Multimodal Biomedical Imaging X

Fred S. Azar Xavier Intes Editors

7 February 2015 San Francisco, California, United States

Sponsored and Published by SPIE

Volume 9316

Proceedings of SPIE, 1605-7422, V. 9316

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

Multimodal Biomedical Imaging X, edited by Fred S. Azar, Xavier Intes, Proc. of SPIE Vol. 9316, 931601 ⋅ © 2015 SPIE ⋅ CCC code: 1605-7422/15/\$18 doi: 10.1117/12.2192259

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 *Multimodal Biomedical Imaging X*, edited by Fred S. Azar, Xavier Intes, Proceedings of SPIE Vol. 9316 (SPIE, Bellingham, WA, 2015) Article CID Number.

ISSN: 1605-7422 ISBN: 9781628414066

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.ora

Copyright © 2015, 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 1605-7422/15/\$18.00.

Printed in the United States of America.

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



Paper Numbering: Proceedings of SPIE follow an e-First publication model, with papers published first online and then in print. Papers are published as they are submitted and meet publication criteria. A unique 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.

Contents

V	Authors
vii	Conference Committee
	IMAGE PROCESSING TECHNIQUES
9316 02	Mammogram incorporated DOI with transmission and reflection parallel scanning [9316-1]
9316 03	Dense motion analysis and segmentation of ultrasound images [9316-2]
9316 04	Tomographic fluorescence reconstruction by a spectral projected gradient pursuit method [9316-3]
9316 05	Systematic optimization of MRI guided near infrared diffuse optical spectroscopy in breast [9316-4]
	CLINICAL APPLICATIONS
9316 07	Illumination-compensated non-contact imaging photoplethysmography via dual-mode temporally coded illumination [9316-6]
9316 08	Multi-modal contrast of tissue anatomy enables correlative biomarker imaging [9316-7]
9316 OA	High-resolution motion-compensated imaging photoplethysmography for remote heart rate monitoring [9316-9]
9316 OC	Dual multispectral and 3D structured light laparoscope [9316-11]
	PRECLINICAL / HYBRID IMAGING
9316 OI	Development of a multi-scale and multi-modality imaging system to characterize tumors and their microenvironment in vivo [9316-18]
9316 OJ	Co-registration of ultrasound and frequency-domain photoacoustic radar images and image improvement for tumor detection [9316-19]
9316 OK	Multi-modality imaging using a handheld gamma camera and MRI for tumor localization [9316-20]
9316 OM	Microscopic x-ray luminescence computed tomography [9316-22]

POSTER SESSION

9316 ON	Non-contact assessment of melanin distribution via multispectral temporal illumination coding [9316-23]
9316 00	Acquisition of priori tissue optical structure based on non-rigid image registration [9316-24]
9316 OP	Photoacoustic tomography guided diffuse optical tomography for small-animal model [9316-25]
9316 OR	Correlative super-resolution fluorescence microscopy combined with optical coherence microscopy [9316-12]

Authors

Numbers in the index correspond to the last two digits of the six-digit citation identifier (CID) article numbering system used in Proceedings of SPIE. The first four 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.

Amelard, Robert, 07, 0A, 0N

An, Yu, 04 Aoki, Kota, 03 Arya, Shobhit, OC Bae, Sung Chul, OR Barnes, Michael, 08 Chen, Liang-Yu, 02 Chi, Chongwei, 04 Choi, Sung soo Sean, 0J Chou, Chia-Cheng, 02 Chung, Audrey, 0A Clancy, Neil T., 0C

Clausi, David A., 07, 0A, 0N

Dika, Cheryl, 0K Dovlo, Edem, 0J Dugon, Emilie, 01 El-Ghussein, Fadi, 05 Elson, Daniel S., 0C Gao, Feng, 00, 0P Garsha, Karl, 08

Georgian-Smith, Dianne, 0K Ginefri, Jean-Christophe, Ol

Gui, Jiang, 05 Hanna, George B., 0C Jang, Soohyun, OR Jiang, Shixin, 04 Jiang, Shudong, 05 Kim, Gyeong Tae, 0R Kim, Sungho, OR Kulinski, Jan, 0A

Laplace-Builhé, Corinne, Ol Lashkari, Bahman, OJ Leguerney, Ingrid, 01 Leong, Joanne, 0A Li, Changqing, 0M Li, Jiao, OO, OP Lin, Jianyu, 0C

Liu, Lingling, 00 Mandelis, Andreas, 0J

Mao, Yamin, 04

Mastanduno, Michael A., 05

Nagahashi, Hiroshi, 03

Nagle, Ray B., 08 Nagy, Dea, 08 Otter, Michael, 08

Pan, Min-Cheng, 02

Pan, Min-Chun, 02

Paulsen, Keith D., 05

Pestano, Gary, 08

Pogue, Brian W., 05 Polrot, Mélanie, 01 Roberts, Esteban, 08 Robin, Sandra, Ol Rouffiac, Valérie, Ol

Salomé-Desnoulez, Sophie, Ol

Scharfenberger, Christian, 07, 0A, 0N

Sebrié, Catherine, 01 Ser-Leroux, Karine, Ol Shim, Sang-Hee, OR Sun, Shen-Yi, 02 Tian, Jie, 04 Ventura, Franklin, 08 Wan, Wenbo, 00, 0P

Wang, Xiao Yu, 0A Wang, Yihan, 00, 0P

Wong, Alexander, 07, 0A, 0N

Xu, Junqing, 05 Yang, Xin, 04 Ye, Jinzuo, 04 Yokoyama, Ryo, 03 Yu, Jhao-Ming, 02 Zhang, Kun, 0M Zhang, Wei, 0M Zhang, Yan, OO, OP Zhao, Yan, 05

Zhu, Dianwen, 0M

Proc. of SPIE Vol. 9316 931601-6

Conference Committee

Symposium Chairs

James G. Fujimoto, Massachusetts Institute of Technology (United States)

R. Rox Anderson, Wellman Center for Photomedicine, Massachusetts General Hospital (United States) and Harvard School of Medicine (United States)

Program Track Chairs

Tuan Vo-Dinh, Fitzpatrick Institute for Photonics, Duke University (United States)

Anita Mahadevan-Jansen, Vanderbilt University (United States)

Conference Chairs

Fred S. Azar, Philips Medical Systems (United States) **Xavier Intes**, Rensselaer Polytechnic Institute (United States)

Conference Program Committee

Caroline Boudoux, Ecole Polytechnique de Montréal (Canada) Christophe Chefd'hotel, Ventana Medical Systems, Inc. (United States)

Yu Chen, University of Maryland, College Park (United States)
Qianqian Fang, Massachusetts General Hospital (United States)

Sergio Fantini, Tufts University (United States)

Gultekin Gulsen, University of California, Irvine (United States)

Theodore J. Huppert, University of Pittsburgh (United States)

Tim Nielsen, Philips Research (Germany)

Vasilis Ntziachristos, Helmholtz Zentrum München GmbH (Germany)

Brian W. Pogue, Thayer School of Engineering at Dartmouth (United States)

Siavash Yazdanfar, GE Global Research (United States)

Arjun G. Yodh, University of Pennsylvania (United States)

Session Chairs

- Image Processing TechniquesFred S. Azar, Philips Medical Systems (United States)
- 2 Clinical Applications Hamid Dehghani, The University of Birmingham (United Kingdom)

- 3 Multimodality Microscopy Fred S. Azar, Philips Medical Systems (United States)
- 4 Preclinical / Hybrid Imaging Caroline Boudoux, Ecole Polytechnique de Montréal (Canada)