PROCEEDINGS OF SPIE

Counterterrorism, Crime Fighting, Forensics, and Surveillance Technologies II

Henri Bouma
Radhakrishna Prabhu
Robert James Stokes
Yitzhak Yitzhaky
Editors

10–11 September 2018
Berlin, Germany

Sponsored by
SPIE

Cooperating Organisations
European Optical Society
Cranfield University (United Kingdom)

Published by
SPIE

Volume 10802

Proceedings of SPIE 0277-786X, V. 10802

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 *Counterterrorism, Crime Fighting, Forensics, and Surveillance Technologies II*, edited by Henri Bouma, Radhakrishna Prabhu, Robert James Stokes, Yitzhak Yitzhaky, Proceedings of SPIE Vol. 10802 (SPIE, Bellingham, WA, 2018) Seven-digit Article CID Number.

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

ISBN: 9781510621879
ISBN: 9781510621886 (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

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

vii *Authors*

ix *Conference Committee*

xi *Introduction*

SESSION 1 DETECTION AND IDENTIFICATION OF CBRNE

10802 02 Development of energy dispersive X-ray diffraction system for identifying dangerous materials [10802-1]

10802 03 Simulation on X-rays backscatter imaging based on Monte Carlo methods for security inspection [10802-2]

10802 04 About influence of effect of multi-playing of frequency for broadband THz pulse on detection and identification of substances [10802-3]

10802 05 Porous silicon microcavities with embedded conjugated polymers for explosives detection [10802-4]

SESSION 2 SPECTROSCOPY, RAMAN/LIBS, AND HYPERSPECTRAL

10802 08 Chemical fingerprint identification system: beyond concept and towards applications for field expeditionary military forensic analysis [10802-7]

10802 09 Waveguide-based machine readable fluorescence security feature for border control and security applications [10802-8]

10802 0A Parameters of laser ionization of explosives for ion mobility spectrometry [10802-10]

10802 0B Using dopants to increase the sensitivity of a laser field asymmetric ion mobility spectrometer for detection of explosives [10802-9]

SESSION 3 SURVEILLANCE SYSTEMS AND AUTONOMOUS SENSORS

10802 0C Novel active-SfM solution for three-dimensional crime scene documentation [10802-11]

10802 0D An architecture for sensor modular autonomy for counter-UAS [10802-12]

10802 0E Quantifying the uncertainty of event detection in full motion video [10802-14]

10802 0F Integrating coalition shared data in a system architecture for high level information management [10802-15]

SESSION 4 BIOMETRICS

10802 0G Application of hyperspectral imaging in hand biometrics [10802-16]

10802 0H Feasibility analysis of unique ID (UID) generation for personal authentication of valuable documents using dorsal hand vein pattern [10802-17]

10802 0I Comparative study of deep learning and classical methods: smart camera implementation for face authentication (Best Student Paper Award) [10802-18]

10802 0J Face recognition based on embedding learning [10802-19]

SESSION 5 ACTION AND BEHAVIOUR RECOGNITION IN VIDEO IMAGES

10802 0K Video-based detection of abnormal activities in crowd using a combination of motion-based features [10802-20]

10802 0L Autonomous computational intelligence-based behaviour recognition in security and surveillance [10802-21]

10802 0M Robust anomaly detection in urban environments using sensor and information fusion and a camera network [10802-22]

10802 0N Flexible human-definable automatic behavior analysis for suspicious activity detection in surveillance cameras to protect critical infrastructures [10802-23]

SESSION 6 DEEP LEARNING AND VIDEO CONTENT ANALYSIS

10802 0Q Real-time fusion of visible and thermal infrared images in surveillance applications on SoC hardware [10802-26]

10802 0R Flexible image analysis for law enforcement agencies with deep neural networks to determine: where, who and what [10802-27]

10802 0S Removing nuisance in tracklet data [10802-28]

POSTER SESSION

10802 0V	Printed explosives standards for the evaluation of stand-off optical systems [10802-31]
10802 0W	Reproducible generation of explosive traces for detection system testing [10802-32]
10802 0X	CYBERDOG: monitoring and control system for law enforcement forces K-9 special activities [10802-33]