PROCEEDINGS
IS&T / SPIE
Electronic Imaging
SCIENCE AND TECHNOLOGY

Image Quality and System Performance X

Peter D. Burns
Sophie Triantaphillidou
Editors

5–7 February 2013
Burlingame, California, United States

Sponsored by
IS&T—The Society for Imaging Science and Technology
SPIE

Cosponsored by
Qualcomm Inc. (United States)

Published by
SPIE

Volume 8653

Proceedings of SPIE 0277-786X, V.8653

Image Quality and System Performance X, edited by Peter D. Burns, Sophie Triantaphillidou,
Proc. of SPIE-IS&T Electronic Imaging, SPIE Vol. 8653, 865301 • © 2013 SPIE-IS&T
CCC code: 0277-786X/13/$18 • doi: 10.1117/12.2020778

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 publishers are 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 *Image Quality and System Performance X*, edited by Peter D. Burns, Sophie Triantaphillidou, Proceedings of SPIE-IS&T Electronic Imaging, SPIE Vol. 8653. Article CID Number (2013)

ISSN: 0277-786X
ISBN: 9780819494269

Copublished 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
and
IS&T—The Society for Imaging Science and Technology
7003 Kilworth Lane, Springfield, Virginia, 22151 USA
Telephone +1 703 642 9090 (Eastern Time) · Fax +1 703 642 9094
imaging.org

Printed in the United States of America.

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

Conference Committee

Symposium Chair

Gaurav Sharma, University of Rochester (United States)

Symposium Cochair

Sergio R. Goma, Qualcomm Inc. (United States)

Conference Chairs

Peter D. Burns, Burns Digital Imaging (United States)
Sophie Triantaphillidou, University of Westminster (United Kingdom)

Conference Program Committee

Majed Chambah, Université de Reims Champagne-Ardenne (France)
Luke C. Cui, Lexmark International, Inc. (United States)
Mark D. Fairchild, Rochester Institute of Technology (United States)
Susan P. Farnand, Rochester Institute of Technology (United States)
Robert D. Fiete, ITT Exelis (United States)
Frans Gaykema, Océ Technologies B.V. (Netherlands)
Dirk W. Hertel, E Ink Corporation (United States)
Robin B. Jenkin, Apple, Inc. (United States)
Sang Ho Kim, Samsung Digital City (Korea, Republic of)
Chaker Larabi, Université de Poitiers (France)
Lindsay William MacDonald, MacColour, Ltd. (United Kingdom)
Toshiya Nakaguchi, Chiba University (Japan)
Göte S. Nyman, University of Helsinki (Finland)
Stuart W. Perry, Canon Australia Pty. Ltd. (Australia)
D. René Rasmussen, Qi Analytics LLC (United States)
Eric K. Zeise, Kodak's Graphic Communications Group (United States)

Session Chairs

1 Image Quality Evaluation Methods/Standards for Mobile and Digital Photography I: Joint Session with Conferences 8653, 8660, and 8667C
Sebastiano Battiato, Università degli Studi di Catania (Italy)
Peter D. Burns, Burns Digital Imaging (United States)

2 Image Quality Evaluation Methods/Standards for Mobile and Digital Photography II: Joint Session with Conferences 8653, 8660, and 8667C
Dietmar Wüller, Image Engineering GmbH & Co. KG (Germany)
Nitin Sampat, Rochester Institute of Technology (United States)

3 Airborne and Security Applications
Robert D. Fiete, ITT Exelis (United States)

4 3D and Video Applications
Chaker Larabi, Université de Poitiers (France)

5 Perceptual Image Quality
Susan P. Farnand, Rochester Institute of Technology (United States)

6 System Analysis and Objective Image Quality Metrics
Sophie Triantaphillidou, University of Westminster (United Kingdom)

7 Image Quality In Print I
Sang Ho Kim, Samsung Digital City (Korea, Republic of)

8 Image Quality in Print II
Frans Gaykema, Océ Technologies B.V. (Netherlands)