PROCEEDINGS OF SPIE

Passive and Active Millimeter-Wave Imaging XXII

David A. Wikner
Duncan A. Robertson
Editors

18–19 April 2019
Baltimore, Maryland, United States

Sponsored and Published by
SPIE

Volume 10994

Proceedings of SPIE 0277-786X, V. 10994

Passive and Active Millimeter-Wave Imaging XXII, edited by David A. Wikner,
Duncan A. Robertson, Proc. of SPIE Vol. 10994, 1099401 · © 2019 SPIE
CCC code: 0277-786X/19/$18 · doi: 10.1117/12.2536368

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 *Passive and Active Millimeter-Wave Imaging XXII*, edited by David A. Wikner, Duncan A. Robertson, Proceedings of SPIE Vol. 10994 (SPIE, Bellingham, WA, 2019) Seven-digit Article CID Number.

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

ISBN: 9781510626539
ISBN: 9781510626546 (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

v *Authors*
vii *Conference Committee*

MILLIMETRE WAVE RADAR: JOINT SESSION WITH CONFERENCES 10994 AND 11003

10994 02 **Compressed sensing millimeter-wave compact radar range data acquisition and imaging** [10994-1]

10994 03 **3D radar imaging of mm-wave compact range data using compressed sensing** [10994-2]

10994 04 **Millimeter wave imaging for fixed wing zero visibility landing** [10994-3]

10994 05 **Coded aperture subreflector array for high resolution radar imaging** [10994-18]

SYSTEMS

10994 06 **Beam resolution analysis of a 340 GHz radar using acoustic levitation** [10994-4]

10994 07 **Handheld millimeter-wave radar and lidar systems using an IMU device** [10994-5]

10994 08 **Through-wall k-band and v-band synthetic aperture radar imaging of building structures and utility infrastructure** [10994-6]

10994 09 **A review of sensor technology development at NASA's Goddard Space Flight Center for earth science** [10994-7]

SECURITY SCANNING

10994 0A **SAR millimeter wave imaging systems** [10994-8]

10994 0D **High-resolution 3D microwave imaging of a moving target using optical motion capture** [10994-11]

PHENOMENOLOGY

10994 0E **Radar backscattering measurements of a simplified rough ocean surface** [10994-12]

10994 0F **Bistatic terahertz scattering from random rough surfaces** [10994-13]

10994 0G **Suitability of explosive simulants for millimeter-wave imaging detection systems** [10994-14]

10994 0H **Exploring material characteristics by polarimetric MMW radiometry** [10994-15]

POSTER SESSION

10994 0I **Millimeter-wave forward-looking 3-D SAR imaging challenges** [10994-16]

10994 0J **Autofocus algorithms for millimeter-wave 3-D FLoSAR** [10994-17]

Authors

Numbers in the index correspond to the last two digits of the seven-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first five digits reflect the volume number. Base 36 numbering is employed for the last two digits and indicates the order of articles within the volume. Numbers start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B...0Z, followed by 10-1Z, 20-2Z, etc.

Barber, Jeffrey , 0G
Case, Tim, 04
Chamberlin, R. A., 0F
Chattopadhyay, Goutam, 06
Clark, R. Trevor, 0D
Cook, Jason D., 02
Cooper, Ken, 06
DeMartinis, Guy B., 02, 03
Deshpande, Manohar, 09
Dickinson, Jason C., 03
Dill, Stephan, 0H
Driggers, Ronald, 0A
Furxhi, Orges, 0A
Gatesman, Andrew J., 02, 03, 0E
Gilmore, Abigail M., 0E
Gordon, J., 0F
Goshi, Darren S., 04
Goyette, Thomas M., 02, 03, 0E
Grossman, E. N., 0F
Hall, Thomas E., 0D
Hammon, David L., 05
Herrault, Florian G., 05
Jones, A. Mark, 0D
Kanno, Atsushi, 07
Karns, Duane, 0G
Kona, Keerti S., 05
Lopez, Aurelio, 05
Lynch, Jonathan J., 05
McKitterick, John, 04
Mishra, Kumar Vijay, 0J
Mohammadian, Nafiseh, 0A
Naghibi, Partia, 05
Nguyen, Lam H., 0I, 0J
Novotny, D., 0F
Otani, Shintaro, 07
Pedross-Engel, Andreas, 08
Peichl, Markus, 0H
Popovic, N., 0F
Prophet, Eric M., 05
Regan, Dean C., 05
Reynolds, Matthew S., 08
Rhoads, Charles, 04
Sheen, David M., 0D
Short, Robert, 0A
Smith, Barry T., 0G
Smith, Peter R., 0G
Soper, Brian W., 02, 0E
Sotobayashi, Hideyuki, 07
Takaoka, Reina, 07
Tang, Yan, 05
Tedeschi, J., 0D
Virbila, Gabriel L., 05
Watts, Claire M., 08
Weatherall, James C., 0G
Wetzel, Michael D., 05
Wong, Joel S., 05
Yamamoto, Naokatsu, 07
Yurduseven, Okan, 06

Conference Committee

Symposium Chairs

Jay Kumler, JENOPTIK Optical Systems, LLC (United States)
Ruth L. Moser, Air Force Research Laboratory (United States)

Symposium Co-chair

John M. Pellegrino, Electro-Optical Systems Laboratory, Georgia Institute of Technology (United States)

Conference Chairs

David A. Wikner, U.S. Army Research Laboratory (United States)
Duncan A. Robertson, University of St. Andrews (United Kingdom)

Conference Program Committee

Roger Appleby, InnovaSec Ltd. (United Kingdom)
Jeffrey Barber, U.S. Deptartment of Homeland Security (United States)
Erich N. Grossman, National Institute of Standards and Technology (United States)
Arttu R. Luukanen, Asqella Corporation (Finland)
Markus Peichl, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany)
David M. Sheen, Pacific Northwest National Laboratory (United States)
Bruce Wallace, Consultant (United States)

Session Chairs

1 Millimetre Wave Radar: Joint Session with Conferences 10994 and 11003
David A. Wikner, U.S. Army Research Laboratory (United States)

2 Systems
Duncan A. Robertson, University of St. Andrews (United Kingdom)

3 Security Scanning
David A. Wikner, U.S. Army Research Laboratory (United States)

4 Phenomenology
Duncan A. Robertson, University of St. Andrews (United Kingdom)