

PROCEEDINGS OF SPIE

***Signal Processing,  
Sensor/Information Fusion,  
and Target Recognition XXX***

Ivan Kadar  
Erik P. Blasch  
Lynne L. Grewe  
*Editors*

12–16 April 2021  
Online Only, United States

*Sponsored and Published by*  
SPIE

**Volume 11756**

Proceedings of SPIE 0277-786X, V. 11756

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 [SPIDigitalLibrary.org](http://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 *Signal Processing, Sensor/Information Fusion, and Target Recognition XXX*, edited by Ivan Kadar, Erik P. Blasch, Lynne L. Grewe, Proc. of SPIE 11756, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510643499

ISBN: 9781510643505 (electronic)

Published by

**SPIE**

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time)

[SPIE.org](http://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](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.

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](http://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

vii *Invited Panel Slides*

---

## MULTISENSOR FUSION, MULTITRAGET TRACKING, AND RESOURCE MANAGEMENT I

---

- 11756 03 **Hybrid probabilistic information matrix fusion** [11756-1]
- 11756 04 **Resolving two point targets with unequal and unknown intensities in a FPA** [11756-2]
- 11756 05 **Estimation for a feedback system with a desired final state and intermittent stochastic inputs** [11756-3]
- 11756 06 **Launch point estimation with a single fixed passive sensor without trajectory state estimation** [11756-4]
- 11756 07 **Application of the sliding innovation filter for fault detection and diagnosis of an electromechanical system** [11756-5]
- 11756 08 **A multiple model-based sliding innovation filter** [11756-6]

---

## MULTISENSOR FUSION, MULTITARGET TRACKING, AND RESOURCE MANAGEMENT II

---

- 11756 09 **The two-pass sliding innovation smoother** [11756-7]
- 11756 0C **Application of machine learning for drone classification using radars** [11756-10]

---

## INFORMATION FUSION METHODOLOGIES AND APPLICATIONS I

---

- 11756 0H **2D point set registration via stochastic particle flow filter** [11756-15]

---

## INFORMATION FUSION METHODOLOGIES AND APPLICATIONS II

---

- 11756 0K **The application of machine learning to signal processing for detection and identification of signals of interest and anomalies** [11756-18]
- 11756 0L **Adversarial machine learning and adversarial risk analysis in multi-source command and control** [11756-19]

11756 0M Risk-based security: from theory to practice [11756-20]

---

**INFORMATION FUSION METHODOLOGIES AND APPLICATIONS III**

---

11756 0N Anomaly detection of unstructured big data via semantic analysis and dynamic knowledge graph construction [11756-21]

11756 0O Learning intent and behavior models from motion trajectories for unsupervised semantic labeling [11756-22]

11756 0P Weighted certainty grids for dynamic search [11756-23]

---

**INFORMATION FUSION METHODOLOGIES AND APPLICATIONS IV**

---

11756 0R Anomaly detection with noisy and missing data using a deep learning architecture [11756-25]

11756 0S Fairness-by-design Dempster-Shafer reasoning system [11756-26]

11756 0T OCULUS iCrowd: an integrated C2I and simulation environment for security management, anomaly detection, and risk assessment [11756-27]

11756 0U OCULUS wayGoo integrated C2I system with geocoding, path planning and navigation [11756-28]

---

**SIGNAL AND IMAGE PROCESSING, AND INFORMATION FUSION APPLICATIONS I**

---

11756 0X Camera placement optimization for sports filming [11756-31]

11756 0Y Effect of the short time Fourier transform on the classification of complex-valued mobile signals [11756-32]

11756 0Z Sliding window study of brain connectivity dynamics based on energy landscape analysis. [11756-33]

11756 10 Energy landscape analysis of fMRI data from schizophrenic and healthy subjects [11756-34]

---

**SIGNAL AND IMAGE PROCESSING, AND INFORMATION FUSION APPLICATIONS II**

---

11756 12 Real-time location fingerprinting for mobile devices in an indoor prison setting [11756-35]

11756 13 Health crisis situation awareness using mobile multiple modalities [11756-36]

- 11756 14      **Low-resolution infrared temperature analysis for disease situation awareness via machine learning on a mobile platform [11756-37]**
- 11756 15      **Adversarial indoor signal detection [11756-38]**
- 11756 17      **Ship formation detection based on spatial distribution and attribute information [11756-40]**
- 11756 19      **Computed extended depth of field photoacoustic microscopy using ratio of low-pass pyramid fusion [11756-42]**

---

**SIGNAL AND IMAGE PROCESSING, AND INFORMATION FUSION APPLICATIONS III**

---

- 11756 1D      **CalibDNN: multimodal sensor calibration for perception using deep neural networks [11756-46]**
- 11756 1E      **Demonstration of hybrid lidar and passive polarimetric infrared imaging [11756-47]**
- 11756 1F      **Vibroacoustic monitoring of technological processes employing electrophysical phenomena [11756-48]**

---

**POSTER SESSION**

---

- 11756 1G      **Comparison of DFT calculated and measured IR absorption spectra [11756-49]**
- 11756 1H      **Simulation study of compressed sensing photoacoustic tomography based on k-space pseudospectral method [11756-50]**