PROCEEDINGS OF SPIE

SPIDigitalLibrary.org/conference-proceedings-of-spie

Front Matter: Volume 8020

, "Front Matter: Volume 8020," Proc. SPIE 8020, Airborne Intelligence, Surveillance, Reconnaissance (ISR) Systems and Applications VIII, 802001 (5 July 2011); doi: 10.1117/12.899622

SPIE.

Event: SPIE Defense, Security, and Sensing, 2011, Orlando, Florida, United States

PROCEEDINGS OF SPIE

Airborne Intelligence, Surveillance, Reconnaissance (ISR) Systems and Applications VIII

**Daniel J. Henry
Beato T. Cheng
Dale C. Linne von Berg
Darrell L. Young**
Editors

**27–28 April 2011
Orlando, Florida, United States**

Sponsored and Published by
SPIE

Volume 8020

Proceedings of SPIE, 0277-786X, v. 8020

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

The papers included 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. The papers published in these proceedings 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 this book:

Author(s), "Title of Paper," in *Airborne Intelligence, Surveillance, Reconnaissance (ISR) Systems and Applications VIII*, edited by Daniel J. Henry, Beato T. Cheng, Dale C. Linne von Berg, Darrell L. Young, Proceedings of SPIE Vol. 8020 (SPIE, Bellingham, WA, 2011) Article CID Number.

ISSN 0277-786X

ISBN 9780819485946

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 © 2011, 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 \$18.00 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/11/\$18.00.

Printed in the United States of America.

Publication of record for individual papers is online in the SPIE Digital Library.

SPIE
Digital Library

SPIDigitalLibrary.org

Paper Numbering: Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print and on CD-ROM. Papers are published as they are submitted and meet publication criteria. A unique, consistent, permanent citation identifier (CID) number is assigned to each article at the time of the first 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, print, and electronic versions of the publication. SPIE uses a six-digit CID article numbering system in which:

- The first four 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. The complete citation is used on the first page, and an abbreviated version on subsequent pages. Numbers in the index correspond to the last two digits of the six-digit CID number.

Contents

vii	Conference Committee
ix	Introduction

SESSION 1 ISR SENSORS AND SYSTEMS I

8020 02	Miniaturization of a SWIR hyperspectral imager [8020-01] C. P. Warren, W. Pfister, D. Even, A. Velasco, S. Yee, D. Breitwieser, J. Naungayan, NovaSol (United States)
8020 03	Small unmanned aerial system high performance payload [8020-02] R. J. Morgan, A. A. Abtahi, Aerospace Missions Corp. (United States); P. B. Griffin, Stanford Univ. (United States); U. Raghuram, F. E. Strömqvist Vetelino, Aerospace Missions Corp. (United States); F. Tejada, Sensing Machines (United States)
8020 04	Real-world noise in hyperspectral imaging systems [8020-03] R. L. Wiggins, L. E. Comstock, J. J. Santman, Corning Inc. (United States)
8020 05	Flight test of an imaging O₂(X-b) monocular passive ranging instrument [8020-04] J. R. Anderson, M. R. Hawks, K. C. Gross, G. P. Perram, Air Force Institute of Technology (United States)
8020 06	A novel SAL detector giving enhanced spatial and temporal resolution [8020-05] M. S. Robbins, C. Weatherup, e2v Technologies Ltd. (United Kingdom)
8020 07	Orbit efficiency for persistent wide area ground surveillance [8020-06] J. J. SantaPietro, The MITRE Corp. (United States)

SESSION 2 ISR SENSORS AND SYSTEMS II

8020 08	Modular multispectral imaging system for multiple missions and applications [8020-07] J. Schoonmaker, Y. Podobna, C. Boucher, S. Saggese, D. Oakley, D. Medeiros, Advanced Coherent Technologies (United States)
8020 09	Imaging EO/IR optical system for long range oblique photography [8020-08] J.-Y. Han, Korea Astronomy and Space Science Institute (Korea, Republic of); S. Marchuk, Samsung Thales Co., Ltd. (Korea, Republic of); H. Kim, Viewworks Co., Ltd. (Korea, Republic of); C.-W. Kim, K.-W. Park, Agency for Defense Development (Korea, Republic of)
8020 0A	Autonomous collection of dynamically-cued multi-sensor imagery [8020-09] B. Daniel, M. L. Wilson, J. Edelberg, U.S. Naval Research Lab. (United States); M. Jensen, T. Johnson, S. Anderson, Space Dynamics Lab. (United States)
8020 0B	High-speed laser communications in UAV scenarios [8020-10] W. Griethe, M. Gregory, F. Heine, H. Kämpfner, Tesat-Spacecom GmbH & Co. KG (Germany)

SESSION 3 ISR SENSORS AND SYSTEMS III

- 8020 OD **Reduction of optically observed artillery blast wave trajectories using low dimensionality models** [8020-13]
B. J. Steward, K. C. Gross, G. P. Perram, Air Force Institute of Technology (United States)
- 8020 OE **The building block approach to airborne pod structures** [8020-14]
J. D. Johansson, Terma A/S (Denmark)

SESSION 4 ISR DETECTION AND TRACKING I

- 8020 OI **Ocean modeling at multiple resolutions for ISR applications** [8020-18]
J. M. Cathcart, J. R. Teague, E. Burdette, B. Kocher, Georgia Institute of Technology (United States)
- 8020 OJ **Experimental analysis of adaptive clutter removal techniques in IR target detection systems** [8020-19]
A. Rossi, Univ. of Pisa (Italy); N. Acito, Naval Academy of Livorno (Italy); M. Diani, G. Corsini, Univ. of Pisa (Italy)
- 8020 OK **The effect of minimum target size and other factors on the performance envelope of automated moving target indication systems for airborne surveillance with EO sensors** [8020-21]
P. A. Boxer, T. Loveard, Sentient Vision Systems (Australia)
- 8020 OL **Robust vehicle detection in aerial images based on salient region selection and superpixel classification** [8020-22]
S. Sahli, P.-L. Duval, Y. Sheng, Univ. Laval (Canada); D. A. Lavigne, Defence Research and Development Canada, Valcartier (Canada)

SESSION 5 ISR DETECTION AND TRACKING II

- 8020 OM **Robust component-based car detection in aerial imagery with new segmentation techniques** [8020-23]
Y. Ouyang, P.-L. Duval, Y. Sheng, Univ. Laval (Canada); D. A. Lavigne, Defence Research and Development Canada, Valcartier (Canada)
- 8020 ON **Layer-based object detection and tracking with graph matching** [8020-25]
Q. He, Mississippi Valley State Univ. (United States); C.-H. H. Chu, Univ. of Louisiana at Lafayette (United States)
- 8020 OO **Software-based robust global motion estimation for real-time video target tracking** [8020-26]
C. Yang, H. Mao, Arizona State Univ. (United States); G. P. Abousleman, General Dynamics C4 Systems (United States); J. Si, Arizona State Univ. (United States)
- 8020 OP **Tracking targets through occlusions in outdoor videos** [8020-27]
H. Mao, C. Yang, Arizona State Univ. (United States); G. P. Abousleman, General Dynamics C4 Systems (United States); J. Si, Arizona State Univ. (United States)

- 8020 0Q **Target location from the estimated instantaneous received frequency** [8020-28]
D. J. Nelson, J. B. McMahon, U.S. Dept. of Defense (United States)
- 8020 0R **Vision-based drone flight control and crowd or riot analysis with efficient color histogram based tracking** [8020-24]
T. Müller, M. Müller, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany)

SESSION 6 ISR IMAGE PROCESSING AND EXPLOITATION I

- 8020 0S **Task based video interpretability as a function of frame rate, playback rate, and target motion** [8020-29]
D. Young, T. Bakir, R. Butto, Jr., Motion Imagery Standards Board (United States)
- 8020 0T **Interactive video compression for remote sensing** [8020-30]
R. Maleh, F. A. Boyle, P. B. Deignan, J. W. Yancey, L-3 Communications Integrated Systems (United States)
- 8020 0U **Efficient compression of sequences of medical and multispectral images** [8020-31]
M. Milanova, Univ. of Arkansas at Little Rock (United States); R. Kountchev, Technical Univ. of Sofia (Bulgaria); V. Todorov, R. Kountcheva, T&K Engineering Co. (Bulgaria)
- 8020 0V **Scene-based blind deconvolution in the presence of anisoplanatism** [8020-32]
D. C. Dayton, Applied Technology Associates (United States); J. D. Gonglewski, M. Myers, Air Force Research Lab. (United States)
- 8020 0W **Video enhancement effectiveness for target detection** [8020-33]
M. Simon, A. Fischer, P. Petrov, 21st Century Systems, Inc. (United States)

SESSION 7 ISR IMAGE PROCESSING AND EXPLOITATION II

- 8020 0Y **Automated UAV-based video exploitation using service oriented architecture framework** [8020-36]
S. Se, C. Nadeau, S. Wood, MacDonald, Dettwiler and Associates Ltd. (Canada)
- 8020 0Z **Techniques for inferring terrain parameters related to ground vehicle mobility using UAV born IFSAR and lidar data** [8020-37]
P. J. Durst, A. Baylot, B. McKinley, U.S. Army Engineer Research and Development Ctr. (United States)

POSTERS SESSION

- 8020 10 **Mean-shift tracking for surveillance applications using thermal and visible band data fusion** [8020-38]
C. Beyan, Middle East Technical Univ. (Turkey) and Baskent Univ. (Turkey); A. Temizel, Middle East Technical Univ. (Turkey)
- 8020 11 **Multi-FOV hyperspectral imager concept** [8020-39]
L. E. Comstock, R. L. Wiggins, Corning Inc. (United States)

- 8020 12 **Plenoptic processing methods for distributed camera arrays** [8020-40]
F. A. Boyle, J. W. Yancey, R. Maleh, P. Deignan, L-3 Communications Integrated Systems
(United States)

Author Index

Conference Committee

Symposium Chair

William Jeffrey, HRL Laboratories, LLC (United States)

Symposium Cochair

Kevin P. Meiners, Office of the Secretary of Defense (United States)

Conference Chair

Daniel J. Henry, Goodrich ISR Systems (United States)

Conference Cochairs

Beato T. Cheng, Goodrich ISR Systems (United States)

Dale C. Linne von Berg, U.S. Naval Research Laboratory (United States)

Darrell L. Young, Raytheon Intelligence & Information Systems
(United States)

Session Chairs

- 1 ISR Sensors and Systems I
 Daniel J. Henry, Goodrich ISR Systems (United States)
- 2 ISR Sensors and Systems II
 Dale C. Linne von Berg, U.S. Naval Research Laboratory (United States)
- 3 ISR Sensors and Systems III
 Dale C. Linne von Berg, U.S. Naval Research Laboratory (United States)
- 4 ISR Detection and Tracking I
 Daniel J. Henry, Goodrich ISR Systems (United States)
- 5 ISR Detection and Tracking II
 Daniel J. Henry, Goodrich ISR Systems (United States)
- 6 ISR Image Processing and Exploitation I
 Darrell L. Young, Raytheon Intelligence & Information Systems
 (United States)
- 7 ISR Image Processing and Exploitation II
 Darrell L. Young, Raytheon Intelligence & Information Systems
 (United States)

Introduction

Airborne intelligence, surveillance, and reconnaissance systems and applications are gaining importance in numerous areas:

- remote sensing
- airborne surveillance and tracking of vehicles, people, and other objects of interest
- detection of possible threats
- terrorism interdiction.

Advanced sensor technologies, processing capabilities, information extraction techniques, and new ways to more effectively model/characterize system performance are all advancing at a fast pace. At the same time, customers are demanding more functionality in smaller and lighter form factors that use less power and cost less. The purpose of this conference is to provide a broad overview across these areas to highlight both advances and areas that need more improvement in this industry.

The caliber of papers in this conference continues to improve each year. I am honored to present the proceedings of the Airborne Intelligence, Surveillance, Reconnaissance (ISR) Systems and Applications VIII conference.

Daniel J. Henry