

Human Vision and Electronic Imaging 2016 (HVEI 2016)

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Editors:

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Human Vision and Electronic Imaging (HVEI) 2016

Monday, February 15, 2016

Welcome and Keynote Session 1:

The Neuroscience of Multisensory Processing

Session Chairs: Bernice Rogowitz, Visual Perspectives (USA); Thrasyvoulos Pappas, Northwestern University (USA); and Huib de Ridder, Delft University of Technology (Netherlands).....N/A

8:50 – 9:50 am

Continental Ballroom 4

HVEI Conference Welcome

HVEI-091

Towards a rudimentary neural model of multisensory integration in human neocortex, John Foxe¹ and Sophie Molholm²; ¹University of Rochester Medical Center and ²Albert Einstein College of Medicine (USA).....N/A

Multisensory Interactions

Session Chairs: Mark McCourt, North Dakota State University (USA) and Lora Likova, Smith-Kettlewell Eye Research Institute (USA)

9:50 – 10:20 am

Continental Ballroom 4

10:20 – 10:50 am Coffee Break

Multisensory Interactions (continued)

Session Chairs: Mark McCourt, North Dakota State University (USA) and Lora Likova, Smith-Kettlewell Eye Research Institute (USA)

10:50 – 12:30 am

Continental Ballroom 4

10:50

HVEI-093

Psychophysical investigations into Ramachandran's mirror and visual feedback for phantom limb pain: Video-based variants for unilateral and bilateral amputees, and temporal dynamics of paresthesias (Invited), David H. Peterzell, John F. Kennedy University (USA).....1

11:10

HVEI-094

Superior verbal abilities in congenital blindness (Invited), Valeria Occelli¹, Simon Lacey¹, Careese Stephens^{1,2} and Krish Sathian^{1,2}; ¹Emory University and ²Atlanta VAMC (USA).....10

11:30

HVEI-095

The Cortical Network for Braille Writing in the Blind (Invited), Lora T. Likova, Christopher W. Tyler, Laura Caciamani, Kristyo Mineff, and Spero Nicholas, Smith-Kettlewell Eye Research Institute (USA).....14

11:50

HVEI-096

Blind individuals represent the auditory space in egocentric rather than allocentric reference frame (Invited), Tiziana Vercillo¹ and Monica Gori²; ¹University of Nevada, Reno (USA) and ²U-VIP Unit for Visually Impaired People, Fondazione Istituto Italiano di Tecnologia (Italy).....20

12:10

HVEI-097

Individual differences in multisensory integration and timing (Invited), Elliot D. Freeman and Alberta Ipser, City University London (United Kingdom).....25

12:30 – 2:00 pm Lunch Break

EI 2016 Opening Plenary and Symposium Awards

Session Chair: Choon-Woo Kim (Inha University)

2:00 – 3:00 PM

Continental Ballroom 5

Illuminating a bright future for medicine, Audrey K. Bowden, Stanford University (USA).....N/A

3:00 – 3:30 pm Coffee Break

Multisensory Interactions (continued)

Session Chairs: Mark McCourt, North Dakota State University (USA) and Lora Likova, Smith-Kettlewell Eye Research Institute (USA)

3:30 – 4:30 pm

Continental Ballroom 4

3:30

HVEI-098

Beyond the predominance of the visual empire: A functional model on haptics & more (Invited), Claus-Christian Carbon, University of Bamberg (Germany).....29

3:50

HVEI-099

Visual-tactile integration during active touch (Invited), Cintia Martins and Qi Wang, Columbia University (USA).....N/A

4:10

HVEI-100

Evaluating the effectiveness of auditory and tactile surface graphs for the visually impaired, James Ferwerda¹, Vladimir Bulatov², and John Gardner²; ¹Rochester Institute of Technology and ²ViewPlus Technologies (USA).....31

HVEI Monday Author Discussion Session

Moderators: Bernice Rogowitz, Visual Perspectives (USA); Thrasyvoulos Pappas, Northwestern University (USA); and Huib de Ridder, Delft University of Technology (Netherlands).....N/A

4:30 – 5:30 pm

Continental Ballroom 4

5:00 – 6:00 pm EI 2016 Symposium Reception

HVEI Banquet

Conference Chairs: Bernice Rogowitz, Visual Perspectives (USA); Thrasyvoulos Pappas, Northwestern University (USA); and Huib de Ridder, Delft University of Technology (Netherlands)

7:30 – 10:30 pm

TBA at Registration

HVEI-101

Bach to the blues: Color, music, emotion, and synesthesia, Stephen Palmer, University of California (USA).....N/A

Tuesday, February 16, 2016

COLOR/HVEI: RETINEX at 50: History Joint Session

Session Chair: Marcelo Bertalmio, Universitat Pompeu Fabra (Spain)

8:50 – 10:10 am
Continental Ballroom 4

This session is jointly sponsored by: Color Imaging XXI: Displaying, Processing, Hardcopy, and Applications, and Human Vision and Electronic Imaging (HVEI) 2016.

8:50 RETINEX-017
Retinexes algorithms: Many spatial processes used to solve many different problems (Invited), *John McCann, McCann Imaging (USA)....N/A*

9:30 RETINEX-018
Designator Retinex, Milano Retinex and the locality issue (Invited), *Alessandro Rizzi, Università degli Studi di Milano (Italy)....N/A*

10:10 – 10:50 am Coffee Break

COLOR/HVEI: RETINEX at 50: Spatial Algorithms Joint Session

Session Chair: John McCann, McCann Imaging (USA)

10:50 am – 12:30 pm
Continental Ballroom 4

This session is jointly sponsored by: Color Imaging XXI: Displaying, Processing, Hardcopy, and Applications, and Human Vision and Electronic Imaging (HVEI) 2016.

10:50 RETINEX-019
The oriented difference of Gaussians model of brightness perception (Invited), *Mark McCourt and Barbara Blakeslee, North Dakota State University (USA)....N/A*

11:10 RETINEX-020
A center-surround framework for spatial image processing, *Vassilios Vonikakis, Advanced Digital Sciences Center (ADSC) (Singapore)....N/A*

11:30 RETINEX-021
Retinex-like computations in human lightness perception and their possible realization in visual cortex (Invited), *Michael Rudd, University of Washington (USA)....N/A*

11:50 RETINEX-022
The role of lightness perception in determining the perceived contrast of real world scenes (Invited), *David Kane and Marcelo Bertalmio, Universitat Pompeu Fabra (Spain)....N/A*

12:10 RETINEX-023
Processing astro photographs using Retinex based methods (Invited), *Daniele Marini, Alessandro Rizzi, and Cristian Bonanomi, Università degli Studi di Milano (Italy)....N/A*

12:30 – 2:00 pm Lunch Break

EI 2016 Tuesday Plenary and Symposium Awards

Session Chair: Nitin Sampat (Rochester Institute of Technology)

2:00 – 3:00 PM
Continental Ballroom 5

Pushing computational photography deeper into imaging system design, *Ren Ng, University of California, Berkeley (USA)....N/A*

3:00 – 3:30 pm Coffee Break

Image Quality from Threshold to Experience

Session Chairs: Thrasyvoulos Pappas, Northwestern University (USA) and Huib de Ridder, Delft University of Technology (Netherlands)

3:30 – 6:10 pm
Continental Ballroom 4

3:30 HVEI-102
The pyramid of visibility, *Andrew B. Watson and Albert J. Ahumada, NASA Ames Research Ctr. (USA)....37*

3:50 HVEI-103
Perceptual image quality assessment using a normalized Laplacian pyramid, *Valero Laparra^{1,2}, Johannes Ballé^{2,3}, Alexander Bernardino², and Eero Simoncelli^{2,3}; ¹Universitat de Valencia (Spain), ²New York University (USA), and ³Howard Hughes Medical Institute (USA)....43*

4:10 HVEI-104
A method for rapid measurement of contrast sensitivity on mobile touch-screens, *Jeffrey B. Mulligan, NASA Ames Research Ctr. (USA)....49*

4:30 HVEI-105
Subjective analysis and objective characterization of adaptive bitrate videos, *Jacob Søgaard¹, Samira Tavakoli², Kjell Brunnström^{3,4}, and Narciso Garcia²; ¹Technical University of Denmark (Denmark), ²Universidad Politécnica de Madrid (Spain), ³Acreo Swedish ICT, and ⁴Mid Sweden University (Sweden)....55*

4:50 HVEI-106
Assessing visibility of individual transmission errors in networked video, *Jari Korhonen and Claire Mantel, Technical University of Denmark (Denmark)....64*

5:10 HVEI-107
HEVC saliency map computation, *Marwa Ammar¹, Mihai Mitrea¹, Ismail Boujelben¹, and Patrick Le Callet²; ¹Télécom Sud Paris and ²Polytech Nantes/Université de Nantes (France)....72*

5:30 HVEI-108
Perceptual flicker visibility prediction model, *Lark Kwon Choi and Alan C. Bovik, The University of Texas at Austin (USA)....80*

5:50 HVEI-109
Does visual quality depend on semantics? A study on the relationship between impairment annoyance and image semantics at early attentive stages, *Ernestasia Sahaan, Alan Hanjalic, and Judith Redi, Technische Universiteit Delft (Netherlands)....86*

EI 2016 Symposium Demonstration Session and Exhibit Hall

Happy Hour
5:30 – 7:00 PM
Continental Ballroom Foyer

HVEI Tuesday Author Discussion Session

Moderators: Bernice Rogowitz, Visual Perspectives (USA); Thrasyloulos Pappas, Northwestern University (USA); and Huib de Ridder, Delft University of Technology (Netherlands)

6:10 – 7:10 pm

Continental Ballroom 4

Wednesday, February 17, 2016

IQSP/HVEI: Keynote: Perception and Quality Joint Session

Session Chair: Chaker Larabi, Université de Poitiers (France)

8:50 – 9:40 am

Continental Ballroom 4

This session is jointly sponsored by: Image Quality and System Performance XIII, and Human Vision and Electronic Imaging (HVEI) 2016.

8:50

IQSP-029

Up Periscope! Designing a new perceptual metric for imaging system performance, Andrew Watson, NASA Ames Research Center (USA)....N/A

Perceptual Image Analysis

Session Chair: Bernice Rogowitz, Visual Perspectives (USA)

9:40 – 10:20 am

Continental Ballroom 4

9:40

HVEI-110

Hierarchical Manifold Sensing with foveation and adaptive partitioning of the dataset (JIST-first), Irina Burciu, Thomas Martinetz, and Erhardt Barth, University of Lübeck (Germany)....95

10:00

HVEI-111

Comparing object recognition from binary and bipolar edge features, Jae-Hyun Jung¹, Tian Pu^{1,2}, and Eli Peli¹; ¹Schepens Eye Research Institute/Mass. Eye and Ear, Harvard Medical School (USA) and ²University of Electronic Science and Technology of China (China)....105

10:20 – 10:50 am Coffee Break

Individual Differences in Perceptual Judgments

Session Chairs: Michael Webster, University of Nevada, Reno (USA) and David Peterzell, John F. Kennedy University (USA)

10:50 am – 12:40 pm

Continental Ballroom 4

10:50

HVEI-112

Discovering sensory processes using individual differences: A review and factor analytic manifesto (Invited), David H. Peterzell, John F. Kennedy University (USA)....110

11:10

HVEI-113

Individual differences in perceptual (Invited), Stephen E. Palmer¹, Karen B. Schloss², and William S. Griscom³; ¹University of California, Berkeley, ²Brown University, and ³Microsoft Corporation (USA)....121

11:40

HVEI-114

Individual differences in color naming (Invited), Delwin T. Lindsey and Angela M. Brown, Ohio State University (USA)....127

12:00

HVEI-115

Using individual differences to better determine normative responses from crowdsourced transcription tasks: An application to the R. E. MacLaury Color Categorization Archive (Invited), Kimberly A. Jameson, Pruthi S. Deshpande, Sean Tauber, Stephanie M. Chang, Nathaniel Benjamin, Yang Jiao, and Sergio Gago, University of California, Irvine (USA)....133

12:20

HVEI-116

Individual differences in lifetime face exposure predict behavioral and neural responses to faces (Invited), Benjamin Balas and Corey Grant, North Dakota State University (USA)....142

12:40 – 2:00 pm Lunch Break

EI 2016 Wednesday Plenary and Symposium Awards

Session Chair: Choon-Woo Kim (Inha University)

2:00 – 3:00 PM

Continental Ballroom 5

Intel® RealSense Technology: Adding human-like sensing and interactions to computing devices, Achin Bhowmik, Intel Corporation (USA)....N/A

3:00 – 3:20 pm Coffee Break

Human Vision and Electronic Imaging (HVEI) 2016 Interactive Papers Oral Previews

Session Chair: Jeffrey Mulligan, NASA Ames Research Ctr. (USA)

3:20 – 3:30 pm

Continental Ballroom 4

In this session interactive poster authors will each provide a brief oral preview of their poster presentation, which will be presented fully in the Human Vision and Electronic Imaging (HVEI) 2016 Interactive Papers Session at 5:30 pm on Wednesday.

3:20

HVEI-117

Role of spatio-temporal distortions in the visual periphery in disrupting natural attention deployment, Yashas Rai, Marcus Barkowsky, and Patrick Le Callet, University of Nantes (France)....148

3:21

HVEI-118

Reducing inattention blindness using subliminal cueing in visual performance tasks, Deepti Pappusetty and Hari Kalva, Florida Atlantic University (USA)....154

3:22

HVEI-119

Evaluation of aesthetic appeal with regard of user's knowledge, Pierre Lebreton¹, Alexander Raake¹, and Marcus Barkowsky²; ¹Technische Universität Ilmenau (Germany) and ²Université de Nantes (France)....159

3:23

HVEI-120

Visually-based sensations: From perception to the 'wow factor', Floris van Nes, Eindhoven University of Technology (Netherlands)....165

3:24

HVEI-121

Image segmentation using fuzzy spatial-taxon cut: comparison of two different stage one perception based input models of color (Bayesian classifier and fuzzy constraint), Lauren Barghout, University of California, Berkeley (USA)....173

3:25 HVEI-122
Positive and negative polarity contrast sensitivity measuring app, Alex Hwang and Eli Peli; Schepens Eye Research Institute, Massachusetts Eye and Ear, Harvard University (USA)....179

3:26 HVEI-123
Are lab-based audiovisual quality tests reflecting what users experience at home?, Miguel Rios Quintero¹ and Alexander Raake^{1,2}; ¹Technical Universität Berlin and ²Technische Universität Ilmenau (Germany)....185

3:27 HVEI-124
Image quality of experience: A subjective test targeting the consumer's experience, Michele A. Saad¹, Margaret H. Pinson², David G. Nicholas¹, Niels Van Kets³, Glenn Van Wallendael³, Ramesh V. Jaladi¹, and Philip J. Corriveau¹; ¹Intel Corporation (USA), ²NTIA's Institute for Telecommunication Sciences (USA), and ³Ghent University-iMinds (Belgium)....191

Psychophysiological Measures for Visual Quality

Session Chairs: Kjell Brunnstrom, Acreo Swedish ICT AB (Sweden) and Sebastian Arndt, Technische Universität Berlin (Germany)

3:30 – 5:10 pm
Continental Ballroom 4

3:30 HVEI-125
Review on using physiology in quality of experience (Invited), Sebastian Arndt¹, Kjell Brunnström^{2,3}, Eva Cheng⁴, Ulrich Engelke⁵, Sebastian Möller¹, and Jan-Niklas Antons¹; ¹Technische Universität Berlin (Germany), ²Acreo (Sweden), ³Mid Sweden University (Sweden), ⁴Royal Melbourne Institute of Technology (RMIT) (Australia), and ⁵Commonwealth Scientific and Industrial Research Organisation (CSIRO) (Australia)....197

3:50 HVEI-126
Physiological capture of augmented viewing states: Objective impact measures of high-dynamic range and wide-color gamut viewing experiences (Invited), Dan Darcy, Evan Gitterman, Alex Brandmeyer, Scott Daly, and Poppy Crum, Dolby Laboratories, Inc. (USA)....206

4:10 HVEI-127
Using eye tracking metrics and visual saliency maps to assess image utility (Invited), Laura E. Matzen, Michael J. Haass, Jonathan Tran, and Laura A. McNamara, Sandia National Laboratories (USA)....215

4:30 HVEI-128
Towards prediction of sense of presence in immersive audiovisual communications (Invited), Anne-Flore Perrin, Martin Řeřábek, and Touradj Ebrahimi, Ecole Polytechnique Fédérale de Lausanne (EPFL) (Switzerland)....223

4:50 HVEI-129
Emotion recognition by physiological signals (Invited), Naeem Ramzan¹, Sebastian Palke², Thomas Cuntz², Ryan Gibson², and Abbas Amira¹, ¹University of West of Scotland (United Kingdom) and ²H.T.W.K. Leipzig, Germany....231

HVEI Wednesday Author Discussion Session

Moderators: Bernice Rogowitz, Visual Perspectives (USA); Thrasylvoulos Pappas, Northwestern University (USA); and Huib de Ridder, Delft University of Technology (Netherlands)

5:10 – 5:40 pm
Continental Ballroom 4

EI 2016 Symposium Interactive Papers Session

5:30 – 7:00 PM
Continental Ballroom 6

Human Vision and Electronic Imaging (HVEI) 2016 Interactive Papers Session

5:30 – 7:00 pm
Continental Ballroom 6

The HVEI interactive papers will be presented in the EI 2016 Symposium Interactive Papers Session.

Thursday, February 18, 2016

Keynote Session II: Visual Cognition

Session Chairs: Bernice Rogowitz, Visual Perspectives (USA); Thrasylvoulos Pappas, Northwestern University (USA); and Huib de Ridder, Delft University of Technology (Netherlands)....N/A

8:50 – 9:40 am

Continental Ballroom 4

8:50

HVEI-130

Optimizing for visual cognition in high performance scientific computing, Colin Ware¹, David Rogers², Mark Petersen², James Ahrens², and Erol Aygar¹; ¹University of New Hampshire (USA) and

²Los Alamos National Laboratory (USA)....237

Perceptual Coding for Visualization

Session Chair: Ulrich Engelke, CSIRO (Australia)

9:40 – 10:30 am

Continental Ballroom 4

9:40

HVEI-131

From vision science to data science: Applying perception to problems in big data (Invited), Remco Chang, Fumeng Yang, and Marianne Procopio, Tufts University (USA)....246

10:10

HVEI-132

A grounded theory study on the language of data visualization principles and guidelines, Eser Kandogan¹ and Hanseung Lee²; ¹IBM Research and ²Google (USA)....253

10:30 – 11:00 am Coffee Break

Perceptual Coding for Visualization (continued)

Session Chair: Ulrich Engelke, CSIRO (Australia)

11:00 am – 12:20 pm

Continental Ballroom 4

11:00

HVEI-133

Why we use bad color maps and what you can do about it (Invited), Kenneth Moreland, Sandia National Laboratories (USA)....262

11:20

HVEI-134

SwordPlots: Exploring neuron behavior within dynamic communities of brain networks (JIST-first), Chihua Ma¹, Angus Forbes¹, Daniel Llano², Tanya Berger-Wolf¹, and Robert Kenyon¹; ¹University of Illinois at Chicago and ²University of Illinois at Urbana-Champaign (USA)....268

11:40

HVEI-135

Color visualization of the phase of complex signals, Alfredo Restrepo and Jorge L. Mayorga, Universidad de los Andes (Colombia)....281

12:00 HVEI-136
Visual performance in multidimensional data characterisation with scatterplots and parallel coordinates (Invited), Ulrich Engelke, Jenny Vuong, and Julian Heinrich, CSIRO (Australia).....288

12:20 – 1:50 pm Lunch Break

Keynote Session III: Perception and Aesthetics in Emerging Media

Session Chairs: Bernice Rogowitz, Visual Perspectives (USA); Thrasylvoulos Pappas, Northwestern University (USA); and Huib de Ridder, Delft University of Technology (Netherlands).....N/A

1:50 – 2:40 pm

Continental Ballroom 4

1:50 HVEI-137

Lessons learned from the colorization and 3D conversion of feature films and how they can be applied to the emerging mediums of virtual and augmented reality: A creative, consumer and neuroscience perspective, Barry Sandrew, Augmented Vision Works (USA).....N/A

Art, Aesthetics, and Perception

Session Chairs: Mónica López-González, La Petite Noiseuse Productions (USA) and Elena Fedorovskaya, Rochester Institute of Technology (USA)

2:40 – 3:40 pm

Continental Ballroom 4

2:40 HVEI-138
Peripheral color vision and motion processing, Christopher Tyler^{1,2}, Smith-Kettlewell Eye Research Institute (USA).....294

3:00 HVEI-139
Experiencing the interestingness concept within and between pictures, Christel Chamaret, Claire-Hélène Demarty, Vincent Demoulin, and Gwenaëlle Marquant, Technicolor (France).....299

3:20 HVEI-140
Enhancing visualization with expressive motion, Matthew Lockyer¹, Lyn Bartram¹, Thecla Schiphorst¹, and Karen Studd²; ¹Simon Fraser University (Canada) and ²GMU School of Dance (USA).....311

3:40 – 4:00 pm Coffee Break

Art, Aesthetics and Perception (continued)

Session Chairs: Mónica López-González, La Petite Noiseuse Productions (USA) and Elena Fedorovskaya, Rochester Institute of Technology (USA)

4:00 – 6:00 pm

Continental Ballroom 4

4:00 HVEI-141
Color systems are categories that carry meaning in visualizations: A conceptual metaphor theory approach (Invited), Jack Ox^{1,2}; ¹University of Texas, Dallas and ²University of New Mexico (USA).....317

4:20 HVEI-142
Towards a computational account of art cognition: Unifying perception, visual art, and music through Bayesian inference (Invited), Jorge Menendez, University College London (United Kingdom).....326

4:40 HVEI-143
Minds in the spotlight: Using live performance art to uncover creative thinking processes (Invited), Mónica López-González, La Petite Noiseuse Productions (USA).....336

5:00 HVEI-144
Swapping swatches: Adapting to and from an artist's palette (Invited), Katherine E.M. Tregillus and Michael A. Webster, University of Nevada Reno (USA).....346

5:20 HVEI-145
Art, interpersonal comparisons of color experience, and potential tetrachromacy (Invited), Kimberly Jameson¹, Alissa D. Winkler² and Keith Goldfarb³, and Vladimir Bochko³; ¹University of California, Irvine (USA), ²University of Nevada, Reno (USA), and ³Blackthorn Media LLC (USA).....354

5:40 HVEI-146
Painting like old masters, creative algorithms for 2.5D reproduction (Invited), Carinna Parraman, University of the West of England (United Kingdom).....N/A

HVEI Thursday Author Discussion and Reception

Hosts: Bernice Rogowitz, Visual Perspectives (USA); Thrasylvoulos Pappas, Northwestern University (USA); and Huib de Ridder, Delft University of Technology (Netherlands)

6:00 – 7:00 pm

Continental Ballroom 4