaneous UVN + LWIR laser induced breakdown spectroscopy (LIBS) detection system for rapid in-situ chemical analysis** [11418-27]

**POSTER SESSION**

---

11418 0J    **The use of remote sensing for maritime surveillance for security and safety in Cyprus** [11418-30]