PROCEEDINGS OF SPIE

[SPIDigitalLibrary.org/conference-proceedings-of-spie](https://spiedigitallibrary.org/conference-proceedings-of-spie)

Front Matter: Volume 6492

, "Front Matter: Volume 6492," Proc. SPIE 6492, Human Vision and Electronic Imaging XII, 649201 (14 March 2007); doi: 10.1117/12.729071

SPIE.

Event: Electronic Imaging 2007, 2007, San Jose, CA, United States

Human Vision and Electronic Imaging XII

Bernice E. Rogowitz
Thrasyvoulos N. Pappas
Scott J. Daly
Chairs/Editors

29 January–1 February 2007
San Jose, California, USA

Sponsored and Published by
IS&T—The Society for Imaging Science and Technology
SPIE—The International Society for Optical Engineering

SPIE Vol. 6492

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 *Human Vision and Electronic Imaging XII*, edited by Bernice E. Rogowitz, Thrasyvoulos N. Pappas, Scott J. Daly, Proceedings of SPIE-IS&T Electronic Imaging, SPIE Vol. 6492, Article CID Number (2007).

ISSN 0277-786X
ISBN 9780819466051

Copublished by

SPIE—The International Society for Optical Engineering

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone 1 360/676-3290 (Pacific Time) · Fax 1 360/647-1445

<http://www.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

<http://www.imaging.org>

Copyright © 2007, The Society of Photo-Optical Instrumentation Engineers and The Society for Imaging Science and Technology.

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 and IS&T 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 <http://www.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/07/\$18.00.

Printed in the United States of America.

Contents

ix *Conference Committee*

SESSION 1 KEYNOTE SESSION

- 649202 **New vistas in image and video quality assessment (Keynote Paper)** [6492-68]
K. Seshadrinathan, A. C. Bovik, The Univ. of Texas at Austin (USA)
- 649203 **Painterly rendered portraits from photographs using a knowledge-based approach (Keynote Paper)** [6492-01]
S. DiPaola, Simon Fraser Univ. (Canada)
- 649204 **Nonlinear encoding in multilayer LNL systems optimized for the representation of natural images (Keynote Paper)** [6492-02]
C. Zetzsche, Univ. of Bremen (Germany); U. Nuding, Univ. of Munich (Germany)

SESSION 2 PERCEPTION OF NATURAL IMAGES

- 649205 **Optimal sensor design for estimating local velocity in natural environments (Invited Paper)** [6492-03]
T. Tversky, W. S. Geisler, Univ. of Texas/Austin (USA)
- 649206 **Bilinear models of natural images (Invited Paper)** [6492-04]
B. A. Olshausen, C. Cadieu, J. Culpepper, Univ. of California/Berkeley (USA); D. K. Warland, Univ. of California/Davis (USA)
- 649207 **Statistically and perceptually motivated nonlinear image representation (Invited Paper)** [6492-05]
S. Lyu, E. P. Simoncelli, New York Univ. (USA)
- 649208 **Spatiotemporal power spectra of motion parallax: the case of cluttered 3D scenes** [6492-06]
D. Rivait, M. S. Langer, McGill Univ. (Canada)
-

Pagination: 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 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.

- 649209 **Feature category systems for 2nd order local image structure induced by natural image statistics and otherwise** [6492-07]
L. D. Griffin, M. Lillholm, Univ. College London (United Kingdom)
- 64920A **The independent components of natural images are perceptually dependent** [6492-08]
M. Bethge, T. V. Wiecki, F. A. Wichmann, Max Planck Institute for Biological Cybernetics (Germany)
- 64920B **Learning optimal features for visual pattern recognition** [6492-09]
K. Labusch, Univ. of Lübeck (Germany); U. Siewert, PLANET intelligent systems GmbH (Germany); T. Martinetz, E. Barth, Univ. of Lübeck (Germany)
- 64920C **Unsupervised learning of a steerable basis for invariant image representations** [6492-10]
M. Bethge, S. Gerwin, J. H. Macke, Max Planck Institute for Biological Cybernetics (Germany)
- 64920D **Analysis of segment statistics for semantic classification of natural images** [6492-11]
D. Depalov, T. N. Pappas, Northwestern Univ. (USA)

SESSION 3 PERCEPTUAL IMAGE QUALITY AND COMPRESSION

- 64920E **The role of spatially adaptive versus non-spatially adaptive distortion in supra-threshold compression** [6492-12]
M. D. Gaubatz, S. Kwan, S. S. Hemami, Cornell Univ. (USA)
- 64920F **Image compression using sparse color sampling combined with nonlinear image processing** [6492-13]
S. Brooks, Dalhousie Univ. (Canada); I. Saunders, Univ. of Edinburgh (United Kingdom); N. A. Dodgson, Univ. of Cambridge (United Kingdom)
- 64920G **Compression of image clusters using Karhunen Loeve transformations** [6492-14]
M. Kramm, Technische Univ. München (Germany)
- 64920H **Visual ergonomic aspects of computer displays: glossy screens and angular dependence** [6492-15]
K. Brunnström, B. Andrén, Z. Konstantinides, L. Nordström, Acreo AB (Sweden)
- 64920I **The blur effect: perception and estimation with a new no-reference perceptual blur metric** [6492-16]
F. Crete, Lab. des Images et des Signaux (France) and STMicroelectronics (France); T. Dolmiere, P. Ladret, Lab. des Images et des Signaux (France); M. Nicolas, STMicroelectronics (France)
- 64920J **Perceptual quality evaluation of geometric distortions in images** [6492-17]
A. D'Angelo, G. Menegaz, M. Barni, Univ. of Siena (Italy)

SESSION 4 PERCEPTUAL VIDEO QUALITY

- 64920K **Color preference, color naturalness, and annoyance of compressed and color scaled digital videos** [6492-18]
C. C. Koh, J. M. Foley, S. K. Mitra, Univ. of California/Santa Barbara (USA)

- 64920L **Relation between DSIS and DSCQS for temporal and spatial video artifacts in a wireless home environment** [6492-19]
N. Van den Ende, Philips Research Europe (Netherlands); L. M. J. Meesters, Eindhoven Univ. of Technology (Netherlands); R. Haakma, Philips Research Europe (Netherlands)
- 64920M **"Can you see me now?" An objective metric for predicting intelligibility of compressed American Sign Language video** [6492-21]
F. M. Ciaramello, S. S. Hemami, Cornell Univ. (USA)
- 64920N **Price-dependent quality: examining the effects of price on multimedia quality requirements** [6492-22]
D. S. Hands, British Telecommunications plc (United Kingdom); C. Partridge, Univ. of Essex (United Kingdom); K. Cheng, R. J. Jacobs, British Telecommunications plc (United Kingdom)

SESSION 5 VISUAL OPTICS

- 64920O **Correcting spurious resolution in defocused images** [6492-23]
J. I. Yellott, J. W. Yellott, Univ. of California/Irvine (USA)
- 64920P **Do focus measures apply to retinal images?** [6492-24]
Y. Tian, K. Shieh, C. F. Wildsoet, Univ. of California/Berkeley (USA)

SESSION 6 CHARACTERIZING COLOR IN IMAGING SYSTEMS

- 64920Q **Aperture and object mode appearances in images** [6492-26]
J. J. McCann, McCann Imaging (USA)
- 64920R **Visibility improvement based on gray matching experiment between dark and ambient condition in mobile display** [6492-27]
I. Kim, H. Ok, D. Park, Samsung Advanced Institute of Technology (South Korea)
- 64920S **Multispectral color constancy: real image tests** [6492-28]
M. Mosny, B. Funt, Simon Fraser Univ. (Canada)
- 64920T **Color balancing based upon gamut and temporal correlations** [6492-29]
S.-S. Kim, H.-Y. Lee, B.-H. Kang, S.-D. Lee, D.-S. Park, C.-Y. Kim, Samsung Advanced Institute of Technology (South Korea)
- 64920U **Visibility of hue, saturation, and luminance deviations in LEDs** [6492-30]
P. J. H. Seuntjens, I. M. L. C. Vogels, E. B. Kraaijenbrink, Philips Research (Netherlands)
- 64920V **Paper whiteness and its effect on the reproduction of colors** [6492-31]
O. Norberg, Mid Sweden Univ. (Sweden)

SESSION 7 COGNITIVE GRAPHICS

- 64920W **Higher-order image representations for hyper-resolution image synthesis and capture** [6492-33]
B. Watson, North Carolina State Univ. (USA)

- 64920X **Semantic photosynthesis** [6492-34]
M. Johnson, G. J. Brostow, J. Shotton, Univ. of Cambridge (United Kingdom); V. Kwatra, UNC-Chapel Hill (USA); R. Cipolla, Univ. of Cambridge (United Kingdom)
- 64920Y **Revealing pentimenti: the hidden history in a painting** [6492-35]
A. A. Gooch, Univ. of Victoria (Canada)

SESSION 8 PERCEPTUAL ISSUES IN HIGH-DYNAMIC RANGE IMAGING

- 64920Z **Self-calibrating wide color gamut high-dynamic-range display** [6492-36]
H. Seetzen, BrightSide Technologies (Canada) and Univ. of British Columbia (Canada); S. Makki, H. Ip, BrightSide Technologies (Canada); T. Wan, BrightSide Technologies (Canada) and Univ. of British Columbia (Canada); V. Kwong, G. Ward, BrightSide Technologies (Canada); W. Heidrich, L. Whitehead, Univ. of British Columbia (Canada)
- 649210 **Tone mapping for high-dynamic-range displays** [6492-38]
L. Meylan, École Polytechnique Fédérale de Lausanne (Switzerland); S. Daly, Sharp Labs. of America (USA); S. Süsstrunk, École Polytechnique Fédérale de Lausanne (Switzerland)
- 649212 **High-dynamic-range imaging pipeline: perception-motivated representation of visual content** [6492-40]
R. Mantiuk, G. Krawczyk, Max-Planck-Institut für Informatik (Germany); R. Mantiuk, Szczecin Univ. of Technology (Poland); H.-P. Seidel, Max-Planck-Institut für Informatik (Germany)
- 649213 **Veiling glare: the dynamic range limit of HDR images** [6492-41]
J. J. McCann, McCann Imaging (USA); A. Rizzi, Univ. degli Studi di Milano (Italy)

SESSION 9 EYE MOVEMENTS AND VISUAL ATTENTION

- 649214 **Hidden Markov model-based face recognition using selective attention** [6492-42]
A. A. Salah, Boğaziçi Univ. (Turkey); M. Bicego, DEIR - Univ. of Sassari (Italy); L. Akarun, Boğaziçi Univ. (Turkey); E. Grosso, DEIR - Univ. of Sassari (Italy); M. Tistarelli, DAP - Univ. of Sassari (Italy)
- 649215 **The role of eye movement signals in dorsal and ventral processing** [6492-43]
J. A. Black, Jr., S. B. Braiman, C. Narayanan, S. Panchanathan, Arizona State Univ. (USA)
- 649216 **Variable resolution images and their effects on eye movements during free viewing** [6492-44]
M. Nyström, K. Holmqvist, Lund Univ. (Sweden)
- 649217 **Hierarchy visual attention map** [6492-45]
K.-C. Yang, C. C. Guest, P. K. Das, Univ. of California/San Diego (USA)
- 649218 **Attention trees and semantic paths** [6492-46]
C. Giusti, G. G. Pieroni, Univ. of Udine (Italy); L. Pieroni, Univ. La Sapienza (Italy)
- 649219 **Motion integration in visual attention models for predicting simple dynamic scenes** [6492-47]
A. Bur, Univ. of Neuchâtel (Switzerland); P. Wurtz, R. M. Müri, Univ. of Bern (Switzerland); H. Hügli, Univ. of Neuchâtel (Switzerland)

SESSION 10 HIGHER LEVEL VISION AND COGNITION

- 64921A **Motion of specularities on low-relief surfaces: frequency domain analysis** [6492-48]
Y. Farasat, M. S. Langer, McGill Univ. (Canada)
- 64921B **Fully automatic perceptual modeling of near regular textures** [6492-49]
G. Menegaz, A. Franceschetti, A. Mecocci, Univ. of Siena (Italy)
- 64921C **Machine perception using the five visual defined forms plus infrared** [6492-50]
P. DeRego, S. Cave, Kansas City Plant/Kirland Operations (USA)
- 64921D **The normalized compression distance and image distinguishability** [6492-51]
N. Tran, Santa Clara Univ. (USA)
- 64921E **Instantaneous stimulus paradigm: cortical network and dynamics of figure-ground organization** [6492-52]
L. T. Likova, C. W. Tyler, The Smith-Kettlewell Eye Research Institute (USA)
- 64921F **Comparing realness between real objects and images at various resolutions** [6492-53]
K. Masaoka, M. Emoto, M. Sugawara, Y. Nojiri, NHK Science & Technical Research Labs. (Japan)
- 64921G **Navigation based on a sensorimotor representation: a virtual reality study** [6492-54]
C. Zetsche, C. Galbraith, J. Wolter, K. Schill, Univ. of Bremen (Germany)

POSTER SESSION

- 64921I **Making flat art for both eyes** [6492-56]
S. Mason, Yavapai College (USA)
- 64921J **A novel Bayer-like WRGB color filter array for CMOS image sensors** [6492-57]
H. Honda, Y. Iida, G. Itoh, Toshiba Corp. (Japan); Y. Egawa, H. Seki, Semiconductor Co., Toshiba Corp. (Japan)
- 64921K **Improving video captioning for deaf and hearing-impaired people based on eye movement and attention overload** [6492-59]
C. Chapdelaine, V. Gouaillier, M. Beaulieu, L. Gagnon, Computer Research Institute of Montreal (Canada)
- 64921L **Comparison of methods for the simplification of mesh models using quality indices and an observer study** [6492-60]
S. Silva, J. Madeira, Univ. de Aveiro (Portugal); C. Ferreira, Univ. de Aveiro (Portugal) and Univ. de Lisboa (Portugal); B. Sousa Santos, Univ. de Aveiro (Portugal)
- 64921M **Influence of motion on contrast perception: supra-threshold spatio-velocity CSF measurements** [6492-61]
S. Tourancheau, P. Le Callet, D. Barba, Univ. de Nantes (France)
- 64921N **First- and third-party ground truth for key frame extraction from consumer video clips** [6492-63]
K. Costello, J. Luo, Eastman Kodak Co. (USA)

- 64921O **Quantifying the use of structure in cognitive tasks** [6492-64]
D. M. Rouse, S. S. Hemami, Cornell Univ. (USA)
- 64921P **Quality metric for H.264/AVC scalable video coding with full scalability** [6492-65]
C. S. Kim, D. Suh, T. M. Bae, Y. M. Ro, Information and Communications Univ. (South Korea)
- 64921Q **Temporal relation between bottom-up versus top-down strategies for gaze prediction**
[6492-66]
S. Krishna, J. A. Black, S. Braiman, S. Panchanathan, Arizona State Univ. (USA)
- 64921R **Eigen local color histograms for object recognition and orientation estimation** [6492-67]
D. Muselet, Lab. LIGIV, Univ. Jean Monnet (France); B. Funt, Simon Fraser Univ. (Canada);
L. Macaire, Lab. LAGIS, CNRS, Univ. des Sciences et Technologies de Lille (France)

KEYNOTE SESSION

- 64921S **Adaptation and perceptual norms (Keynote Paper)** [6492-69]
M. A. Webster, M. Yasuda, S. Haber, D. Leonard, N. Ballardini, Univ. of Nevada/Reno (USA)

Author Index

Conference Committee

Symposium Chairs

Michael A. Kriss, Consultant (USA)
Robert A. Sprague, Consultant (USA)

Conference Chairs

Bernice E. Rogowitz, IBM Thomas J. Watson Research Center (USA)
Thrasyvoulos N. Pappas, Northwestern University (USA)
Scott J. Daly, Sharp Laboratories of America, Inc. (USA)

Program Committee

Albert J. Ahumada, Jr., NASA Ames Research Center (USA)
Jan P. Allebach, Purdue University (USA)
Erhardt Barth, Universität zu Lübeck (Germany)
Walter R. Bender, MIT Media Laboratory (USA)
Michael H. Brill, Datacolor (USA)
John C. Dalton, Synthetik Software (USA)
Gunilla A. M. Derefeldt, Swedish Defence Research Agency (Sweden)
Huib de Ridder, Technische Universiteit Delft (Netherlands)
Elena A. Fedorovskaya, Eastman Kodak Company (USA)
Jennifer Gille, Qualcomm Inc. (USA)
Sheila S. Hemami, Cornell University (USA)
Laurent Itti, University of Southern California (USA)
Stanley A. Klein, University of California/Berkeley (USA)
Jan J. Koenderink, Universiteit Utrecht (Netherlands)
John J. McCann, McCann Imaging (USA)
Jeffrey B. Mulligan, NASA Ames Research Center (USA)
Karol Myszkowski, Max-Planck-Institut für Informatik (Germany)
Adar Pelah, The University of York (United Kingdom)
Hawley K. Rising III, Sony Electronics Inc. (USA)
Sabine E. Süsstrunk, École Polytechnique Fédérale de Lausanne (Switzerland)
Christopher W. Tyler, Smith-Kettlewell Institute (USA)
Andrew B. Watson, NASA Ames Research Center (USA)

Session Chairs

- 1 Keynote Session
Bernice E. Rogowitz, IBM Thomas J. Watson Research Center (USA)
- 2 Perception of Natural Images
Erhardt Barth, Universität zu Lübeck (Germany)

- 3 Perceptual Image Quality and Compression
Thrasyvoulos N. Pappas, Northwestern University (USA)
- 4 Perceptual Video Quality
Thrasyvoulos N. Pappas, Northwestern University (USA)
- 5 Visual Optics
Albert J. Ahumada, Jr., NASA Ames Research Center (USA)
- 6 Characterizing Color in Imaging Systems
John J. McCann, McCann Imaging (USA)
- 7 Cognitive Graphics
John E. Tumblin, Northwestern University (USA)
- 8 Perceptual Issues in High-Dynamic Range Imaging
Scott J. Daly, Sharp Laboratories of America, Inc. (USA)
- 9 Eye Movements and Visual Attention
Bernice E. Rogowitz, IBM Thomas J. Watson Research Center (USA)
- 10 Higher Level Vision and Cognition
Bernice E. Rogowitz, IBM Thomas J. Watson Research Center (USA)