

# 2014 Electronic Imaging

SCIENCE AND TECHNOLOGY

## Technical Program

**Conferences and Courses**

2–6 February 2014

**Location**

Hilton San Francisco, Union Square  
San Francisco, California, USA



**SPIE**<sup>®</sup>



# Welcome

On behalf of IS&T—The Society for Imaging Science and Technology and SPIE, the international society for optics and photonics, we would like to welcome you to the 26th annual Symposium on Electronic Imaging. Imaging is pervasive in the human experience, be it photographs that we take in our everyday lives or those that are used in space exploration, medical imaging, entertainment, science, or national security.

This week at Electronic Imaging 2014, you will hear the latest research from the world's leading experts in imaging, image processing, sensors, applications, and imaging science and technology.

You will also have many opportunities to develop both your career and business by networking with leading researchers and entrepreneurs in the field.

Electronic Imaging 2014 is the premier international imaging symposium where you are on the forefront of research and innovation, and we look forward to seeing you this week.



*2014 Symposium Chair*  
**Sergio R. Goma**  
Qualcomm Inc.



*2014 Short Course Chair*  
**Choon-Woo Kim**  
Inha University

*Symposium Steering Committee*

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**Sheila S. Hemami**, Symposium Co-chair, Cornell Univ. (United States)  
**Choon-Woo Kim**, Inha Univ. (Korea, Republic of)  
**Majid Rabbani**, Eastman Kodak Co. (United States)  
**Gaurav Sharma**, Univ. of Rochester (United States)  
**Andrew J. Woods**, Curtin Univ. (Australia)  
**Suzanne E. Grinnan**, IS&T Executive Director (United States)  
**Rob Whitner**, SPIE Event Manager



*2014 Symposium Co-chair*  
**Sheila S. Hemami**  
Northeastern University



*2014 Short Course Co-chair*  
**Majid Rabbani**  
Eastman Kodak Co.



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### Conferences

#### 3D Imaging, Interaction, and Metrology

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9012 <b>The Engineering Reality of Virtual Reality 2014</b> ( <i>Dolinsky, McDowall</i> ) . . . . .	18
9013 <b>Three-Dimensional Image Processing, Measurement (3DIPM), and Applications 2014</b> ( <i>Baskurt, Sitnik</i> ) . . . . .	20

#### Visualization, Perception, and Color

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9015 <b>Color Imaging XIX: Displaying, Processing, Hardcopy, and Applications</b> ( <i>Eschbach, Marcu, Rizzi</i> ) . . . . .	25
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### Image Processing

9018 <b>Measuring, Modeling, and Reproducing Material Appearance</b> ( <i>Ortiz Segovia, Urban, Allebach</i> ) . . . . .	34
9019 <b>Image Processing: Algorithms and Systems XII</b> ( <i>Egiazarian, Agaian, Gotchev</i> ) . . . . .	36
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### Computer Vision

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### Media Processing and Communication

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9029 <b>Visual Information Processing and Communication V</b> ( <i>Said, Guleryuz, Stevenson</i> ) . . . . .	61

### Mobile Imaging

9030 <b>Mobile Devices and Multimedia: Enabling Technologies, Algorithms, and Applications 2014</b> ( <i>Creutzburg, Akopian</i> ) . . . . .	63
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# Special Events



## Onsite Registration Hours

Sunday 2 February	7:00 am to 4:00 pm
Monday 3 February	7:00 am to 4:00 pm
Tuesday 4 February	7:30 am to 4:00 pm
Wednesday 5 February	7:30 am to 4:00 pm
Thursday 6 February	7:30 am to noon



## Symposium Demonstration Session

*Continental Ballroom 4*

Tuesday 4 February . . . . . 5:30 to 7:30 pm

**Demonstration Set Up:** Tuesday 4 February, 3:00 to 5:30 pm

The highly-successful, interactive, hands-on demonstration of hardware, software, display, and research products are related to all the topics covered by the Electronic Imaging Symposium.

This annual demonstration, which traditionally has showcased the largest and most diverse collection of stereoscopic research and products in one location, represents a unique networking opportunity, a time when attendees can see the latest research in action, compare commercial products, ask questions of technically knowledgeable demonstrators, and even make purchasing decisions about a range of EI products.

## SPIE Member Reception

*ROE Restaurant, 651 Howard Street*

Tuesday 4 February . . . . . 8:00 to 9:30 pm

*For SPIE Members Only*

SPIE Members are invited to the ROE Restaurant for an after dinner reception in their honor. Come relax and talk with your colleagues while enjoying dessert, coffee. Please note: this reception is limited to SPIE Members only. Membership cards or invitations will be requested at the entrance. If you join SPIE on-site, please bring your registration receipt. Dress is casual or business attire.



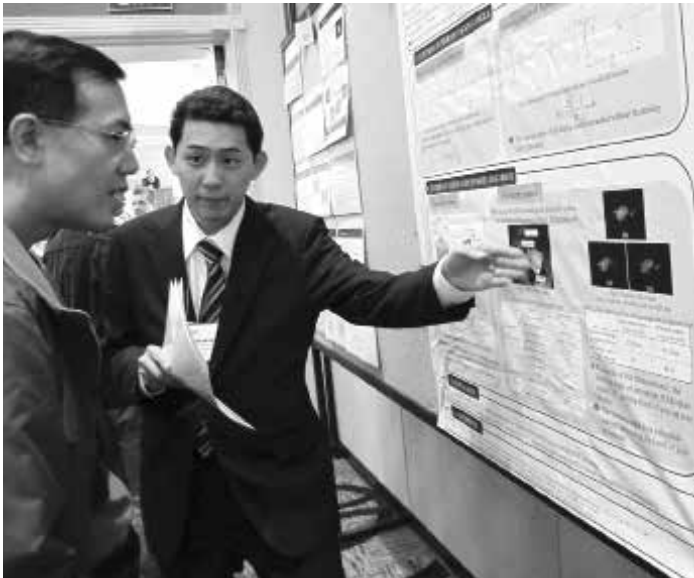
## 3D Theatre

*Continental Ballroom 7*

Monday 3 February . . . . . 5:30 to 7:30 pm

Hosted by **Andrew J. Woods**, Curtin Univ. (Australia)

The 3D Theatre Session at each year's Stereoscopic Displays and Applications conference showcases the wide variety of 3D content that is being produced and exhibited around the world. All 3D footage screened at the 3D Theatre Session is shown in high-quality, polarized 3D on a large screen. The final program will be announced at the conference and 3D glasses will be provided.



## Interactive Paper Set-Up, Viewing, and Presentations

*Continental Ballroom and Golden Gate Foyers*

### Author Set-Up:

Tuesday 4 February 8:00 am, or  
Wednesday 5 February 7:00 am

### Tuesday Interactive Paper Session:

Tuesday 4 February 5:30 to 6:45 pm

### Wednesday Interactive Paper Session:

Wednesday 5 February 9:50 to 11:10 am

Conference attendees are encouraged to attend the Interactive Paper Sessions where authors display their posters and are available to answer questions and engage in in-depth discussions about their papers. Light refreshments are provided. Please note that conference registration badges are required for entrance and that posters may be previewed by all attendees beginning Tuesday at 8:00 am.

Authors are asked to set up their poster papers starting at 8:00 am on Tuesday or 7:00 am on Wednesday, depending on the day of their assigned presentation. Pushpins are provided; other supplies can be obtained at the Conference Registration Desk.

Authors must remove poster papers at the conclusion of the Interactive Session; posters not removed are considered unwanted and will be removed by staff and discarded. Neither sponsoring Society assumes responsibility for posters left up before or after the Interactive Paper Session.

## All-Conference Reception

*Continental Ballroom Foyer*

Wednesday 5 February . . . . . 8:00 to 9:30 pm

The All-Conference Reception provides a wonderful opportunity to get to know your Electronic Imaging colleagues. Plan to join us for this relaxing and enjoyable event. Coffee, dessert, and beverages will be provided. Conference registration badges are required for entrance.

## Special Presentations from the *Journal of Electronic Imaging*

Authors of recently published JEI articles will present their work in this year's meeting. Look for the JEI logo within the conference programs to find the schedule of these peer-reviewed journal articles.



= Published in the *Journal of Electronic Imaging*

## Industry Exhibition and Employment Marketplace

*Continental Ballroom 4*

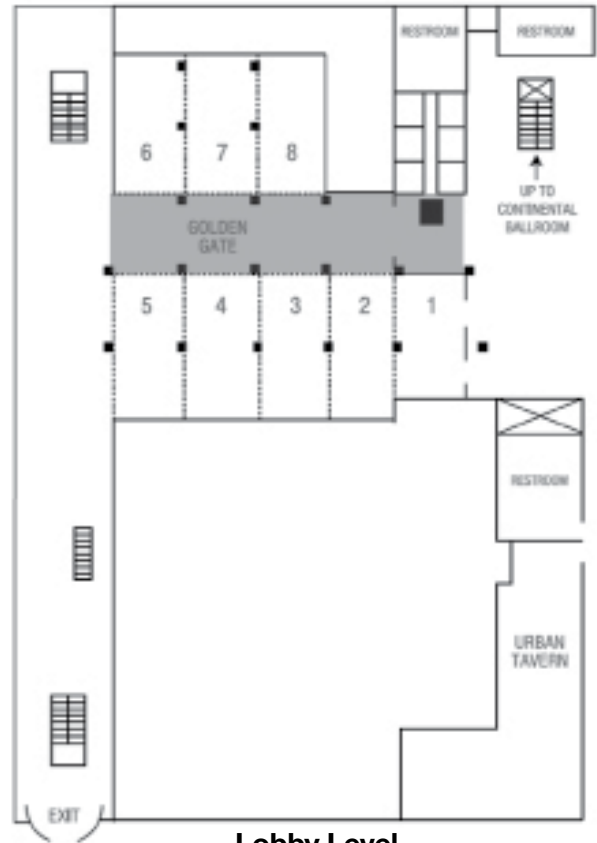
Tuesday 4 February . . . . . 10:00am to 7:30pm

Wednesday 5 February . . . . . 10:00am to 4:00pm

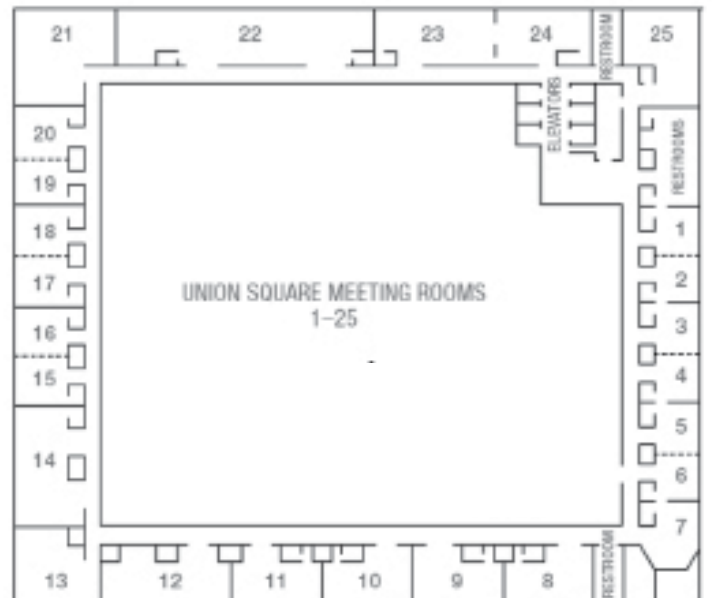
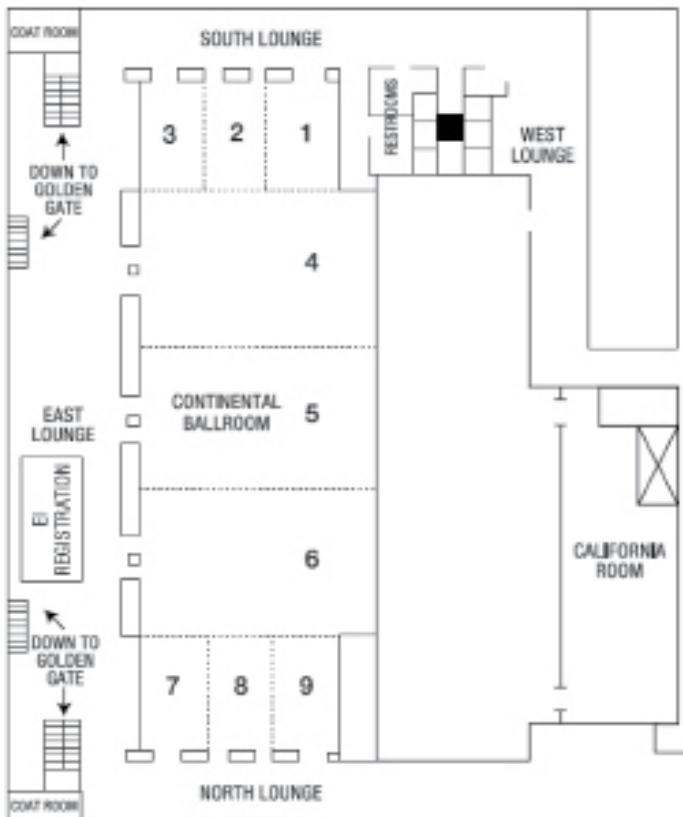
With 2014, the EI Symposium launches an annual industry exhibit focused on mobile imaging and its applications. While not limited to mobile imaging, this event provides a unique opportunity to meet company representatives working in this and related EI spaces to highlighting products and services while meeting prospective employers.

# Meeting Room Locations

## Hilton San Francisco, Union Square



**Lobby Level**



**Union Square Fourth Floor**

## Plenary Session and Society Award Presentations

Continental Ballroom 5

Tuesday 4 February . . . . . 8:30 to 9:50 am

### Using fMRI To Reverse Engineer the Human Visual System



**Jack L. Gallant**, Univ. of California, Berkeley (United States)

*Abstract:* The human brain is the most sophisticated image processing system known, capable of impressive feats of recognition and discrimination under challenging natural conditions. Reverse-engineering the brain might enable us to design artificial systems with the same capabilities. My

laboratory uses a data-driven system identification approach to tackle this reverse-engineering problem. Our approach consists of four broad stages. First, we use functional MRI to measure brain activity while people watch movies. We divide these data into two parts, one used to fit models and one for testing model predictions. Second, we use a system identification framework based on multiple linearizing feature spaces to model activity measured at each point in the brain. Third, we inspect the most accurate models to understand how the brain represents structural and semantic information in the movies. Finally, we use the estimated models to decode brain activity, reconstructing the structural and semantic content in the movies. This framework could form the basis of practical new brain reading technologies, and can inform development of biologically-inspired computer vision systems.

*Biography:* **Jack Gallant** is Professor of Psychology at the University of California at Berkeley, and is affiliated with the graduate programs in Bioengineering, Biophysics, Neuroscience and Vision Science. He received his PhD. from Yale University and did post-doctoral work at the California Institute of Technology and Washington University Medical School. His research program focuses on computational modeling of human brain activity. These models accurately describe how the brain encodes information during complex, naturalistic tasks, and they show how information about the external and internal world are mapped systematically across the cortical surface. These models can also be used to decode information in the brain in order to reconstruct mental experiences.

## Plenary Session and Conference Award Presentations

Continental Ballroom 5

Wednesday 5 February . . . . . 8:30 am to 9:50 am

### Integrated Imaging: Creating Images from the Tight Integration of Algorithms, Computation, and Sensors



**Charles A. Bouman**, Purdue University

*Abstract:* Some people suggest that imaging is a mature field, but nothing could be further from the truth. In fact, we are entering into the next phase of innovation in which a convergence of technologies is enabling the creation of an endless variety of imaging systems based on the tight integration of algorithms, computation, and

sensor design. This new field, which we call integrated imaging, is evolving out of classical imaging modalities into a wide array of new applications. Integrated imaging systems will drive both scientific exploration and consumer products by blending novel and often counter-intuitive sensor design with algorithms that exploit the availability of enormous quantities of data and computation. This talk presents some examples of state-of-the-art integrated imaging systems based on computed tomography (CT), transmission electron microscopy (STEM), synchrotron beam imaging, optical sensing, and scanning electron microscopy (SEM). For each of these examples, we also explore their use and potential impact in applications ranging from healthcare to jet engine design. We conclude with some speculation on where integrated imaging might be going; where it might have greatest impact; and what will be the greatest challenges ahead.

*Biography:* **Charles A. Bouman** received a B.S.E.E. degree from the University of Pennsylvania in 1981 and a MS degree from the University of California at Berkeley in 1982. From 1982 to 1985, he was a full staff member at MIT Lincoln Laboratory and in 1989 he received a Ph.D. in electrical engineering from Princeton University. He joined the faculty of Purdue University in 1989 where he is currently the Michael J. and Katherine R. Birck Professor of Electrical and Computer Engineering. He also holds a courtesy appointment in the School of Biomedical Engineering and is co-director of Purdue's Magnetic Resonance Imaging Facility located in Purdue's Research Park.

# IS&T/SPIE Electronic Imaging

## SCIENCE AND TECHNOLOGY

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**Ralf Widenhorn**, Portland State Univ. (United States)

**Pak Chung Wong**, Pacific Northwest National Lab. (United States)

**Andrew J. Woods**, Curtin Univ. (Australia)

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[www.electronicimaging.org](http://www.electronicimaging.org)

# Visit the 2014 Electronic Imaging Symposium Industry Exhibition and Employment Marketplace.

See products, applications, related research, and job opportunities



Tuesday 4 February  
10:00 am to 7:30 pm

Wednesday 5 February  
10:00 am to 4:00 pm

*Location: Continental Ballroom 4*

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With 2014, the EI Symposium launches an annual industry exhibit focused on mobile imaging and its applications. This event provides a unique opportunity for companies working in related EI fields to highlight products and services while meeting prospective employees.



The EI Symposium already offers the best snapshot of allied industry and academic research—the exhibit increases value by providing a place to foster the transition and showcase the technological advances in mobile and other imaging devices.

We believe the research that starts in academia continues to industry. To develop and encourage this transition, we are integrating the exhibit with an Employment Marketplace.

[www.electronicimaging.org](http://www.electronicimaging.org)

# Conference Daily Schedule

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY
<b>3D Imaging, Interaction, and Metrology</b>				
	9011 <b>Stereoscopic Displays and Applications XXV</b> ( <i>Woods, Holliman, Favalora</i> ), p. 13			
	9012 <b>The Engineering Reality of Virtual Reality 2014</b> ( <i>Dolinsky, McDowall</i> ), p. 18		9013 <b>Three-Dimensional Image Processing, Measurement (3DIPM), and Applications 2014</b> ( <i>Baskurt, Sitnik</i> ), p. 20	
<b>Visualization, Perception, and Color</b>				
	9014 <b>Human Vision and Electronic Imaging XIX</b> ( <i>Rogowitz, Pappas, de Ridder</i> ), p. 21			
	9015 <b>Color Imaging XIX: Displaying, Processing, Hardcopy, and Applications</b> ( <i>Eschbach, Marcu, Rizzi</i> ), p. 25			
	9016 <b>Image Quality and System Performance XI</b> ( <i>Triantaphillidou, Larabi</i> ), p. 28			
	9017 <b>Visualization and Data Analysis 2014</b> ( <i>Wong, Kao, Hao, Chen</i> ), p. 31			
<b>Image Processing</b>				
	9018 <b>Measuring, Modeling, and Reproducing Material Appearance</b> ( <i>Ortiz Segovia, Urban, Allebach</i> ), p. 34			
	9019 <b>Image Processing: Algorithms and Systems XII</b> ( <i>Egiazarian, Aгаian, Gotchev</i> ), p. 36		9020 <b>Computational Imaging XII</b> ( <i>Bouman, Sauer</i> ), p. 39	
			9021 <b>Document Recognition and Retrieval XXI</b> ( <i>Coüasnon, Ringger</i> ), p. 41	
<b>Image Capture</b>				
			9022 <b>Image Sensors and Imaging Systems 2014</b> ( <i>Widenhorn, Dupret</i> ), p. 43	
	9023 <b>Digital Photography X</b> ( <i>Sampat, Tezaur</i> ), p. 46			
<b>Computer Vision</b>				
	9024 <b>Image Processing: Machine Vision Applications VII</b> ( <i>Bingham, Niel</i> ), p. 49		9025 <b>Intelligent Robots and Computer Vision XXXI: Algorithms and Techniques</b> ( <i>Röning, Casasent</i> ), p. 51	
	9026 <b>Video Surveillance and Transportation Imaging Applications 2014</b> ( <i>Loce, Saber</i> ), p. 53			
<b>Media Processing and Communication</b>				
			9027 <b>Imaging and Multimedia Analytics in a Web and Mobile World 2014</b> ( <i>Lin, Allebach, Fan</i> ), p. 56	
	9028 <b>Media Watermarking, Security, and Forensics 2014</b> ( <i>Alattar, Memon, Heitzenrater</i> ), p. 58			
			9029 <b>Visual Information Processing and Communication V</b> ( <i>Said, Guleryuz, Stevenson</i> ), p. 61	
<b>Mobile Imaging</b>				
	9030 <b>Mobile Devices and Multimedia: Enabling Technologies, Algorithms, and Applications 2014</b> ( <i>Creutzburg, Akopian</i> ), p. 63			



# Courses

## Courses at Electronic Imaging

Relevant training | Proven instructors | Education you need to stay competitive in today's job market

- 15 Courses in fundamental and current topics in electronic imaging including mobile imaging, 3D, image capture and processing, and more
- Course attendees receive CEUs to fulfill continuing education requirements
- Full-time students receive 50% off courses
- All-new and featured courses for 2014 include
  - Computer Vision and Imaging in Transportation Applications
  - Image and Video Forensics: Recent Trends and Challenges
  - Joint Design of Optics and Image Processing for Imaging Systems
  - Digital Camera and Scanner Performance Evaluation: Science, Standards and Software
  - Perception, Cognition, and Next Generation Imaging
  - Perceptual Metrics for Image Quality Evaluation

[www.spie.org/education](http://www.spie.org/education)

### Money-back Guarantee

We are confident that once you experience an IS&T/SPIE course for yourself you will look to us for your future education needs. However, if for any reason you are dissatisfied, we will gladly refund your money. We just ask that you tell us what you did not like; suggestions for improvement are always welcome.



### Continuing Education Units

IS&T/SPIE has been approved as an authorized provider of CEUs by IACET, The International Association for Continuing Education and Training (Provider #1002091). In obtaining this approval, IS&T/SPIE has demonstrated that it complies with the ANSI/IACET Standards which are widely recognized as standards of good practice.

**IS&T/SPIE reserves the right to cancel a course due to insufficient advance registration.**

# Course Daily Schedule

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY
<b>3D Imaging, Interaction, and Metrology</b>				
<p>SC468 <b>Image Enhancement, Deblurring and Super-Resolution</b> (<i>Rabbani</i>) 8:30 am to 5:30 pm, \$600 / \$710</p> <p>SC969 <b>Perception, Cognition, and Next Generation Imaging</b> (<i>Rogowitz</i>) 8:30 am to 12:30 pm, \$375 / \$430</p> <p>SC060 <b>Stereoscopic Display Application Issues</b> (<i>Merritt, Woods</i>) 8:30 am to 5:30 pm, \$600 / \$710</p>		<p>SC1015 <b>Understanding and Interpreting Images</b> (<i>Rabbani</i>) 1:30 pm to 5:30 pm, \$375 / \$430</p>	<p>SC927 <b>3D Imaging</b> (<i>Agam</i>) 8:30 am to 12:30 pm, \$375 / \$430</p>	
<b>Computer Vision</b>				
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<b>Image Capture</b>				
<p>SC967 <b>High Dynamic Range Imaging: Sensors and Architectures</b> (<i>Darmont</i>) 8:30 am to 5:30 pm, \$645 / \$755</p> <p>SC468 <b>Image Enhancement, Deblurring and Super-Resolution</b> (<i>Rabbani</i>) 8:30 am to 5:30 pm, \$600 / \$710</p> <p>SC1058 <b>Image Quality and Evaluation of Cameras In Mobile Devices</b> (<i>Wüller, Matherson</i>) 8:30 am to 5:30 pm, \$600 / \$710</p> <p>SC969 <b>Perception, Cognition, and Next Generation Imaging</b> (<i>Rogowitz</i>) 8:30 am to 12:30 pm, \$375 / \$430</p> <p>SC980 <b>Theory and Methods of Lightfield Photography</b> (<i>Georgiev, Lumsdaine, Georgieva</i>) 8:30 am to 5:30 pm, \$600 / \$710</p> <p>SC1130 <b>Image and Video Forensics: Recent Trends and Challenges</b> (<i>Battiato</i>) 1:30 pm to 5:30 pm, \$375 / \$430</p> <p>SC965 <b>Joint Design of Optics and Image Processing for Imaging Systems</b> (<i>Stork</i>) 1:30 pm to 5:30 pm, \$375 / \$430</p> <p>SC807 <b>Digital Camera and Scanner Performance Evaluation: Standards and Measurement</b> (<i>Burns, Williams</i>) 8:30 am to 12:30 pm, \$375 / \$430</p> <p>SC812 <b>Perceptual Metrics for Image and Video Quality in a Broader Context: From Perceptual Transparency to Structural Equivalence</b> (<i>Pappas/Hemami</i>) 1:30 pm to 5:30 pm, \$375 / \$430</p>	<p>SC1049 <b>Objective and Subjective Image Quality Camera Benchmarking</b> (<i>Phillips</i>) 8:30 am to 5:30 pm, \$600 / \$710</p> <p>SC1097 <b>HDR Imaging in Cameras, Displays and Human Vision</b> (<i>Rizzi, McCann</i>) 1:30 to 5:30 pm, \$375 / \$430</p>	<p>SC1015 <b>Understanding and Interpreting Images</b> (<i>Rabbani</i>) 1:30 pm to 5:30 pm, \$375 / \$430</p>		

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SC967 <b>High Dynamic Range Imaging: Sensors and Architectures</b> ( <i>Darmont</i> ) 8:30 am to 5:30 pm, \$645 / \$755	SC1097 <b>HDR Imaging in Cameras, Displays and Human Vision</b> ( <i>Rizzi, McCann</i> ) 1:30 to 5:30 pm, \$375 / \$430	SC1015 <b>Understanding and Interpreting Images</b> ( <i>Rabbani</i> ) 1:30 pm to 5:30 pm, \$375 / \$430	SC927 <b>3D Imaging</b> ( <i>Agam</i> ) 8:30 am to 12:30 pm, \$375 / \$430	
SC468 <b>Image Enhancement, Deblurring and Super-Resolution</b> ( <i>Rabbani</i> ) 8:30 am to 5:30 pm, \$600 / \$710			SC1131 <b>Computer Vision and Imaging in Transportation Applications</b> ( <i>Bala, Loce</i> ) 8:30 am to 12:30 pm, \$375 / \$430	
SC1058 <b>Image Quality and Evaluation of Cameras In Mobile Devices</b> ( <i>Wüller, Matherson</i> ) 8:30 am to 5:30 pm, \$600 / \$710				
SC969 <b>Perception, Cognition, and Next Generation Imaging</b> ( <i>Rogowitz</i> ) 8:30 am to 12:30 pm, \$375 / \$430				
SC060 <b>Stereoscopic Display Application Issues</b> ( <i>Merritt, Woods</i> ) 8:30 am to 5:30 pm, \$600 / \$710				
SC980 <b>Theory and Methods of Lightfield Photography</b> ( <i>Georgiev, Lumsdaine, Georgieva</i> ) 8:30 am to 5:30 pm, \$600 / \$710				
SC1130 <b>Image and Video Forensics: Recent Trends and Challenges</b> ( <i>Battiato</i> ) 1:30 pm to 5:30 pm, \$375 / \$430				
SC965 <b>Joint Design of Optics and Image Processing for Imaging Systems</b> ( <i>Stork</i> ) 1:30 pm to 5:30 pm, \$375 / \$430				
SC807 <b>Digital Camera and Scanner Performance Evaluation: Standards and Measurement</b> ( <i>Burns, Williams</i> ) 8:30 am to 12:30 pm, \$375 / \$430				
SC812 <b>Perceptual Metrics for Image and Video Quality in a Broader Context: From Perceptual Transparency to Structural Equivalence</b> ( <i>Pappas/Hemami</i> ) 1:30 pm to 5:30 pm, \$375 / \$430				
<b>Media Processing and Communication</b>				
SC967 <b>High Dynamic Range Imaging: Sensors and Architectures</b> ( <i>Darmont</i> ) 8:30 am to 5:30 pm, \$645 / \$755	SC1049 <b>Objective and Subjective Image Quality Camera Benchmarking</b> ( <i>Phillips</i> ) 8:30 am to 5:30 pm, \$600 / \$710	SC1015 <b>Understanding and Interpreting Images</b> ( <i>Rabbani</i> ) 1:30 pm to 5:30 pm, \$375 / \$430	SC1131 <b>Computer Vision and Imaging in Transportation Applications</b> ( <i>Bala, Loce</i> ) 8:30 am to 12:30 pm, \$375 / \$430	
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SC812 <b>Perceptual Metrics for Image and Video Quality in a Broader Context: From Perceptual Transparency to Structural Equivalence</b> ( <i>Pappas/Hemami</i> ) 1:30 pm to 5:30 pm, \$375 / \$430				

# Course Daily Schedule

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY
<b>Mobile Imaging</b>				
SC967 <b>High Dynamic Range Imaging: Sensors and Architectures</b> ( <i>Darmont</i> ) 8:30 am to 5:30 pm, \$645 / \$755	SC1049 <b>Objective and Subjective Image Quality Camera Benchmarking</b> ( <i>Phillips</i> ) 8:30 am to 5:30 pm, \$600 / \$710	SC1015 <b>Understanding and Interpreting Images</b> ( <i>Rabbani</i> ) 1:30 pm to 5:30 pm, \$375 / \$430		
SC468 <b>Image Enhancement, Deblurring and Super-Resolution</b> ( <i>Rabbani</i> ) 8:30 am to 5:30 pm, \$600 / \$710	SC1097 <b>HDR Imaging in Cameras, Displays and Human Vision</b> ( <i>Rizzi, McCann</i> ) 1:30 to 5:30 pm, \$375 / \$430			
SC1058 <b>Image Quality and Evaluation of Cameras In Mobile Devices</b> ( <i>Wüller, Matherson</i> ) 8:30 am to 5:30 pm, \$600 / \$710				
SC969 <b>Perception, Cognition, and Next Generation Imaging</b> ( <i>Rogowitz</i> ) 8:30 am to 12:30 pm, \$375 / \$430				
SC812 <b>Perceptual Metrics for Image and Video Quality in a Broader Context: From Perceptual Transparency to Structural Equivalence</b> ( <i>Pappas/Hemami</i> ) 1:30 pm to 5:30 pm, \$370 / \$430				
<b>Visualization, Perception, and Color</b>				
SC967 <b>High Dynamic Range Imaging: Sensors and Architectures</b> ( <i>Darmont</i> ) 8:30 am to 5:30 pm, \$645 / \$755	SC1049 <b>Objective and Subjective Image Quality Camera Benchmarking</b> ( <i>Phillips</i> ) 8:30 am to 5:30 pm, \$600 / \$710	SC1015 <b>Understanding and Interpreting Images</b> ( <i>Rabbani</i> ) 1:30 pm to 5:30 pm, \$375 / \$430	SC927 <b>3D Imaging</b> ( <i>Agam</i> ) 8:30 am to 12:30 pm, \$375 / \$430	
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# Conference 9011 • Locations: Continental Ballroom 5, and Continental Ballroom 7

Monday–Wednesday 3–5 February 2014 • Proceedings of SPIE Vol. 9011

## Stereoscopic Displays and Applications XXV

Conference Chairs: **Andrew J. Woods**, Curtin Univ. (Australia); **Nicolas S. Holliman**, Univ. of York (United Kingdom); **Gregg E. Favalora**, VisionScope Technologies LLC (United States)

Program Committee: **Neil A. Dodgson**, Univ. of Cambridge (United Kingdom); **Hideki Kakeya**, Univ. of Tsukuba (Japan); **Takashi Kawai**, Waseda Univ. (Japan); **John D. Stern**, Intuitive Surgical, Inc. (United States); **Vivian K. Walworth**, StereoJet, Inc. (United States); **Chris Ward**, Lightspeed Design, Inc. (United States); **Michael A. Weissman**, Perspective Systems (United States); **Samuel Zhou**, IMAX Corp. (China)

Founding Chair: **John O. Merritt**, The Merritt Group (United States)

### Monday 3 February

#### Session 1

Location: Continental Ballroom 5 . . . . . Mon 8:30 am to 9:10 am

Session Chair: **Andrew J. Woods**, Curtin Univ. (Australia)

#### Stereoscopic Applications I

8:30 am: **Stereoscopic cell visualization: from mesoscopic to molecular scale**, Björn Sommer, Christian Bender, Tobias Hoppe, Christian Gamroth, Lukas Jelonek, Univ. Bielefeld (Germany) . . . . . [9011-1]

8:50 am: **The impact of stereo 3D sports TV broadcasts on user's depth perception and spatial presence experience**, Kathrin Weigelt, Josef Wiemeyer, Technische Univ. Darmstadt (Germany) . . . . . [9011-2]

Location: Continental Ballroom 5 . . . . . 9:10 am to 9:20 am

#### Opening Remarks

Location: Continental Ballroom 5 . . . . . 9:20 am to 10:20 am

#### SD&A Keynote Session I

Session Chair: **Andrew J. Woods**, Curtin Univ. (Australia)

**Preservation and exhibition of historical 3D movies** (Keynote Presentation), Jeff Joseph, Producer, World 3D Film Expo (United States) . . . . . [9011-83]

Coffee Break . . . . . Mon 10:20 am to 10:50 am

*Sessions 2 and 3 run concurrently.*

#### Session 2

Location: Continental Ballroom 5 . Mon 10:50 am to 12:30 pm

#### Autostereoscopic Displays I

Session Chair: **Nicolas S. Holliman**, Univ. of York (United Kingdom)

10:50 am: **A novel stereoscopic display technique with improved spatial and temporal properties**, Paul V. Johnson, Joohwan Kim, Martin S. Banks, Univ. of California, Berkeley (United States) . . . . . [9011-3]

11:10 am: **Frameless multiview display modules employing flat-panel displays for a large-screen autostereoscopic display**, Kenji Hirabayashi, Masayuki Tokoro, Yasuhiro Takaki, Tokyo Univ. of Agriculture and Technology (Japan) . . . . . [9011-4]

11:30 am: **JEI Interpolating vertical parallax for an autostereoscopic 3D projector array**, Andrew V. Jones, Koki Nagano, USC Institute for Creative Technologies (United States); Jing Liu, Univ. of California, Santa Cruz (United States); Jay Busch, Xueming Yu, Mark T. Bolas, Paul Debevec, USC Institute for Creative Technologies (United States) [9011-5]

11:50 am: **Vertical parallax added tabletop-type 360-degree three-dimensional display**, Yasuhiro Takaki, Junya Nakamura, Tokyo Univ. of Agriculture and Technology (Japan) . . . . . [9011-6]

12:10 pm: **A variable-collimation display system**, Robert Batchko, Sam Robinson, Holochip Corp. (United States); Benito Graniela, Naval Air Warfare Ctr. Training Systems Div. (United States) . . . . . [9011-80]

Lunch Break . . . . . Mon 12:30 pm to 2:00 pm

#### Session 3

Location: Continental Ballroom 7 . Mon 10:50 am to 12:30 pm

#### Subjective Quality of 3D Systems

Session Chair: **Michael A. Weissman**, Perspective Systems (United States)

10:50 am: **Subjective evaluation of a 3D video conferencing system**, Hadi Rizek, Acreo Swedish ICT AB (Sweden); Kjell E. Brunnström, Kun Wang, Acreo Swedish ICT AB (Sweden) and Mid Sweden Univ. (Sweden); Börje Andrén, Acreo Swedish ICT AB (Sweden); Mathias Johanson, Alkit Communications AB (Sweden) . . . . . [9011-7]

11:10 am: **Subjective quality assessment for stereoscopic video: a case study on robust watermarking**, Rania ben Said, Mihai P. Mitrea, Afef Chammem, Télécom SudParis (France); Touradj Ebrahimi, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [9011-8]

11:30 am: **Measuring perceived depth in natural images and study of its relation with monocular and binocular depth cues**, Pierre Lebreton, Alexander Raake, Technische Univ. Berlin (Germany); Marcus Barkowsky, Patrick Le Callet, L'Univ. Nantes Angers le Mans (France) and Univ. de Nantes (France) and Institut de Recherche en Communications et en Cybernétique de Nantes (France) . . . . . [9011-9]

11:50 am: **Subjective evaluation of two stereoscopic imaging systems exploiting visual attention to improve 3D quality of experience**, Philippe Hanhart, Martin Rerábek, Touradj Ebrahimi, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [9011-10]

12:10 pm: **Subjective quality and depth assessment in stereoscopic viewing of volume-rendered medical images**, Johanna Rousson, Barco N.V. (Belgium); Jeanne Coutourou, Télécom Saint-Etienne (France); Arnout Vetsuypens, Barco N.V. (Belgium); Ljiljana Platisa, Asli E. Kumcu, Univ. Gent (Belgium); Tom R. Kimpe, Barco N.V. (Belgium); Wilfried Philips, Univ. Gent (Belgium) . . . . . [9011-11]

Lunch Break . . . . . Mon 12:30 pm to 2:00 pm

Sessions 4 and 5 run concurrently.

**Session 4**

**Location: Continental Ballroom 5 . . . . . Mon 2:00 pm to 3:20 pm**

**Stereoscopic Applications II**

Session Chair: **John D. Stern**, Intuitive Surgical, Inc. (United States)

2:00 pm: **Interlopers 3D: experiences designing a stereoscopic game**, James Weaver, Durham Univ. (United Kingdom); Nicolas S. Holliman, The Univ. of York (United Kingdom). . . . . [9011-12]

2:20 pm: **Architecture for high performance stereoscopic game rendering on Android**, Julien C. Flack, Hugh Sanderson, Dynamic Digital Depth Australia Pty. (Australia) . . . . . [9011-13]

2:40 pm: **Comprehensive evaluation of latest 2D/3D monitors and comparison to a custom built 3D mirror based display in laparoscopic surgery**, Ulrich Leiner, Lothar Mühlbach, Detlef Ruschin, Wolfgang Reiner, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany); Hubertus Feussner, Dirk Wilhelm, Silvano Reiser, Technische Univ. München (Germany). . . . . [9011-14]

3:00 pm: **A stereoscopic system for viewing the temporal evolution of brain activity clusters in response to linguistic stimuli**, Angus Forbes, Javier Villegas, Kyle Almryde, Elena Plante, The Univ. of Arizona (United States) . . . . . [9011-15]

Coffee Break . . . . . Mon 3:20 pm to 3:50 pm

**Session 5**

**Location: Continental Ballroom 7 . . . . . Mon 2:00 pm to 3:20 pm**

**Depth Map Capture and Processing**

Session Chair: **Neil A. Dodgson**, Univ. of Cambridge (United Kingdom)

2:00 pm: **Fusion of Kinect depth data with trifocal disparity estimation for near real-time high quality depth maps generation**, Guillaume Boisson, Paul Kerbirou, Valter Drazic, Olivier Bureller, Neus Sabater, Arno Schubert, Technicolor S.A. (France) . . . . . [9011-16]

2:20 pm: **Depth map post-processing for depth-image-based rendering: a user study**, Matej Nezveda, Nicole Brosch, Technische Univ. Wien (Austria); Florian H. Seitner, emotion3D (Austria); Margrit Gelautz, Technische Univ. Wien (Austria) . . . . . [9011-17]

2:40 pm: **Enhancing depth quality of stereoscopic 3D image using disparity map decomposition**, Hosik Sohn, Yong Ju Jung, Seong-II Lee, Yong Man Ro, KAIST (Korea, Republic of) . . . . . [9011-18]

3:00 pm: **Efficient quality enhancement of disparity maps based on alpha matting**, Nicole Brosch, Matej Nezveda, Margrit Gelautz, Technische Univ. Wien (Austria); Florian H. Seitner, emotion3D (Austria) . . . . . [9011-19]

Coffee Break . . . . . Mon 3:20 pm to 3:50 pm

Sessions 6 and 7 run concurrently.

**Session 6**

**Location: Continental Ballroom 5 . . . . . Mon 3:50 pm to 5:10 pm**

**3D Display Systems**

Session Chair: **Gregg E. Favalora**, VisionScope Technologies LLC (United States)

3:50 pm: **Description of a 3D display with motion parallax and direct interaction**, Mark Flynn, Jerry Tu, zSpace (United States). . . . . [9011-20]

4:10 pm: **LCD masks for spatial augmented reality**, Quinn Y. J. Smithwick, Daniel Reetz, Lanny S. Smoot, Walt Disney Imagineering (United States). . . . . [9011-21]

4:30 pm: **Transparent stereoscopic display and application**, Nicola Ranieri, Hagen Seifert, ETH Zurich (Switzerland); Markus Gross, ETH Zürich (Switzerland). . . . . [9011-22]

4:50 pm: **A hand-held immaterial volumetric display**, Antti Sand, Ismo K. Rakkolainen, Tampere Univ. of Technology (Finland). . . . . [9011-28]

**Session 7**

**Location: Continental Ballroom 7 . . . . . Mon 3:50 pm to 5:10 pm**

**Human Factors I**

Session Chair: **John O. Merritt**, The Merritt Group (United States)

3:50 pm: **Perceived crosstalk assessment on patterned retarder 3D display**, Bochao Zou, Yue Liu, Yongtian Wang, Beijing Institute of Technology (China); Yi Huang, Beijing Institute of Technology (China) and Beijing Engineering Research Ctr. for Mixed Reality and Novel Display Technology (China) . . . . . [9011-24]

4:10 pm: **Subjective evaluation of an active crosstalk reduction system for mobile autostereoscopic displays**, Philippe Hanhart, Alexandre Chappuis, Martin Rerábek, Touradj Ebrahimi, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [9011-25]

4:30 pm: **Study of blur discrimination for 3D stereo viewing**, Mahesh M. Subedar, Arizona State Univ. (United States) and Intel Corp. (United States); Lina J. Karam, Arizona State Univ. (United States) . . . . . [9011-26]

4:50 pm: **The effect of stereoscopic acquisition parameters on both distortion and comfort**, Robert H. Black, Georg F. Meyer, Sophie M. Wuerger, Univ. of Liverpool (United Kingdom) . . . . . [9011-27]

**Location: Continental Ballroom 5 . . . . . 5:30 pm to 7:30 pm**

**3D Theatre**

Session Chairs: **Chris Ward**, Lightspeed Design, Inc. (United States); **John D. Stern**, Intuitive Surgical, Inc. (United States); **Andrew J. Woods**, Curtin Univ. (Australia)

This ever-popular session allows attendees to see large-screen examples of 3D content from around the world. Program announced at the conference. 3D glasses provided.

**Location: Continental Ballroom 5 . . . . . 7:50 pm to 10:00 pm**

**SD&A 25th Anniversary Dinner**

The annual informal SD&A dinner for attendees. An opportunity to meet with colleagues and discuss the latest advances. There is no host for the dinner. Information on venue and cost will be provided on the day at the conference.

**Tuesday 4 February**

**Session 10**

**Location: Continental Ballroom 5 . . . . .8:30 am to 9:50 am**

**Plenary Session and Society Award Presentations**

8:30 am: **Using fMRI To Reverse Engineer the Human Visual System (Plenary)**, Jack L. Gallant, Univ. of California, Berkeley (United States) . . . . . [9011-301]

Coffee Break . . . . .Tue 9:50 am to 10:10 am

**Session 8**

**Location: Continental Ballroom 5 . . Tue 10:10 am to 11:30 am**

**3D Developments**

Session Chair: **Takashi Kawai**, Waseda Univ. (Japan)

10:10 am: **Fully automatic 2D to 3D conversion with aid of high-level image features**, Vikram V. Appia, Umit Batur, Texas Instruments Inc. (United States) . . . . . [9011-29]

10:30 am: **Stereoscopy for visual simulation of materials of complex appearance**, Fernando E. da Graça, Alexis Paljic, Dominique Lafon-Pham, Mines ParisTech (France) . . . . . [9011-30]

10:50 am: **Stereoscopic depth perception in video see-through augmented reality within action space**, Mikko Kytö, Aleksii Mäkinen, Timo Tossavainen, Pirkko T. Oittinen, Aalto Univ. School of Science and Technology (Finland) . . . . . [9011-31]

11:10 am: **A multilayer display augmented by alternating layers of lenticular sheets**, Hironobu Gotoda, National Institute of Informatics (Japan) . . . . . [9011-32]

**Location: Continental Ballroom 5 . . . . .11:30 am to 12:30 pm**

**SD&A Keynote Session II**

Session Chair: **Gregg E. Favalora**, VisionScope Technologies LLC (United States)

11:30 am: **Compressive displays: combining optical fabrication, computational processing, and perceptual tricks to build the displays of the future (Keynote Presentation)**, Gordon Wetzstein, MIT Media Lab. (United States) . . . . . [9011-81]

Lunch Break . . . . . Tue 12:30 pm to 2:00 pm

**Session 9**

**Location: Continental Ballroom 5 . . . . Tue 2:00 pm to 3:30 pm**

**Stereoscopic Panoramas and 3D Imaging**

Session Chair: **Andrew J. Woods**, Curtin Univ. (Australia)

2:00 pm: **JEI Acquisition of omnidirectional stereoscopic images and videos of dynamic scenes: a review (Invited Paper)**, Luis E. Gurrieri, Eric Dubois, Univ. of Ottawa (Canada) . . . . . [9011-33]

2:30 pm: **Automatic detection of artifacts in converted S3D video**, Dmitriy Vatolin, Lomonosov Moscow State Univ. (Russian Federation) . . . . . [9011-82]

2:50 pm: **Depth consistency and vertical disparities in stereoscopic panoramas**, Luis E. Gurrieri, Eric Dubois, Univ. of Ottawa (Canada) . . . . . [9011-35]

3:10 pm: **Integration of multiple view plus depth data for free viewpoint 3D display**, Kazuyoshi Suzuki, Nagoya Univ. (Japan); Yuko Yoshida, Tetsuya Kawamoto, Chukyo TV Broadcasting Corp. (Japan); Toshiaki Fujii, Kenji Mase, Nagoya Univ. (Japan) . . . . . [9011-36]

Coffee Break . . . . . Tue 3:30 pm to 4:00 pm

**Location: Continental Ballroom 5 . . . Tue 4:00 pm to 5:20 pm**

**Human Factors II**

Session Chair: **Chris Ward**, Lightspeed Design, Inc. (United States)

4:00 pm: **Disparity modifications and the emotional effects of stereoscopic images**, Takashi Kawai, Daiki Atsuta, Yuya Tomiyama, Sanghyun Kim, Waseda Univ. (Japan); Hiroyuki Morikawa, Aoyama Gakuin Univ. (Japan) and Waseda Univ. (Japan); Reiko Mitsuya, Waseda Univ. (Japan); Jukka P. Häkkinen, Univ. of Helsinki (Finland) . . . . . [9011-37]

4:20 pm: **Estimating impact of stereo 3D display technology on depth perception**, Petr Kellnhofer, Tobias Ritschel, Karol Myszkowski, Hans-Peter Seidel, Max-Planck-Institut für Informatik (Germany) . . . . . [9011-38]

4:40 pm: **Measurement of perceived stereoscopic sensation through disparity based features and disparity distribution**, Satoshi Toyosawa, Tokuyama Univ. (Japan); Takashi Kawai, Waseda Univ. (Japan) . [9011-39]

5:00 pm: **Stereo and motion cues effect on depth judgment of volumetric data**, Isaac Cho, Zachary J. Wartell, Wenwen Dou, Xiaoyu Wang, William Ribarsky, The Univ. of North Carolina at Charlotte (United States) . . . . . [9011-40]

**Interactive Paper Session-Tuesday**

*Interactive papers will be placed on display after 3:30 pm on Tuesday. An interactive paper session, with authors present at their papers, will be held Tuesday evening, 5:30 to 6:45 pm. Refreshments will be served.*

**Location: Continental Ballroom and Golden Gate Foyers . . . . . 5:30 pm to 6:45 pm**

**3D Display Engineering**

**Practical resolution requirements of measurement instruments for precise characterization of auto-stereoscopic 3D displays**, Pierre M. Boher, Thierry Leroux, Véronique Collomb-Patton, Thibault Bignon, ELDIM (France) . . . . . [9011-51]

**Stereoscopic model for depth-fused 3D (DFD) display**, Hirotsugu Yamamoto, Hiroshi Sonobe, Atsuhiko Tsunakawa, Junnosuke Kawakami, Shiro Suyama, Univ. of Tokushima (Japan) . . . . . [9011-52]

**Parallax multi-viewer auto-stereoscopic three-dimensional display**, Lingdao Sha, Dan Schonfeld, Qun Li, Univ. of Illinois at Chicago (United States) . . . . . [9011-53]

**Floating volumetric display using an imaging element that consists of a 90° prism sheet and a linear Fresnel lens**, Yuki Maeda, Daisuke Miyazaki, Osaka City Univ. (Japan); Satoshi Maekawa, Univ. of Hyogo (Japan); Takaaki Mukai, Osaka City Univ. (Japan) . . . . . [9011-54]

**Stereoscopic Rendering and Standards**

**Rendering for stereoscopic web pages**, Jianlong Zhang, Wenmin Wang, Qinshui Chen, Ronggang Wang, Peking Univ. Shenzhen Graduate School (China) . . . . . [9011-56]

**The rendering context for stereoscopic 3D web**, Qinshui Chen, Wenmin Wang, Ronggang Wang, Peking Univ. Shenzhen Graduate School (China) . . . . . [9011-57]

**The development and future of 3D render technology for digital cinema**, Darren Ma, Leonis Cinema (Beijing) Tech. Co., Ltd. (China) . . . . . [9011-58]

**The design and implementation of stereoscopic 3D scalable vector graphics based on WebKit**, Zhongxin Liu, Wenmin Wang, Ronggang Wang, Peking Univ. Shenzhen Graduate School (China) . . . . . [9011-59]

**Depth Maps and View Synthesis**

**Joint estimation of high resolution images and depth maps from light field cameras**, Kazuki Ohashi, Keita Takahashi, Toshiaki Fujii, Nagoya Univ. (Japan) . . . . . [9011-60]

# Conference 9011 · Locations: Continental Ballroom 7, and Continental Ballroom 2

**Discontinuity preserving depth estimation using distance transform**, Woo-Seok Jang, Yo-Sung Ho, Gwangju Institute of Science and Technology (Korea, Republic of) . . . . . [9011-61]

**Integrating multiview camera arrays into adaptive multiview laser scan displays**, Leif Arne Rønningen, Norwegian Univ. of Science and Technology (Norway). . . . . [9011-62]

**View synthesis from wide-baseline views using occlusion aware estimation of large disparities**, Ahmed S. Elliethy, Hussein A. Aly, Military Technical College (Egypt); Gaurav Sharma, Univ. of Rochester (United States) . . . . . [9011-63]

**Superpixel-based 3D warping using view plus depth data from multiple viewpoints**, Tomoyuki Tezuka, Keita Takahashi, Toshiaki Fujii, Nagoya Univ. (Japan) . . . . . [9011-64]

**Stereoscopic augmented reality with pseudo-realistic global illumination effects**, Francois de Sorbier, Hideo Saito, Keio Univ. (Japan). . . . . [9011-65]

**Development of free-viewpoint image synthesis system using time varying projection and spacetime stereo**, Tatsuro Mori, Keita Takahashi, Toshiaki Fujii, Nagoya Univ. (Japan) . . . . . [9011-66]

**General stereoscopic distortion rectification due to arbitrary viewer motion in binocular stereoscopic display**, Qun Li, Dan Schonfeld, Univ. of Illinois at Chicago (United States) . . . . . [9011-67]

**Wide-field-of-view image pickup system for multiview volumetric 3D displays using multiple RGB-D cameras**, Yuan Luo, Hideki Kakeya, Univ. of Tsukuba (Japan) . . . . . [9011-68]

**Joint upsampling and noise reduction for real-time depth map enhancement**, Kazuki Matsumoto, Chiyong Song, Francois de Sorbier, Hideo Saito, Keio Univ. (Japan). . . . . [9011-69]

## Stereoscopic Human Factors

**Experimental investigation of discomfort combination: towards visual discomfort prediction for stereoscopic videos**, Seong-Il Lee, Yong Ju Jung, Hosik Sohn, Yong Man Ro, KAIST (Korea, Republic of) . . . . . [9011-70]

**Stereoscopic visual fatigue assessment and modeling**, Danli Wang, Tingting Wang, Yue Gong, Institute of Software (China). . . . . [9011-71]

**Visual discomfort under various illumination conditions using eye movement in watching stereoscopic 3D video**, Sang-Hyun Cho, Hang-Bong Kang, The Catholic Univ. of Korea (Korea, Republic of) . . . [9011-72]

**On the comparison of visual discomfort generated by 3D and 2D content based on eye-tracking features**, Iana Iatsun, Mohamed-Chaker Larabi, XLIM-SIC (France) . . . . . [9011-73]

**Perception and annoyance of crosstalk in stereoscopic 3D projector systems**, Kun Wang, Acreo Swedish ICT AB (Sweden) and Mid Sweden Univ. (Sweden); Börje Andrén, Mahir Hussain, Acreo Swedish ICT AB (Sweden); Kjell E. Brunnström, Acreo Swedish ICT AB (Sweden) and Mid Sweden Univ. (Sweden); Jesper Osterman, LC-Tec Displays AB (Sweden) . . . . . [9011-74]

## Stereoscopic Perception

**Eliciting steady state visual evoked potentials by means of stereoscopic displays**, Enrico Calore, Davide Gadia, Daniele L. Marini, Univ. degli Studi di Milano (Italy) . . . . . [9011-75]

**A new multimodal, interactive way of subjective scoring of 3D video quality of experience**, Taewan Kim, Kwang-Hyun Lee, Sanghoon Lee, Yonsei Univ. (Korea, Republic of); Alan C. Bovik, The Univ. of Texas at Austin (United States) . . . . . [9011-76]

**Effect of local crosstalk on depth perception**, Hiroshi Watanabe, Hiroyasu Ujike, National Institute of Advanced Industrial Science and Technology (Japan); John Penczek, Paul A. Boynton, National Institute of Standards and Technology (United States) . . . . . [9011-77]

**Investigation of retinal images and accommodation responses for super multi-view display**, Junya Nakamura, Yasuhiro Takaki, Tokyo Univ. of Agriculture and Technology (Japan) . . . . . [9011-78]

**Location: Continental Ballroom 4 . . . . . 5:30 pm to 7:30 pm**

## Symposium Demonstration Session

A symposium-wide demonstration session will be open to attendees 5:30 to 7:30 pm Tuesday evening. Demonstrators will provide interactive, hands-on demonstrations of a wide-range of products related to Electronic Imaging.

## Wednesday 5 February

**Location: Continental Ballroom 5 . . . . . 8:30 am to 9:50 am**

## Plenary Session and Conference Award Presentations

8:30 am: **Integrated Imaging: Creating Images from the Tight Integration of Algorithms, Computation, and Sensors** (*Plenary*), Charles A. Bouman, Purdue Univ. (United States) . . . . . [9011-300]

Coffee Break . . . . . Wed 9:50 am to 10:30 am

## Session 11

**Location: Continental Ballroom 5 . Wed 10:30 am to 11:30 am**

## Digital Imaging for Autostereoscopy

Session Chair: **Gregg E. Favalora**, VisionScope Technologies LLC (United States)

10:30 am: **Compression for full-parallax light field displays**, Danillo B. Graziosi, Zahir Y. Alpaslan, Ostendo Technologies, Inc. (United States) . . . . . [9011-41]

10:50 am: **Non-linear rendering for autostereoscopic displays**, Christian Riechert, Marcus Müller, Peter P. Kauff, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany) . . . . . [9011-42]

11:10 am: **Enhancing multi-view autostereoscopic displays by viewing distance control (VDC)**, Silvio Jurk, Thomas Ebner, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany); Bernd Duckstein, Fraunhofer Institute for Telecommunications, Heinrich Hertz Institute (Germany); Sylvain Renault, René de la Barré, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany) . . . . . [9011-43]

**Location: Continental Ballroom 5 . . . 11:30 am to 12:30 pm**

## SD&A Discussion Forum: 3D in Entertainment: A Time of Transition

Panel Moderator: **Lenny Lipton**, Leonardo IP (United States)

Panel Members: **David S. Cohen**, Variety Media, LLC (United States); **Barry Sandrew**, Legend Films, Inc. (United States); **Jim Chabin**, International 3D Society (United States); **Chris Ward**, Lightspeed Design, Inc. (United States)

The SD&A Discussion Forum is a great opportunity to hear a panel of stereoscopic luminaries discuss a topic of high stereoscopic relevance. Topic and speakers to be announced closer to the event. Please visit the conference website or join the SD&A LinkedIn group for updates.

Session 12

Location: Continental Ballroom 5 . . . Wed 2:00 pm to 3:20 pm

**Autostereoscopic Displays II**

Session Chair: **Hideki Kakeya**, Univ. of Tsukuba (Japan)

2:00 pm: **Vision-based calibration of parallax barrier displays**, Nicola Ranieri, Markus Gross, ETH Zurich (Switzerland) . . . . . [9011-44]

2:20 pm: **JEI Viewing zone of autostereoscopic display with directional backlight using convex lens array**, Shuta Ishizuka, Takuya Mukai, Hideki Kakeya, Univ. of Tsukuba (Japan) . . . . . [9011-45]

2:40 pm: **Time-division multiplexing parallax barrier based on primary colors**, Qu Zhang, Hideki Kakeya, Univ. of Tsukuba (Japan) . . . . . [9011-46]

3:00 pm: **Multi-user autostereoscopic display based on direction-controlled illumination using a slanted cylindrical lens array**, Daisuke Miyazaki, Yui Hashimoto, Takahiro Toyota, Kenta Okoda, Osaka City Univ. (Japan); Tetsuro Okuyama, Toshikazu Ohtsuki, Akio Nishimura, Hiroyuki Yoshida, Panasonic Corp. (Japan) . . . . . [9011-47]

Coffee Break . . . . . Wed 3:20 pm to 4:00 pm

Session 13

Location: Continental Ballroom 5 . . . Wed 4:00 pm to 5:00 pm

**Optical Elements in 3D Systems**

Session Chair: **Nicolas S. Holliman**, Univ. of York (United Kingdom)

4:00 pm: **Accommodation measurements of integral photography**, Hitoshi Hiura, Tomoyuki Mishina, Jun Arai, Yuichi Iwadate, NHK Science & Technical Research Labs. (Japan) . . . . . [9011-48]

4:20 pm: **Optimized design of directional backlight system for time-multiplexed auto-stereoscopic display based on VHOE**, Yong Seok Hwang, Byeong Mok Kim, Eun-Soo Kim, Kwangwoon Univ. (Korea, Republic of) . . . . . [9011-49]

4:40 pm: **Analysis of multiple recording methods for full resolution multi-view auto-stereoscopic 3D display system incorporating VHOE**, Yong Seok Hwang, Kyu Ha Cho, Eun-Soo Kim, Kwangwoon Univ. (Korea, Republic of) . . . . . [9011-50]

Location: Continental Ballroom 5 . . . . . 5:20 pm to 5:30 pm

**SD&A Prizes and Closing Remarks**

Session Chair: **Andrew J. Woods**, Curtin Univ. (Australia)

Further information about the SD&A conference is available at the conference website [www.stereoscopic.org](http://www.stereoscopic.org).

Location: Continental Ballroom Foyer . 8:00 pm to 9:30 pm

**All-Conference Reception**

The annual Electronic Imaging All-Conference Reception provides a wonderful opportunity to get to know and interact with your SD&A colleagues. Plan to join us for this relaxing and enjoyable event. Coffee, dessert, and beverages will be provided. Conference registration badges are required for entrance.

Thursday 6 February

Location: Continental Ballroom 5 . . . . . 12:30 pm to 8:00 pm

**SD&A Magical Mystery 3D Bus Tour**

The SD&A committee has organised a bus tour to visit two local 3D companies in Silicon Valley. Please visit the SD&A conference website [www.stereoscopic.org](http://www.stereoscopic.org) or the SD&A LinkedIn group for specific details. A separate fee is payable to attend the tour. Numbers are limited. Please register via the SD&A conference website or the Registration desk at the EI Symposium (subject to ticket availability). The bus will pick up from the Hilton conference hotel at 12:30pm and from the Photonics West exhibition (Moscone Center, Howard Street) at 1:00pm. We expect to return guests to the hotel by approximately 8:00 pm after dinner.

# Conference 9012 • Location: Continental Ballroom 8

Monday–Tuesday 3–4 February 2014 • Proceedings of SPIE Vol. 9012

## The Engineering Reality of Virtual Reality 2014

Conference Chairs: **Margaret Dolinsky**, Indiana Univ. (United States); **Ian E. McDowall**, Fakespace Labs, Inc. (United States)

### Monday 3 February

#### Session 1

Location: Continental Ballroom 8 . . Mon 8:30 am to 10:10 am

#### Smart Phones, Smart Immersion, and Creative Thinking

Session Chair: **Ian E. McDowall**, Fakespace Labs, Inc. (United States)

8:30 am: **Interactive projection for aerial dance using depth sensing camera**, Tammuz Dubnov, Univ. of California, Berkeley (United States); Zachary Seldess, Shlomo Dubnov, Univ. of California, San Diego (United States) . . . . . [9012-1]

8:50 am: **Evaluation of smartphone-based interactions techniques in a CAVE in the context of immersive digital project review**, Paul George, Renault Technocentre (France); Florent Colombet, Theoris (France); Andras Kemeny, Renault Technocentre (France); Frédéric Merienne, Jean-Rémy Chardonnet, Ecole Nationale Supérieure d'Arts et Métiers (France); Indira Thouvenin, Univ. de Technologie Compiègne (France) . . . . . [9012-2]

9:10 am: **3D whiteboard: collaborative sketching with self-tracked smartphones**, James Lue, Jürgen P. Schulze, Univ. of California, San Diego (United States) . . . . . [9012-3]

9:30 am: **Scalable metadata environments (MDE): artistically-impelled immersive environments for large-scale data exploration**, Ruth G. West, Univ. of North Texas (United States); Todd Margolis, Andrew Prudhomme, Jürgen P. Schulze, Univ. of California, San Diego (United States); John P. Lewis, Weta Digital Ltd. (New Zealand) and Victoria Univ. of Wellington (New Zealand); Joachim H. Gossmann, Rajvikram Singh, Univ. of California, San Diego (United States); Iman Mostafavi, Limbic Software, Inc. (United States) . . . . . [9012-4]

9:50 am: **Virtual art revisited**, Silvia P. Ruzanka, Rensselaer Polytechnic Institute (United States) . . . . . [9012-5]

Coffee Break . . . . . Mon 10:10 am to 10:30 am

#### Session 2

Location: Continental Ballroom 8 . . Mon 10:30 am to 11:50 am

#### Seriously Speaking: Navigation, Immersion, and Architectural Design

Session Chair: **Margaret Dolinsky**, Indiana Univ. (United States)

10:30 am: **Navigating large-scale virtual environments within immersive displays: interfaces and cybersickness**, Daniel R. Mestre, Aix-Marseille Univ. (France) . . . . . [9012-6]

10:50 am: **CaveCAD: a tool for architectural design in immersive virtual environments**, Lelin Zhang, Cathleen E. Hughes, Eve Edelstein, Jürgen P. Schulze, Eduardo Macagno, Univ. of California, San Diego (United States) . . . . . [9012-7]

11:10 am: **A hardware and software architecture to deal with multimodal and collaborative interactions in multiuser virtual reality environments**, Pierre Martin, Anthony Tseu, Nicolas Férey, Patrick Bourdot, Lab. d'Informatique pour la Mécanique et les Sciences de l'Ingénieur (France) . . . . . [9012-8]

11:30 am: **Z-depth integration: a new technique for manipulating z-depth properties in composited scenes**, Kayla Steckel, David M. Whittinghill, Purdue Univ. (United States) . . . . . [9012-9]

#### PANEL DISCUSSION

Location: Continental Ballroom 8 . . 11:50 am to 12:30 pm

When VR Really Hits the Streets, Jacquelyn Ford Morie, All These Worlds, LLC (United States) . . . . . [9012-10]

#### Session 3

Location: Continental Ballroom 8 . . . Mon 2:00 pm to 3:20 pm

#### Exploring Space, HMDs, and Audiovisual Integration

Session Chair: **Ian E. McDowall**, Fakespace Labs, Inc. (United States)

2:00 pm: **Automatic exposure for panoramic systems in uncontrolled lighting conditions: a football stadium case study**, Vamsidhar Reddy Gaddam, Univ. I Oslo (Norway) and Simula Research Lab. (Norway); Marius Tennoe, Espen Helgedagsrud, Mikkel Nass, Henrik K. Alstad, Univ. I Oslo (Norway); Haakon K. Stensland, Carsten Griwodz, Pål Halvorsen, Univ. I Oslo (Norway) and Simula Research Lab. (Norway) . . . . . [9012-11]

2:20 pm: **Museum as spacecraft: a building in virtual space**, Julieta C. Aguilera, Adler Planetarium & Astronomy Museum (United States) and Plymouth Univ. (United Kingdom) . . . . . [9012-12]

2:40 pm: **Recent improvements in SPE3D: a VR-based surgery planning environment**, Marcin Witkowski, Robert Sitnik, Warsaw Univ. of Technology (Poland); Nico Verdonshot, Univ. Twente (Netherlands) and Radboud Univ. Nijmegen Medical Ctr. (Netherlands) . . . . . [9012-25]

3:00 pm: **Enhancing audiovisual integration in virtual environments with libCollider**, Joachim H. Gossmann, Eric Hamdan, Qualcomm Institute (United States) . . . . . [9012-14]

Coffee Break . . . . . Mon 3:20 pm to 3:40 pm

#### Session 4

Location: Continental Ballroom 8 . . . Mon 3:40 pm to 5:20 pm

#### Move!: Affectively Speaking About Immersion and Aesthetics

Session Chair: **Ian E. McDowall**, Fakespace Labs, Inc. (United States)

3:40 pm: **Game engines and immersive displays**, Benjamin Chang, Marc Destefano, Rensselaer Polytechnic Institute (United States) . . . . . [9012-15]

4:00 pm: **Gestural interfaces for immersive environments**, Todd Margolis, Univ. of California, San Diego (United States) . . . . . [9012-16]

4:20 pm: **Aleatoric narrative on the Zaxis: typographic expression in virtual 3D**, Elif E. Ayiter, Sabanci Univ. (Turkey) . . . . . [9012-17]

# Conference 9012 · Location: Continental Ballroom 8

4:40 pm: **Embodiments, visualizations, and immersion with enactive affective systems**, Diana G. Domingues, LART (Brazil); Cristiano J. Miosso, Suéila S. Rodrigues Fleury Rosa, Carla Silva Rocha Aguiar, Univ. de Brasília (Brazil); Tiago F. Lucena, Univ. de Brasília (Brazil) and LART (Brazil); Mateus Miranda, Adson F. Rocha, Univ. de Brasília (Brazil); Ramesh Raskar, Massachusetts Institute of Technology (United States) . . . . . [9012-18]

5:00 pm: **The visceral umbilicus: entwining body image and body schema in VR**, Diane Gromala, Bryn Ludlow, Simon Fraser Univ. (Canada) . . . . . [9012-19]

## Tuesday 4 February

**Location: Continental Ballroom 5 . . . . . 8:30 am to 9:50 am**

### Plenary Session and Society Award Presentations

8:30 am: **Using fMRI To Reverse Engineer the Human Visual System (Plenary)**, Jack L. Gallant, Univ. of California, Berkeley (United States) . . . . . [9011-301]

### Interactive Paper Session-Tuesday

*Interactive papers will be placed on display after 3:30 pm on Tuesday. An interactive paper session, with authors present at their papers, will be held Tuesday evening, 5:30 to 6:45 pm. Refreshments will be served.*

**Location: Continental Ballroom and Golden Gate Foyers . . . . . 5:30 pm to 6:45 pm**

**Retinal projection type super multiview head-mounted display**, Yutaka Ito, Hideya Takahashi, Seigo Nakata, Osaka City Univ. (Japan); Kenji Yamada, Osaka Univ. (Japan) . . . . . [9012-13]

**Comparing two input devices for virtual walkthroughs using a head mounted display (HMD)**, Beatriz Sousa Santos, Paulo M. Dias, Paulo J. Santos, Carlos M. Ferreira, Univ. de Aveiro (Portugal) . . . . . [9012-20]

**Automatic generation of Chinese character using features fusion from calligraphy and font**, Cao Shi, Jianguo Xiao, Wenhua Jia, Canhui Xu, Peking Univ. (China) . . . . . [9012-21]

**Platform for setting up interactive virtual environments**, Danilo D. Souza, Paulo M. Dias, Beatriz Sousa Santos, Daniel Santos, Instituto de Engenharia Electrónica e Telemática de Aveiro (Portugal) . . . . . [9012-22]

**MARVEL agents: mobile augmented reality for validating embodied learning**, Quincy Conley, Robert K. Atkinson, Arizona State Univ. (United States) . . . . . [9012-24]

**Ergonomic approaches to designing educational materials for immersive multi-projection system**, Takashi Shibata, Tokyo Univ. of Social Welfare (Japan); JaeLin Lee, Tetsuri Inoue, Kanagawa Institute of Technology (Japan) . . . . . [9012-26]

**Location: Continental Ballroom 4 . . . . . 5:30 pm to 7:30 pm**

### Symposium Demonstration Session

A symposium-wide demonstration session will be open to attendees 5:30 to 7:30 pm Tuesday evening. Demonstrators will provide interactive, hands-on demonstrations of a wide-range of products related to Electronic Imaging.

## Wednesday 5 February

**Location: Continental Ballroom 5 . . . . . 8:30 am to 9:50 am**

### Plenary Session and Conference Award Presentations

8:30 am: **Integrated Imaging: Creating Images from the Tight Integration of Algorithms, Computation, and Sensors (Plenary)**, Charles A. Bouman, Purdue Univ. (United States) . . . . . [9011-300]

# Conference 9013 • Location: Continental Ballroom 7

Wednesday 5 February 2014 • Proceedings of SPIE Vol. 9013

## 3D Image Processing, Measurement (3DIPM), and Applications 2014

*Conference Chairs:* **Atila M. Baskurt**, Univ. de Lyon (France); **Robert Sitnik**, Warsaw Univ. of Technology (Poland)

*Program Committee:* **Hugues Benoit-Cattin**, Institut National des Sciences Appliquées de Lyon (France); **Silvia Biasotti**, Consiglio Nazionale delle Ricerche (Italy); **Adrian G. Bors**, The Univ. of York (United Kingdom); **Saida Bouakaz**, Univ. Claude Bernard Lyon 1 (France); **Benjamin Bustos**, Univ. de Chile (Chile); **Eduardo da Silva**, UFRJ (Brazil); **Mohamed Daoudi**, TELECOM Lille 1 (France); **Florent Dupont**, Univ. Claude Bernard Lyon 1 (France); **Gilles Gesquière**, Lab. des Sciences de l'Information et des Systèmes (France); **Afzal Godil**, National Institute of Standards and Technology (United States); **Serge Miguet**, Univ. Lumière Lyon 2 (France); **Eric Paquet**, National Research Council Canada (Canada); **William Puech**, Lab. d'Informatique de Robotique et de Microelectronique de Montpellier (France); **Tobias Schreck**, Univ. Konstanz (Germany); **Frédéric Truchetet**, Univ. de Bourgogne (France); **Stefano Tubaro**, Politecnico di Milano (Italy)

### Tuesday 4 February

**Location: Continental Ballroom 5 . . . . . 8:30 am to 9:50 am**

#### Plenary Session and Society Award Presentations

8:30 am: **Using fMRI To Reverse Engineer the Human Visual System (Plenary)**, Jack L. Gallant, Univ. of California, Berkeley (United States) . . . . . [9011-301]

**Location: Continental Ballroom 4 . . . . . 5:30 pm to 7:30 pm**

#### Symposium Demonstration Session

*A symposium-wide demonstration session will be open to attendees 5:30 to 7:30 pm Tuesday evening. Demonstrators will provide interactive, hands-on demonstrations of a wide-range of products related to Electronic Imaging.*

### Wednesday 5 February

**Location: Continental Ballroom 5 . . . . . 8:30 am to 9:50 am**

#### Plenary Session and Conference Award Presentations

8:30 am: **Integrated Imaging: Creating Images from the Tight Integration of Algorithms, Computation, and Sensors (Plenary)**, Charles A. Bouman, Purdue Univ. (United States) . . . . . [9011-300]

#### Interactive Paper Session-Wednesday

**Location: Continental Ballroom and Golden Gate Foyers . . . . . 9:50 am to 11:10 am**

*Interactive papers will be placed on display after 8:30 am on Wednesday. An interactive paper session, with authors present at their papers, will be held Wednesday morning, 9:50 to 11:10 am. Refreshments will be served.*

**Human machine interface by using stereo-based depth extraction**, Chao Kang Liao, Chi Hao Wu, Hsueh Yi Lin, Tung Yang Lin, Ting Ting Chang, Chin Chun Hsiao, Po Kuan Huang, Imec Taiwan Co. (Taiwan) . . . . . [9013-12]

**Tabu search for human pose recognition**, William J. Dyce, Univ. Montpellier 2 (France); Nancy Rodriguez, Lab. d'Informatique de Robotique et de Microelectronique de Montpellier (France); Benoit Lange, Univ. Pierre et Marie Curie (France); Sebastien Andary, Antoine Seilles, NaturalPad (France) . . . . . [9013-14]

**A multiple wavelength unwrapping algorithm for digital fringe profilometry based on spatial shift estimation**, Jiangtao Xi, Pu Cao, Yanguang Yu, Qinghua Guo, Univ. of Wollongong (Australia) . . . [9013-16]

**Experimental demonstration of parallel phase-shifting digital holography under weak light condition**, Lin Miao, Kobe Univ. (Japan); Tatsuki Tahara, Kansai Univ. (Japan); Peng Xia, Yasunori Ito, Yasuhiro Awatsuji, Kyoto Institute of Technology (Japan); Osamu Matoba, Kobe Univ. (Japan) . . . . . [9013-17]

**Global color calibration for 3D images through polynomial fitting**, Pierre Yver, Sébastien Kramm, Abdelaziz Benschrair, Institut National des Sciences Appliquées de Rouen (France) . . . . . [9013-18]

### Session 1

**Location: Continental Ballroom 7 . Wed 11:10 am to 12:30 pm**  
**3D Processing, Indexing, and Modeling**

11:10 am: **Temporal consistent depth map upscaling for 3DTV**, Sebastian Schwarz, Mårten Sjöström, Roger Olsson, Mid Sweden Univ. (Sweden) . . . . . [9013-1]

11:30 am: **Feature enhancing aerial lidar point cloud refinement**, Zhenzhen Gao, Ulrich Neumann, The Univ. of Southern California (United States) . . . . . [9013-2]

11:50 am: **VOLUMNECT: measuring volumes with Kinect™**, Beatriz Quintino Ferreira, Miguel Griné, Duarte Gameiro, Univ. Técnica de Lisboa (Portugal); Beatriz Sousa Santos, Univ. de Aveiro (Portugal) . . . . . [9013-3]

12:10 pm: **3D-mesh indexing based on structural analysis**, William Puech, Meha Hachani, Lab. d'Informatique de Robotique et de Microelectronique de Montpellier (France); Azza Ouled Zaid, National Engineering School of Tunis (Tunisia) . . . . . [9013-4]

Lunch Break . . . . . Wed 12:30 pm to 2:00 pm

### Session 2

**Location: Continental Ballroom 7 . . . . . Wed 2:00 pm to 3:00 pm**  
**3D Pattern Recognition and Real Time Processing**

2:00 pm: **Real-time 3D human pose recognition from reconstructed volume via a voxel classifier**, ByungIn Yoo, Changkyu Choi, Jae-Joon Han, Changkyo Lee, Wonjun Kim, Sungjoo Suh, Dusik Park, Samsung Advanced Institute of Technology (Korea, Republic of), Junmo Kim, KAIST(Korea, Republic of) . . . . . [9013-5]

2:20 pm: **Model-based 3D human shape estimation from silhouettes for virtual fitting**, Shunta Saito, Keio Univ. (Japan); Makiko Kouchi, Masaaki Mochimaru, National Institute of Advanced Industrial Science and Technology (Japan); Yoshimitsu Aoki, Keio Univ. (Japan) . . . . . [9013-6]

2:40 pm: **3D face recognition via conformal representation**, Junhui Han, Chi Fang, Xiaoging Ding, Jian Sun, Tsinghua Univ. (China); Xianfeng Gu, Stony Brook Univ. (United States) . . . . . [9013-7]

Coffee Break . . . . . Wed 3:00 pm to 4:00 pm

### Session 3

**Location: Continental Ballroom 7 . . . . . Wed 4:00 pm to 5:00 pm**  
**3D Imaging Systems**

4:00 pm: **Real-time 3D shape measurement system with full temporal resolution and spatial resolution**, Kai Zhong, Zhongwei Li, Guomin Zhan, Xingjian Liu, Yusheng Shi, Congjun Wang, Xiaohui Zhou, Cheng Wu, Huazhong Univ. of Science and Technology (China) . . . . . [9013-9]

4:20 pm: **New concept of technology chain for 3D/4D content generation and display**, Malgorzata Kujawińska, Robert Sitnik, Tomasz Kozacki, Warsaw Univ. of Technology (Poland) . . . . . [9013-10]

4:40 pm: **Low-cost structured-light based 3D capture system design**, Jing Dong, Purdue Univ. (United States); Kurt R. Bengtson, Hewlett-Packard Co. (United States); Jan P. Allebach, Purdue Univ. (United States) [9013-11]

# Conference 9014 • Location: Plaza A

Monday–Thursday 3–6 February 2014 • Proceedings of SPIE Vol. 9014

## Human Vision and Electronic Imaging XIX

*Conference Chairs:* **Bernice E. Rogowitz**, Visual Perspectives Consulting (United States); **Thrasylvoulos N. Pappas**, Northwestern Univ. (United States); **Huib de Ridder**, Technische Univ. Delft (Netherlands)

*Program Committee:* **Albert J. Ahumada Jr.**, NASA Ames Research Ctr. (United States); **Jan P. Allebach**, Purdue Univ. (United States); **Erhardt Barth**, Univ. zu Lübeck (Germany); **Walter R. Bender**, Sugar Labs. (United States); **Michael H. Brill**, Datacolor (United States); **John C. Dalton**, Synthetik Software (United States); **Scott J. Daly**, Dolby Labs., Inc. (United States); **Ulrich Engelke**, Commonwealth Scientific and Industrial Research Organisation (Australia); **Elena A. Fedorovskaya**, Rochester Institute of Technology (United States); **James A. Ferwerda**, Rochester Institute of Technology (United States); **Jennifer L. Gille**, Qualcomm Technologies Inc. (United States); **Sergio R. Goma**, Qualcomm Inc. (United States); **Sheila S. Hemami**, Cornell Univ. (United States); **Stanley A. Klein**, Univ. of California, Berkeley (United States); **Patrick Le Callet**, Univ. de Nantes (France); **Lora T. Likova**, The Smith-Kettlewell Eye Research Institute (United States); **John J. McCann**, McCann Imaging (United States); **Jeffrey B. Mulligan**, NASA Ames Research Ctr. (United States); **Karol Myszkowski**, Max-Planck-Institut für Informatik (Germany); **Adar Pelah**, The Univ. of York (United Kingdom); **Eliezer Peli**, Schepens Eye Research Institute (United States); **Robert Pepperell**, Cardiff School of Art & Design (United Kingdom); **Judith A. Redi**, Technische Univ. Delft (Netherlands); **Hawley K. Rising III**, Consultant (United States); **Sabine Süsstrunk**, Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Christopher W. Tyler**, The Smith-Kettlewell Eye Research Institute (United States); **Andrew B. Watson**, NASA Ames Research Ctr. (United States); **Michael A. Webster**, Univ. of Nevada, Reno (United States)

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### Monday 3 February

**Location: Plaza B .....8:30 am to 9:10 am**

#### **Keynote Presentation: Joint Session with Conferences 9014 and 9018**

Session Chair: **Jan P. Allebach**, Purdue Univ. (United States)

8:30 am: **Perceiving, measuring, and modeling 3D material appearance** (*Keynote Presentation*), Christopher W. Tyler, Smith-Kettlewell Eye Research Institute (United States) ..... [9018-1]

**Location: Plaza A .....9:20 am to 12:20 pm**

#### **HVEI Keynote Session I**

Session Chairs: **Bernice E. Rogowitz**, Visual Perspectives Consulting (United States); **Thrasylvoulos N. Pappas**, Northwestern Univ. (United States); **Huib de Ridder**, Technische Univ. Delft (Netherlands)

9:20 am: **Seven challenges for image quality research** (*Keynote Presentation*), Damon M. Chandler, Oklahoma State Univ. (United States) ..... [9014-1]

Coffee Break ..... Mon 10:10 am to 10:40 am

10:40 am: **Images shared in social media: a window into human sentiment and emotion** (*Keynote Presentation*), Shih-Fu Chang, Columbia Univ. (United States) ..... [9014-2]

11:30 am: **Digital coloring books** (*Keynote Presentation*), Patrick Hanrahan, Stanford Univ. (United States) ..... [9014-3]

Lunch Break ..... Mon 12:20 pm to 2:00 pm

#### **Session 1**

**Location: Plaza A .....Mon 2:00 pm to 5:00 pm**

#### **Auditory/Visual Interactions: From Detection to Cognition**

Session Chairs: **Scott J. Daly**, Dolby Labs., Inc. (United States); **Laura Rossi**, Istituto Nazionale di Ricerca Metrologica (Italy); **Poppy Crum**, Dolby Labs., Inc. (United States)

2:00 pm: **Auditory modulation of visual motion perception** (*Invited Paper*), Mark E. McCourt, North Dakota State Univ. (United States) [9014-4]

2:20 pm: **Modulation of luminance contrast perception by background acoustical noise** (*Invited Paper*), Laura Rossi, Istituto Nazionale di Ricerca Metrologica (Italy) ..... [9014-5]

2:40 pm: **Audiovisual focus of attention and its application to UHD video compression** (*Invited Paper*), Martin Rerábek, Hiromi Nemoto, Jong-Seok Lee, Touradj Ebrahimi, Ecole Polytechnique Fédérale de Lausanne (Switzerland) ..... [9014-6]

3:00 pm: **Influence of audio triggered emotional attention on video perception** (*Invited Paper*), Freddy Torres, Hari Kalva, Florida Atlantic Univ. (United States) ..... [9014-7]

Coffee Break ..... Mon 3:20 pm to 4:00 pm

4:00 pm: **3D sound and 3D image interactions** (*Invited Paper*), Jonathan Berry, Durham Univ. (United Kingdom); Nicolas S. Holliman, The Univ. of York (United Kingdom) ..... [9014-8]

4:20 pm: **WWII cargo cults and their implications for the future of digital cinema imaging and sound** (*Invited Paper*), Harry Mathias, San José State Univ. (United States) ..... [9014-9]

4:40 pm: **Does movie genre or the scene statistics dominate in the balance of audio and video bitrates on perceived overall quality?** (*Invited Paper*), Poppy Crum, J. Tobin, Dan Darcy, Scott J. Daly, Dolby Labs., Inc. (United States) ..... [9014-10]

**Location: Plaza A .....5:00 pm to 6:00 pm**

#### **Discussion Session**

*An interactive discussion of the day's papers, where authors and members of the multidisciplinary HVEI community can examine the work, and its implications, more deeply.*

**Location: Plaza A .....7:30 pm to 10:30 pm**

#### **Human Vision and Electronic Imaging Banquet**

Details regarding the banquet to be announced.

### Tuesday 4 February

**Location: Continental Ballroom 5 .....8:30 am to 9:50 am**

#### **Plenary Session and Society Award Presentations**

8:30 am: **Using fMRI To Reverse Engineer the Human Visual System** (*Plenary*), Jack L. Gallant, Univ. of California, Berkeley (United States) ..... [9011-301]

Coffee Break ..... Tue 9:50 am to 10:20 am

# Conference 9014 · Location: Plaza A

## Session 2

Location: Plaza A ..... Tue 10:20 am to 12:20 pm

### Perception and Appearance of Materials: Texture, Luminance, and Noise: Joint Session with Conferences 9014 and 9018

Session Chairs: **Philipp Urban**, Fraunhofer-Institut für Graphische Datenverarbeitung (Germany); **Bernice E. Rogowitz**, Visual Perspectives Consulting (United States)

10:20 am: **Roughness versus contrast in natural textures**, Pubudu M. Silva, Thrasylvoulos N. Pappas, Northwestern Univ. (United States); Huib de Ridder, René van Egmond, Technische Univ. Delft (Netherlands) ..... [9014-11]

10:40 am: **Mathematical limitations when choosing psychophysical methods: geometric versus linear grey scales**, Niels Dekker, Akzo Nobel Coating B.V. (Netherlands); Marcel P. Lucassen, LUCASSEN Colour Research (Netherlands); Eric J. J. Kirchner, Akzo Nobel Coating B.V. (Netherlands); Philipp Urban, Fraunhofer-Institut für Graphische Datenverarbeitung (Germany); Rafael Huertas Roa, Univ. de Granada (Spain) ..... [9018-15]

11:00 am: **The visual appearance and surface texture of materials according to the old masters**, Carinna E. Parraman, Univ. of the West of England (United Kingdom) ..... [9018-16]

11:20 am: **Investigation of visual attention priority in selection of objects with texture, crossed, and uncrossed disparities in 3D images**, Darya Khaustova, Jérôme Fournier, Emmanuel Wyckens, Orange SA (France); Olivier Le Meur, Univ. de Rennes 1 (France) ..... [9014-12]

11:40 am: **On pictures and stuff: image quality and material appearance**, James A. Ferwerda, Rochester Institute of Technology (United States) ..... [9018-17]

12:00 pm: **Memory texture as a mechanism of improvement in preference by adding noise**, Hiroyuki Kobayashi, Yinzhu Zhao, Naokazu Aoki, Chiba Univ. (Japan) ..... [9014-13]

Lunch Break ..... Tue 12:20 pm to 2:00 pm

## Session 3

Location: Plaza A ..... Tue 2:00 pm to 4:30 pm

### Real-World and Natural Environments

Session Chairs: **Thrasylvoulos N. Pappas**, Northwestern Univ. (United States); **Huib de Ridder**, Technische Univ. Delft (Netherlands)

2:00 pm: **Computer vision enhances mobile eye-tracking to expose expert cognition in natural-scene visual search tasks**, Tommy P. Keane, Nathan D. Cahill, Rochester Institute of Technology (United States); John A. Tarduno, Robert A. Jacobs, Univ. of Rochester (United States); Jeff B. Pelz, Rochester Institute of Technology (United States) .. [9014-14]

2:20 pm: **An adaptive hierarchical sensing scheme for sparse signals**, Henry Schütze, Erhardt Barth, Thomas M. Martinetz, Univ. zu Lübeck (Germany) ..... [9014-15]

2:40 pm: **Referenceless perceptual fog density prediction model**, Lark Kwon Choi, The Univ. of Texas at Austin (United States); Jaehee You, Hongik Univ. (Korea, Republic of); Alan C. Bovik, The Univ. of Texas at Austin (United States) ..... [9014-16]

Coffee Break ..... Tue 3:00 pm to 3:30 pm

3:30 pm: **Dynamics of backlight luminance for using smartphone in dark environment**, Nooree Na, Jiho Jang, Hyeon-Jeong Suk, KAIST (Korea, Republic of) ..... [9014-18]

3:50 pm: **Effects of image size and interactivity in lighting visualization**, Michael J. Murdoch, Mariska G. M. Stokkermans, Philips Research (Netherlands) ..... [9014-19]

4:10 pm: **On the delights of being an ex-cataract patient**, Floris L. van Nes, Technische Univ. Eindhoven (Netherlands) ..... [9014-20]

Location: Plaza A ..... 4:30 pm to 4:40 pm

### Posters Fast Forward

*In this session, the interactive paper authors will each present one slide introducing their poster.*

Location: Plaza A ..... 4:40 pm to 5:40 pm

### Discussion Session

An interactive discussion of the day's papers, where authors and members of the multidisciplinary HVEI community can examine the work, and its implications, more deeply.

### Interactive Paper Session-Tuesday

*Interactive papers will be placed on display after 3:30 pm on Tuesday. An interactive paper session, with authors present at their papers, will be held Tuesday evening, 5:30 to 6:45 pm. Refreshments will be served.*

### Location: Continental Ballroom and

**Golden Gate Foyers ..... 5:30 pm to 6:45 pm**

**Color visualization of cyclic magnitudes**, Alfredo Restrepo, Univ. de los Andes (Colombia) ..... [9014-45]

**Quality evaluation of stereo 3DTV systems with open profiling of quality**, Sara Kepplinger, Technische Univ. Ilmenau (Germany); Nikolaus Hottong, Hochschule Furtwangen Univ. (Germany) ..... [9014-46]

**Saliency map computation in the MPEG-4 AVC compressed stream**, Marwa Ammar, Mihai P. Mitrea, Marwen Hasnaoui, Télécom SudParis (France) ..... [9014-47]

**Visual manifold sensing**, Irina Burciu, Adrian Ion-Margineanu, Thomas M. Martinetz, Erhardt Barth, Univ. zu Lübeck (Germany) ..... [9014-48]

**Visually lossless coding based on temporal masking in human vision**, Velibor Adzic, Howard S. Hock, Hari Kalva, Florida Atlantic Univ. (United States) ..... [9014-49]

**Some further developments on a neurobiologically-based two-stage model for human color vision**, Charles Q. Wu, Stanford Univ. (United States) ..... [9014-50]

**Face detection on distorted images using perceptual quality-aware features**, Suriya Gunasekar, Joydeep Ghosh, Alan C. Bovik, The Univ. of Texas at Austin (United States) ..... [9014-51]

**Consciousness and stereoscopic environmental imaging**, Steve Mason, Yavapai College (United States) ..... [9014-52]

**Bivariate statistical modeling of color and range in natural scenes**, Che-Chun Su, Lawrence K. Cormack, Alan C. Bovik, The Univ. of Texas at Austin (United States) ..... [9014-53]

Location: Continental Ballroom 4 ..... 5:30 pm to 7:30 pm

### Symposium Demonstration Session

A symposium-wide demonstration session will be open to attendees 5:30 to 7:30 pm Tuesday evening. Demonstrators will provide interactive, hands-on demonstrations of a wide-range of products related to Electronic Imaging.

## Wednesday 5 February

## Session 6

Location: Continental Ballroom 5 .....8:30 am to 9:50 am

### Plenary Session and Conference Award Presentations

8:30 am: **Integrated Imaging: Creating Images from the Tight Integration of Algorithms, Computation, and Sensors** (*Plenary*), Charles A. Bouman, Purdue Univ. (United States) ..... [9011-300]

Coffee Break ..... Wed 9:50 am to 10:10 am

## Session 4

Location: Plaza A .....Wed 10:10 am to 12:10 pm

### Methodologies for Quantifying Perceptual Quality: Joint Session with Conferences 9014 and 9016

Session Chairs: **Mohamed-Chaker Larabi**, XLIM-SIC (France); **Thrasylvoulos N. Pappas**, Northwestern Univ. (United States)

10:10 am: **Noisy images-JPEG compressed: subjective and objective image quality evaluation**, Silvia Corchs, Francesca Gasparini, Raimondo Schettini, Univ. degli Studi di Milano-Bicocca (Italy) ..... [9016-32]

10:30 am: **Perceptibility and acceptability of JPEG 2000 compressed images of various scene types**, Elizabeth Allen, Sophie Triantaphillidou, Ralph E. Jacobson, Univ. of Westminster (United Kingdom) .... [9016-33]

10:50 am: **X-eye: a reference format for eye tracking data to facilitate analysis across databases**, Stefan Winkler, Subramanian Ramanathan, Advanced Digital Sciences Ctr. (Singapore) ..... [9014-21]

11:10 am: **A new image quality assessment database for tiled images**, Steven McFadden, Paul A. S. Ward, Univ. of Waterloo (Canada). [9016-34]

11:30 am: **Modeling the leakage of LCD displays with local backlight for quality assessment**, Claire Mantel, Jari Korhonen, DTU Fotonik (Denmark); Jesper M. Pedersen, Soren Bech, Bang & Olufsen A/S (Denmark); Ehsan Nadernejad, Nino Burini, Soren O. Forchhammer, DTU Fotonik (Denmark) ..... [9014-22]

11:50 am: **On improving the pooling in HDR-VDP-2 towards better HDR perceptual quality assessment**, Manish Narwaria, Matthieu Perreira Da Silva, Patrick Le Callet, Romuald Pepion, Institut de Recherche en Communications et en Cybernétique de Nantes (France) ..... [9014-23]

Lunch Break .....Wed 12:10 pm to 2:00 pm

## Session 5

Location: Plaza A .....Wed 2:00 pm to 3:30 pm

### Perceptual Issues for Video

Session Chair: **Hari Kalva**, Florida Atlantic Univ. (United States)

2:00 pm: **Theory and practice of perceptual video processing in broadcast encoders for cable, IPTV, satellite, and internet distribution** (*Invited Paper*), Sean McCarthy, ARRIS (United States) ..... [9014-24]

2:30 pm: **Temporal perceptual coding using a visual acuity model** (*Invited Paper*), Velibor Adzic, Florida Atlantic Univ. (United States); Robert A. Cohen, Anthony Vetro, Mitsubishi Electric Research Labs. (United States) ..... [9014-25]

2:50 pm: **Characterizing perceptual artifacts in compressed video streams** (*Invited Paper*), Kai Zeng, Tiesong Zhao, Abdul Rehman, Zhou Wang, Univ. of Waterloo (Canada) ..... [9014-26]

3:10 pm: **Zero shot prediction of video quality using intrinsic video statistics** (*Invited Paper*), Anish Mittal, Nokia Research Ctr. (United States); Michele A. Saad, Intel Corp. (United States); Alan C. Bovik, The Univ. of Texas at Austin (United States) ..... [9014-27]

Coffee Break .....Wed 3:30 pm to 4:00 pm

Location: Plaza A .....Wed 4:00 pm to 5:10 pm

### Quality of Experience: Cognition, Emotion, and Aesthetics

Session Chairs: **Judith A. Redi**, Technische Univ. Delft (Netherlands); **Elena Federovskaya**, Rochester Institute of Technology (United States)

4:00 pm: **Personalized visual aesthetics** (*Invited Paper*), Edward A. Vessel, New York Univ. (United States) ..... [9014-28]

4:30 pm: **Identifying image preferences based on demographic attributes**, Elena A. Fedorovskaya, Daniel R. Lawrence, Rochester Institute of Technology (United States) ..... [9014-29]

4:50 pm: **Chamber QoE: a multi-instrumental approach to explore affective aspects in relation to quality of experience**, Katrien De Moor, Norwegian Univ. of Science and Technology (Norway) and Univ. Gent (Belgium); Filippo Mazza, Ecole Centrale de Nantes (France); Isabelle Hupont, Instituto Tecnológico de Aragón (Spain); Miguel Rios Quintero, Technische Univ. Berlin (Germany); Toni Mäki, Martin Varela, VTT Technical Research Ctr. of Finland (Finland) ..... [9014-30]

Location: Plaza A .....5:10 pm to 6:10 pm

### Discussion Session

*An interactive discussion of the day's papers, where authors and members of the multidisciplinary HVEI community can examine the work, and its implications, more deeply.*

## Thursday 6 February

Location: Plaza A .....8:30 am to 9:20 am

### HVEI Keynote Session II

Session Chair: **Bernice E. Rogowitz**, Visual Perspectives Consulting (United States)

8:30 am: **The science of social interactions on the web** (*Keynote Presentation*), Ed H. Chi, Google (United States) ..... [9014-31]

## Session 7

Location: Plaza A ..... Thu 9:20 am to 10:20 am

### Quality of Experience: User Experience in a Social Context

Session Chairs: **Judith A. Redi**, Technische Univ. Delft (Netherlands); **Elena Federovskaya**, Rochester Institute of Technology (United States)

9:20 am: **Alone or together: measuring users' viewing experience in different social contexts**, Yi Zhu, Technische Univ. Delft (Netherlands); Ingrid Heynderickx, Technische Univ. Eindhoven (Netherlands); Judith A. Redi, Technische Univ. Delft (Netherlands) ..... [9014-32]

9:40 am: **Is there a "like" effect?: considering social biases in image quality evaluation**, Filippo Mazza, Ecole Centrale de Nantes (France); Matthieu Perreira Da Silva, Patrick Le Callet, Univ. de Nantes (France) ..... [9014-33]

10:00 am: **Assessing the impact of image modification and manipulation on users' perceptions of deception**, Duc Tien Dang Nguyen, Valentina Conotter, Giulia Boato, Maria Menendez, Univ. degli Studi di Trento (Italy); Martha A. Larson, Technische Univ. Delft (Netherlands) ..... [9014-34]

Coffee Break .....Thu 10:20 am to 10:50 am

# Conference 9014 · Location: Plaza A

## Session 8

**Location: Plaza A** ..... Thu 10:50 am to 12:10 pm

### **Color Perception and Applications: The Bright Side of Color**

Session Chair: **Bernice E. Rogowitz**, Visual Perspectives Consulting (United States)

10:50 am: **Spectral compression: weighted principal component analysis versus weighted least squares**, Farnaz Agahian, Brian V. Funt, Simon Fraser Univ. (Canada); Seyed Hossein Amirshahi, Amirkabir Univ. of Technology (Iran, Islamic Republic of) ..... [9014-35]

11:10 am: **Creating experimental color harmony map**, Christel Chamaret, Fabrice Urban, Josselin Lepinel, Technicolor S.A. (France) ..... [9014-37]

11:30 am: **Exploring the use of memory colors for image enhancement**, Su Xue, Minghui Tan, Yale Univ. (United States); Ann McNamara, Texas A&M Univ. (United States); Julie Dorsey, Holly E. Rushmeier, Yale Univ. (United States) ..... [9014-38]

11:50 pm: **Perceptual evaluation of colorized nighttime imagery**, Alexander Toet, Michael J. de Jong, Maarten A. Hogervorst, TNO Defence, Security and Safety (Netherlands); Ignace T.C. Hooge, Utrecht Univ. (Netherlands) ..... [9014-39]

Lunch Break ..... Thu 12:10 pm to 2:00 pm

## Session 9

**Location: Plaza A** ..... Thu 2:00 pm to 3:40 pm

### **Art, Perception, and Pictorial Space**

Session Chair: **Huib de Ridder**, Technische Univ. Delft (Netherlands)

2:00 pm: **Reaching into pictorial spaces**, Robert Volcic, Istituto Italiano di Tecnologia (Italy); Dhanraj Vishwanath, Univ. of St. Andrews (United Kingdom); Fulvio Domini, Istituto Italiano di Tecnologia (Italy) and Brown Univ. (United States) ..... [9014-40]

2:20 pm: **A framework for the study of vision in active observers**, Carlo Nicolini, Istituto Italiano di Tecnologia (Italy); Carlo Fantoni, Istituto Italiano di Tecnologia (Italy) and Univ. degli Studi di Trieste (Italy); Giovanni Mancuso, Robert Volcic, Istituto Italiano di Tecnologia (Italy); Fulvio Domini, Istituto Italiano di Tecnologia (Italy) and Brown Univ. (United States) ..... [9014-41]

2:40 pm: **Shadows in pictorial space**, Maarten W. A. Wijnjtes, Huib de Ridder, Technische Univ. Delft (Netherlands) ..... [9014-42]

3:00 pm: **3D space perception as embodied cognition in the history of art images**, Christopher W. Tyler, The Smith-Kettlewell Eye Research Institute (United States) ..... [9014-43]

3:20 pm: **Learning to draw and how it changes the brain**, Lora T. Likova, The Smith-Kettlewell Eye Research Institute (United States) . . . . [9014-44]

Coffee Break ..... Thu 3:30 pm to 4:00 pm

**Location: Plaza A** ..... 4:00 pm to 5:00 pm

### **Discussion Session**

*An interactive discussion of the day's papers, where authors and members of the multidisciplinary HVEI community can examine the work, and its implications, more deeply.*

**Location: Plaza A** ..... 5:00 pm to 8:00 pm

### **Museum Visit: Exploratorium**

*Details regarding the museum visit to be announced. Visit [www.exploratorium.edu](http://www.exploratorium.edu) for details about the Exploratorium.*

# Conference 9015 • Location: Golden Gate 6

Monday–Wednesday 3–5 February 2014 • Proceedings of SPIE Vol. 9015

## Color Imaging XIX: Displaying, Processing, Hardcopy, and Applications

*Conference Chairs:* **Reiner Eschbach**, Xerox Corp. (United States); **Gabriel G. Marcu**, Apple Inc. (United States); **Alessandro Rizzi**, Univ. degli Studi di Milano (Italy)

*Program Committee:* **Jan Philip Allebach**, Purdue Univ. (United States); **Scott J. Daly**, Dolby Labs., Inc. (United States); **Phil J. Green**, Gjøvik Univ. College (Norway); **Roger D. Hersch**, Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Choon-Woo Kim**, Inha Univ. (Korea, Republic of); **Michael A. Kriss**, MAK Consultants (United States); **Fritz Lebowsky**, STMicroelectronics (France); **Nathan Moroney**, Hewlett-Packard Labs. (United States); **Carinna E. Parraman**, Univ. of the West of England (United Kingdom); **Shoji Tominaga**, Chiba Univ. (Japan); **Stephen Westland**, Univ. of Leeds (United Kingdom)

### Monday 3 February

#### Session 1

**Location: Golden Gate 6 . . . . . Mon 11:00 am to 12:10 pm**

#### Applied Color and Perception

Session Chair: **Reiner Eschbach**, Xerox Corp. (United States)

11:00 am: **Improving information perception from digital images for users with dichromatic color vision**, Omid Shayeghpour, Daniel Nyström, Sasan Gooran, Linköping Univ. (Sweden) . . . . . [9015-1]

11:20 am: **Spectral analysis of omnidirectional color signals in natural scenes**, Shoji Tominaga, Daiki Watanabe, Keita Hirai, Takahiko Horiuchi, Chiba Univ. (Japan) . . . . . [9015-2]

11:40 am: **Realistic fetus skin color processing for ultrasound volume rendering**, Yun-Tae Kim, Samsung Advanced Institute of Technology (Korea, Republic of); Kyuhong Kim, SAMSUNG Electronics Co., Ltd. (Korea, Republic of); Sung-Chan Park, Samsung Advanced Institute of Technology (Korea, Republic of); Jooyoung Kang, Jung-Ho Kim, SAMSUNG Electronics Co., Ltd. (Korea, Republic of) . . . . . [9015-3]

12:00 pm: **What impacts skin color in digital photos?**, Albrecht J. Lindner, Stefan Winkler, Advanced Digital Sciences Ctr. (Singapore) . . . . . [9015-4]

Lunch Break . . . . . Mon 12:20 pm to 2:00 pm

#### Session 2

**Location: Plaza B . . . . . Mon 2:00 pm to 5:40 pm**

#### Material Colors: Joint Session with Conferences 9015 and 9018

Session Chairs: **Maria V. Ortiz Segovia**, Océ Print Logic Technologies (France); **Jon Yngve Hardeberg**, Gjøvik Univ. College (Norway)

2:00 pm: **Colour printing 7.0: goals, challenges, and accomplishments (Invited Paper)**, Jon Yngve Hardeberg, Gjøvik Univ. College (Norway) . . . . . [9018-10]

2:30 pm: **Microscale halftone color image analysis: perspective of spectral color prediction modeling**, G. M. Atiqur Rahaman, Ole L. Norberg, Per Edström, Mid Sweden Univ. (Sweden) . . . . . [9015-5]

2:50 pm: **Reproducing the old masters: applying colour mixing and painting methodologies to inkjet printing**, Melissa K. Olen, Univ. of the West of England (United Kingdom); Joseph Padfield, The National Gallery (United Kingdom); Carinna E. Parraman, Univ. of the West of England (United Kingdom) . . . . . [9015-6]

3:10 pm: **Color prediction modeling for five-channel CMYk printing**, Yuan Yuan Qu, Paula Zitinski Elias, Sasan Gooran, Linköping Univ. (Sweden) . . . . . [9015-7]

Coffee Break . . . . . Mon 3:30 pm to 4:00 pm

4:00 pm: **Physical and optical dot gain: characterization and relation to dot shape and paper properties**, Mahziar Namedanian, Daniel Nyström, Paula Zitinski Elias, Sasan Gooran, Linköping Univ. (Sweden) . . . . . [9015-8]

4:20 pm: **Estimating Neugebauer primaries for multi-channel spectral printing modeling**, Radovan Slavuj, Ludovic G. Coppel, Gjøvik Univ. College (Norway); Melissa Olen, University of the West of England (United Kingdom); Jon Yngve Hardeberg, Gjøvik Univ. College (Norway) [9018-11]

4:40 pm: **An interactive tool for gamut masking**, Ying Song, Cheryl Lau, Sabine Süssstrunk, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [9018-12]

5:00 pm: **A new connection space for low-dimensional spectral color management**, Steven Le Moan, Technische Univ. Darmstadt (Germany); Philipp Urban, Fraunhofer-Institut für Graphische Datenverarbeitung (Germany) . . . . . [9018-13]

5:20 pm: **Extension of Murray-Davies tone reproduction model by adding edge effect of halftone dots**, G. M. Atiqur Rahaman, Ole L. Norberg, Per Edström, Mid Sweden Univ. (Sweden) . . . . . [9018-14]

### Tuesday 4 February

**Location: Continental Ballroom 5 . . . . . 8:30 am to 9:50 am**

#### Plenary Session and Society Award Presentations

8:30 am: **Using fMRI To Reverse Engineer the Human Visual System (Plenary)**, Jack L. Gallant, Univ. of California, Berkeley (United States) . . . . . [9011-301]

Coffee Break . . . . . Tue 9:50 am to 10:10 am

#### Session 3

**Location: Golden Gate 6 . . . . . Tue 10:10 am to 11:10 am**

#### High Dynamic Range

Session Chair: **Alessandro Rizzi**, Univ. degli Studi di Milano (Italy)

10:10 am: **Gamut mapping in a high-dynamic-range color space**, Jens Preiss, Technische Univ. Darmstadt (Germany); Mark D. Fairchild, James A. Ferwerda, Rochester Institute of Technology (United States); Philipp Urban, Fraunhofer-Institut für Graphische Datenverarbeitung (Germany) . . . . . [9015-9]

10:30 am: **Color preservation for tone reproduction and image enhancement**, Chengho Hsin, Zong Wei Lee, Zheng Zhan Lee, Shaw Jyh Shin, Feng Chia Univ. (Taiwan) . . . . . [9015-10]

10:50 am: **Color signal encoding for high dynamic range and wide color gamut based on human perception**, Mahdi Nezamabadi, Scott Miller, Scott J. Daly, Dolby Labs (United States); Robin Atkins, Dolby Canada Corp. (United States) . . . . . [9015-11]

# Conference 9015 · Location: Golden Gate 6

## Session 4

Location: Golden Gate 6 . . . . . Tue 11:10 am to 12:30 pm

### Processing

Session Chair: **Fritz Lebowsky**, STMicroelectronics (France)

11:10 am: **Design for implementation of color image processing algorithms**, Jamison Whitesell, Dorin Patru, Eli Saber, Rochester Institute of Technology (United States); Gene Roylance, Brad Larson, Hewlett-Packard Co. (United States) . . . . . [9015-12]

11:30 am: **Dynamic histogram equalization based on gray level labeling**, Bongjoe Kim, Samsung Electronics Co., Ltd. (Korea, Republic of); Gi Yeong Gim, Hyung Jun Park, Samsung Digital City (Korea, Republic of) . . . . . [9015-14]

11:50 am: **Slide localization in video sequence by using a rapid and suitable segmentation in marginal space**, Sheetal Rajgure, Vincent Oria, New Jersey Institute of Technology (United States); Pierre Gouton, Univ. de Bourgogne (France) . . . . . [9015-15]

12:10 pm: **SVM-based automatic scanned image classification with quick decision capability**, Cheng Lu, Purdue Univ. (United States); Jerry Wagner, Brandi Pitta, David Larson, Hewlett-Packard Co. (United States); Jan Philip Allebach, Purdue Univ. (United States). . . . . [9015-16]

Lunch Break . . . . . Tue 12:30 pm to 2:00 pm

## Session 5

Location: Golden Gate 6 . . . . . Tue 2:00 pm to 5:10 pm

### Cameras and Displays

Session Chairs: **Gabriel G. Marcu**, Apple Inc. (United States); **Mahdi Nezamabadi**, Dolby Labs (United States)

2:00 pm: **Optimal color temperature adjustment for mobile devices under varying illuminants**, Kyungah Choi, Hyeon-Jeong Suk, KAIST (Korea, Republic of). . . . . [9015-17]

2:20 pm: **Primary selection for uniform display response**, Carlos E. Rodriguez Pardo, Gaurav Sharma, Univ. of Rochester (United States); Xiao-Fan Feng, Sharp Labs. of America, Inc. (United States). . . . [9015-18]

2:40 pm: **Moire reduction using inflection point in frequency domain**, Dae-Chul Kim, Wang-Jun Kyung, Bong-Seok Choi, Yeong-Ho Ha, Kyungpook National Univ. (Korea, Republic of) . . . . . [9015-19]

3:00 pm: **Recalling white point of smartphone under varying illuminants**, Kyungah Choi, Jiho Jang, Hyeon-Jeong Suk, KAIST (Korea, Republic of) . . . . . [9015-20]

Coffee Break . . . . . Tue 3:20 pm to 3:50 pm

3:50 pm: **Evaluation of static color breakup for natural images on field sequential displays**, Jae Uk Kim, Chang Mo Yang, Jang Hyeon Bae, Choon-Woo Kim, Inha Univ. (Korea, Republic of); Ho Seop Lee, Daesik Kim, Samsung Electronics (Korea, Republic of) . . . . . [9015-21]

4:10 pm: **Preserving color fidelity for display devices using scalable memory compression architecture for text, graphics, and video**, Fritz Lebowsky, Marina M. Nicolas, STMicroelectronics (France) . . . . [9015-22]

4:30 pm: **Simplifying irradiance independent color calibration**, Pouya Bastani, Brian V. Funt, Simon Fraser Univ. (Canada) . . . . . [9015-23]

4:50 pm: **Using statistical analysis and artificial intelligence tools for automatic assessment of video sequences**, Brice Ekobo Akoa, Emmanuel Simeu, TIMA Lab. (France); Fritz Lebowsky, STMicroelectronics (France) . . . . . [9015-24]

Location: Continental Ballroom 4 . . . . .5:30 pm to 7:30 pm

### Symposium Demonstration Session

A symposium-wide demonstration session will be open to attendees 5:30 to 7:30 pm Tuesday evening. Demonstrators will provide interactive, hands-on demonstrations of a wide-range of products related to Electronic Imaging.

## Wednesday 5 February

Location: Continental Ballroom 5 . . . . .8:30 am to 9:50 am

### Plenary Session and Conference Award Presentations

8:30 am: **Integrated Imaging: Creating Images from the Tight Integration of Algorithms, Computation, and Sensors (Plenary)**, Charles A. Bouman, Purdue Univ. (United States) . . . . . [9011-300]

Coffee Break . . . . . Wed 9:50 am to 10:10 am

## Session 6

Location: Golden Gate 6 . . . . .Wed 10:10 am to 12:10 pm

### Printing and Halftoning

Session Chair: **Carinna E. Parraman**, Univ. of the West of England (United Kingdom)

10:10 am: **Hybrid halftoning using direct multi-bit search (DMS) screen algorithm**, Kartheek Chandu, Mikel J. Stanich, Ricoh Production Print Solutions, LCC (United States); Chai Wah Wu, Barry M. Trager, IBM Thomas J. Watson Research Ctr. (United States). . . . . [9015-25]

10:30 am: **A Riesz energy based approach to generating dispersed dot patterns for halftoning applications**, Chai Wah Wu, Barry M. Trager, IBM Thomas J. Watson Research Ctr. (United States); Kartheek Chandu, Mikel J. Stanich, Ricoh Production Print Solutions, LLC (United States)[9015-26]

10:50 am: **Yule-Nielsen effect in halftone prints: graphical analysis method and improvement of the Yule-Nielsen transform**, Hebert Mathieu, Univ. de Lyon (France) and Institut d'Optique Graduate School (France) . . . . . [9015-27]

11:10 am: **Irregular clustered-dot periodic halftone screen design**, Chuohao Tang, Purdue Univ. (United States); Alex Veis, Hewlett-Packard Scitex, Ltd. (Israel); Robert A. Ulichney, Hewlett-Packard Labs. (United States); Jan P. Allebach, Purdue Univ. (United States). . . . . [9015-28]

11:30 am: **Effect of image capture device on the accuracy of black-box printer models**, Jason Youn, Jian Sun, Yanling Ju, Purdue Univ. (United States); Tamar Kashti, Tal Frank, Dror Kella, Hewlett-Packard Indigo Ltd. (Israel); Mani Fischer, Hewlett-Packard Labs. Israel Ltd. (Israel); Robert Ulichney, Hewlett-Packard Labs. (United States); Guy Adams, Hewlett-Packard Labs. (United Kingdom); Jan Allebach, Purdue Univ. (United States) . . . . . [9015-29]

11:50 am: **Ink-constrained halftoning with application to QR codes**, Marzieh Bayeh, Univ. of Regina (Canada); Erin Compaan, Univ. of Illinois at Urbana-Champaign (United States); Theodore Lindsey, Univ. of Kansas (United States); Nathan Orlow, Univ. of Illinois at Urbana-Champaign (United States); Stephen Melcer, Simon Fraser Univ. (Canada); Zachary Voller, Iowa State Univ. (United States). . . . . [9015-30]

Lunch Break . . . . .Wed 12:10 pm to 2:00 pm

## Session 7

Location: Golden Gate 6 . . . . .Wed 2:00 pm to 3:20 pm

### The Dark Side of Color

Session Chair: **Reiner Eschbach**, Xerox Corp. (United States)

2:00 pm: **ColorChecker at the beach: dangers of sunburn and glare** (*Invited Paper*), John J. McCann, McCann Imaging (United States) . . . . . [9015-31]

2:20 pm: **The bright future of metameric blacks** (*Invited Paper*), Philipp Urban, Fraunhofer Institute for Computer Graphics Research IGD (Germany) . . . . . [9015-32]

2:40 pm: **Can color management and anaglyph 3D images be friends once more?** (*Invited Paper*), Andrew J. Woods, Curtin Univ. (Australia) . . . . . [9015-33]

3:00 pm: **Feeling edgy about color blindness** (*Invited Paper*), Reiner Eschbach, Stephen C. Morgana, Xerox Corp. (United States); Anna Quaranta, Cristian Bonanomi, Alessandro Rizzi, Univ. degli Studi di Milano (Italy) . . . . . [9015-34]

# Conference 9016 • Location: Golden Gate 8

Monday–Wednesday 3–5 February 2014 • Proceedings of SPIE Vol. 9016

## Image Quality and System Performance XI

Conference Chairs: **Sophie Triantaphillidou**, Univ. of Westminster (United Kingdom); **Mohamed-Chaker Larabi**, Univ. de Poitiers (France)

Program Committee: **Nicolas Bonnier**, Canon Australia Pty. Ltd. (Australia); **Peter D. Burns**, Burns Digital Imaging (United States); **Majed Chambah**, Univ. 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 Corp. (United States); **Robin B. Jenkin**, Apple, Inc. (United States); **Elaine W. Jin**, Marvel Semiconductor (United States); **Sang Ho Kim**, Samsung Digital City (Korea, Republic of); **Toshiya Nakaguchi**, Chiba Univ. (Japan); **Göte S. Nyman**, Univ. 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)

### Monday 3 February

Location: Golden Gate 8 ..... 8:20 am to 8:30 am

#### Opening Remarks

Session Chairs: **Sophie Triantaphillidou**, Univ. of Westminster (United Kingdom); **Mohamed-Chaker Larabi**, XLIM-SIC (France)

#### Session 1

Location: Golden Gate 8 ..... Mon 8:30 am to 9:50 am

#### Perceptual Image Quality and Imaging Performance

Session Chair: **Peter D. Burns**, Burns Digital Imaging (United States)

8:30 am: **Just noticeable differences in perceived image contrast with changes in displayed image size**, Jae Young Park, Sophie Triantaphillidou, Ralph E. Jacobson, Univ. of Westminster (United Kingdom) ..... [9016-1]

8:50 am: **The subjective importance of noise spectral content**, Donald J. Baxter, STMicroelectronics Ltd. (United Kingdom); Jonathan B. Phillips, NVIDIA Corp. (United States); Hugh Denman, Google (United States) ..... [9016-2]

9:10 am: **Spatial contrast sensitivity and discrimination in pictorial images**, Sophie Triantaphillidou, John Jarvis, Gaurav Gupta, Univ. of Westminster (United Kingdom) ..... [9016-3]

9:30 am: **Evolution of slanted edge gradient SFR measurement**, Donald R. Williams, Image Science Associates (United States); Peter D. Burns, Burns Digital Imaging (United States) ..... [9016-5]

Coffee Break ..... Mon 9:50 am to 10:30 am

#### Session 2

Location: Golden Gate 8 ..... Mon 10:30 am to 11:50 am

#### Print Quality I

Session Chair: **Susan P. Farnand**, Rochester Institute of Technology (United States)

10:30 am: **Evaluation of perceptual resolution of printed matter (Fogra L-Score evaluation)**, Thomas Liensberger, BARBIERI electronic snc (Italy); Andreas Kraushaar, Fogra-Forschungsgesellschaft Druck e.V. (Germany) ..... [9016-6]

10:50 am: **Automated measurement of printer effective addressability**, Brian E. Cooper, Ahmed H. Eid, Edward E Rippetoe, Lexmark International, Inc. (United States) ..... [9016-7]

11:10 am: **Perceptual metrics and visualization tools for evaluation of page uniformity**, Minh Q. Nguyen, Purdue Univ. (United States); Renee Jessome, Stephen Astling, Eric Maggard, Terry Nelson, Mark Shaw, Hewlett-Packard Co. (United States); Jan P. Allebach, Purdue Univ. (United States) ..... [9016-8]

11:30 am: **On the analysis of wavelet-based approaches for print mottle artifacts**, Ahmed H. Eid, Brian E. Cooper, Lexmark International, Inc. (United States) ..... [9016-9]

Lunch Break ..... Mon 11:50 am to 12:50 pm

#### Session 3

Location: Golden Gate 8 ..... Mon 12:50 pm to 2:10 pm

#### Print Quality II

Session Chair: **Sang Ho Kim**, Samsung Digital City (Korea, Republic of)

12:50 pm: **MFP scanner diagnostics using a self-printed target to measure the modulation transfer function**, Weibao Wang, Purdue Univ. (United States); Peter Bauer, Jerry K. Wagner, Hewlett-Packard Co. (United States); Jan P. Allebach, Purdue Univ. (United States) .. [9016-10]

1:10 pm: **High-performance automatic cropping and deskew of multiple objects on scanned images**, Ilya Kurilin, Samsung Advanced Institute of Technology (Russian Federation); Ilia V. Safonov, Nokia R&D Ctr. (Russian Federation); Michael N. Rychagov, Samsung R&D Institute (Russian Federation); Ho Keun Lee, Sang Ho Kim, Samsung Digital City (Korea, Republic of) ..... [9016-11]

1:30 pm: **Visual quality of printed surfaces: study of homogeneity**, David Nébouy, Mathieu Hébert, Thierry T. Fournel, Lab. Hubert Curien (France); Jean-Luc Lesur, Gemalto (Gémenos) (France) ..... [9016-12]

1:50 pm: **A computational texture masking model for natural images based on adjacent visual channel inhibition**, Yucheng Liu, Jan P. Allebach, Purdue Univ. (United States) ..... [9016-13]

#### Session 4

Location: Continental

Ballroom 5 ..... Mon 2:20 pm to 5:00 pm

#### Image Quality Evaluation Methods/Standards for Mobile and Digital Photography: Joint Session with Conferences 9016 and 9023

Session Chairs: **Dietmar Wüller**, Image Engineering GmbH & Co. KG (Germany); **Sophie Triantaphillidou**, Univ. of Westminster (United Kingdom); **Robin B. Jenkin**, Aptina Imaging Corp. (United States)

2:20 pm: **No training blind image quality assessment**, Ying Chu, Xi'an Jiaotong Univ. (China) and Shenzhen Univ. (China); Xuanqin Mou, Xi'an Jiaotong Univ. (China); Zhen Ji, Shenzhen Univ. (China) ..... [9023-10]

2:40 pm: **Description of texture loss using the dead leaves target: current issues and a new intrinsic approach**, Uwe Artmann, Leonie Kirk, Image Engineering GmbH & Co. KG (Germany) ..... [9023-11]

3:00 pm: **Electronic trigger for capacitive touchscreen and extension of ISO 15781 standard time lags measurements to smartphones**, François-Xavier Bucher, Frédéric Cao, Clément Viard, Frédéric Guichard, DxO Labs (France) ..... [9023-12]

Coffee Break ..... Mon 3:20 pm to 3:40 pm

3:40 pm: **JPEG ringing artifact visibility evaluation**, Sirui Hu, Zygmunt Pizlo, Jan P. Allebach, Purdue Univ. (United States) ..... [9016-14]

4:00 pm: **Mobile phone camera benchmarking: combination of camera speed and image quality**, Veli-Tapani Peltoketo, Sofica Ltd. (Finland) ..... [9016-15]

# Conference 9016 · Location: Golden Gate 8

4:20 pm: **Device and algorithms for camera timing evaluation**, Lucie Masson, Frédéric Cao, Clément Viard, Frédéric Guichard, DxO Labs (France) . . . . . [9016-16]

4:40 pm: **Embedded signal approach to image texture reproduction analysis**, Peter D. Burns, Burns Digital Imaging (United States); Donald J. Baxter, STMicroelectronics Ltd. (United Kingdom). . . . . [9016-17]

## PANEL DISCUSSION

**Location: Golden Gate 8 . . . . . 5:10 pm to 5:40 pm**

**Panel Discussion: Print Quality and Performance**

## Tuesday 4 February

**Location: Continental Ballroom 5 . . . . . 8:30 am to 9:50 am**

### Plenary Session and Society Award Presentations

8:30 am: **Using fMRI To Reverse Engineer the Human Visual System (Plenary)**, Jack L. Gallant, Univ. of California, Berkeley (United States) . . . . . [9011-301]

Coffee Break . . . . . Tue 9:50 am to 10:20 am

### Session 5

**Location: Golden Gate 8 . . . . . Tue 10:20 am to 11:00 am**

#### Keynote Session

Session Chairs: **Sophie Triantaphillidou**, Univ. of Westminster (United Kingdom); **Mohamed-Chaker Larabi**, XLIM-SIC (France)

10:20 am: **Perceptual tools for quality-aware video networks**, Alan C. Bovik, The Univ. of Texas at Austin (United States) . . . . . [9016-18]

### Session 6

**Location: Golden Gate 8 . . . . . Tue 11:00 am to 12:20 pm**

#### Subjective Video Quality Methodologies

Session Chair: **Göte S. Nyman**, Univ. of Helsinki (Finland)

11:00 am: **On the definition of adapted audio/video profiles for high-quality video calling services over LTE/4G**, Maty Ndiaye, Catherine Quinquis, lab'Orange (France); Mohamed-Chaker Larabi, Univ. de Poitiers (France); Gwenael Le Lay, lab'Orange (France); Abdelhakim Saadane, Univ. de Nantes (France); Clency Perrine, Univ. de Poitiers (France) . . . . . [9016-19]

11:20 am: **Subjective quality assessment of an adaptive video streaming model**, Samira Tavakoli, Univ. Politécnica de Madrid (Spain); Kjell E. Brunström, Kun Wang, Acreo Swedish ICT AB (Sweden), Mid Sweden Univ. (Sweden); Börje Andrén, Acreo Swedish ICT AB (Sweden); Narciso García Santos, Univ. Politécnica de Madrid (Spain); Narciso García, Univ Politécnica de Madrid (Spain). . . . . [9016-20]

11:40 am: **Video interpretability rating scale under network impairments**, Thomas Kreitmair, Cristian Coman, NATO Communication and Information Agency (Netherlands) . . . . . [9016-21]

12:00 pm: **Multimodal video quality assessment for talking face analysis**, Naty Ould Sidaty, Mohamed-Chaker Larabi, XLIM-SIC (France) . . . . . [9016-22]

Lunch Break . . . . . Tue 12:20 pm to 1:50 pm

### Session 7

**Location: Golden Gate 8 . . . . . Tue 1:50 pm to 3:10 pm**

#### Objective Video Quality Metrics

Session Chair: **Elaine W. Jin**, Aptina Imaging Corp. (United States)

1:50 pm: **Breaking down the problem of blind video quality evaluation**, Michele Saad, Intel Corp. (United States) and The Univ. of Texas at Austin (United States); Alan C. Bovik, The Univ. of Texas at Austin (United States) . . . . . [9016-23]

2:10 pm: **Incorporating visual attention models into video quality metrics**, Wellington Y. L. Akamine, Mylene C. Q. Farias, Univ. de Brasilia (Brazil) . . . . . [9016-24]

2:30 pm: **An objective model for audio-visual quality**, Helard B. Martinez, Mylene C. Q. Farias, Univ. de Brasilia (Brazil) . . . . . [9016-25]

2:50 pm: **Efficient measurement of stereoscopic 3D video content issues**, Stefan Winkler, Advanced Digital Sciences Ctr. (Singapore) and Cheetah Technologies (United States) . . . . . [9016-26]

Coffee Break . . . . . Tue 3:10 pm to 4:00 pm

### Session 8

**Location: Golden Gate 8 . . . . . Tue 4:00 pm to 5:20 pm**

#### System Performance

Session Chair: **Luke C. Cui**, Lexmark International, Inc. (United States)

4:00 pm: **Image characterization of row and column defect correction**, Kaushik Atmanadhan, Ramkumar Narayanswamy, Aptina Imaging Corp. (United States) . . . . . [9016-28]

4:20 pm: **Analysis of noise power spectrum of gamma rays camera**, Hongwei Xie, Faqiang Zhang, Jianhua Zhang, Jinchuan Chen, Institute of Nuclear Physics and Chemistry (China); Linbo Li, Institute of Nuclear Physics and Chemistry (China) . . . . . [9016-29]

4:40 pm: **Analysis on relation between Hartmann-Shack wavefront detection error and image restoration quality**, Qi Li, Zhihai Xu, Huajun Feng, Yueting Chen, Yuhua Yu, Zhejiang Univ. (China) . . . . . [9016-30]

5:00 pm: **Implementation of an image signal processor for reconfigurable processors**, Seung-Hyun Choi, Kwangwoon Univ. (Korea, Republic of); Junguk Cho, Samsung Digital City (Korea, Republic of); Yong-Min Tai, SAMSUNG Electronics Co., Ltd. (Korea, Republic of); Seong-Won Lee, Kwangwoon Univ. (Korea, Republic of). . . . . [9016-31]

**Location: Continental Ballroom 4 . . . . . 5:30 pm to 7:30 pm**

#### Symposium Demonstration Session

A symposium-wide demonstration session will be open to attendees 5:30 to 7:30 pm Tuesday evening. Demonstrators will provide interactive, hands-on demonstrations of a wide-range of products related to Electronic Imaging.

# Conference 9016 · Location: Golden Gate 8

## Wednesday 5 February

Location: Continental Ballroom 5 . . . . . 8:30 am to 9:50 am

### Plenary Session and Conference Award Presentations

8:30 am: **Integrated Imaging: Creating Images from the Tight Integration of Algorithms, Computation, and Sensors** (*Plenary*), Charles A. Bouman, Purdue Univ. (United States) . . . . . [9011-300]

Coffee Break . . . . . Wed 9:50 am to 10:10 am

### Session 9

Location: Plaza A . . . . . Wed 10:10 am to 12:10 pm

#### Methodologies for Quantifying Perceptual Quality: Joint Session with Conferences 9014 and 9016

Session Chairs: **Mohamed-Chaker Larabi**, XLIM-SIC (France); **Thrasyvoulos N. Pappas**, Northwestern Univ. (United States)

10:10 am: **Noisy images-JPEG compressed: subjective and objective image quality evaluation**, Silvia Corchs, Francesca Gasparini, Raimondo Schettini, Univ. degli Studi di Milano-Bicocca (Italy) . . . . . [9016-32]

10:30 am: **Perceptibility and acceptability of JPEG 2000 compressed images of various scene types**, Elizabeth Allen, Sophie Triantaphillidou, Ralph E. Jacobson, Univ. of Westminster (United Kingdom) . . . . [9016-33]

10:50 am: **X-eye: a reference format for eye tracking data to facilitate analysis across databases**, Stefan Winkler, Subramanian Ramanathan, Advanced Digital Sciences Ctr. (Singapore) . . . . . [9014-21]

11:10 am: **A new image quality assessment database for tiled images**, Steven McFadden, Paul A. S. Ward, Univ. of Waterloo (Canada) . [9016-34]

11:30 am: **Modeling the leakage of LCD displays with local backlight for quality assessment**, Claire Mantel, Jari Korhonen, DTU Fotonik (Denmark); Jesper M. Pedersen, Soren Bech, Bang & Olufsen A/S (Denmark); Ehsan Nadernejad, Nino Burini, Søren O. Forchhammer, DTU Fotonik (Denmark) . . . . . [9014-22]

11:50 am: **On improving the pooling in HDR-VDP-2 towards better HDR perceptual quality assessment**, Manish Narwaria, Matthieu Perreira Da Silva, Patrick Le Callet, Romuald Pepion, Institut de Recherche en Communications et en Cybernétique de Nantes (France) . . . . . [9014-23]

# Conference 9017 • Location: Golden Gate 7

Monday–Wednesday 3–5 February 2014 • Proceedings of SPIE Vol. 9017

## Visualization and Data Analysis 2014

**Conference Chairs:** Pak Chung Wong, Pacific Northwest National Lab. (United States); David L. Kao, NASA Ames Research Ctr. (United States); Ming C. Hao, Hewlett-Packard Labs. (United States); Chaomei Chen, Drexel Univ. (United States)

**Conference Co-Chairs:** Christopher G. Healey, North Carolina State Univ. (United States); Mark A. Livingston, U.S. Naval Research Lab. (United States); Ian Roberts, Pacific Northwest National Lab. (United States); Thomas Wischgoll, Wright State Univ. (United States)

**Program Committee:** Madjid Alili, Bishop's Univ. (Canada); Barry G. Becker, Pros (United States); Daniel Cernea, Technische Univ. Kaiserslautern (Germany); Remco Chang, Tufts Univ. (United States); Guoning Chen, Univ. of Houston (United States); Yi-Jen Chiang, Polytechnic Institute of New York Univ. (United States); Hank Childs, Univ. of Oregon (United States); Jaegul Choo, Georgia Institute of Technology (United States); Sussan Einakian, The Univ. of Alabama in Huntsville (United States); Christoph Garth, Technische Univ. Kaiserslautern (Germany); John Gerth, Stanford Univ. (United States); Matti T. Gröhn, Finnish Institute of Occupational Health (Finland); Andreas Kerren, Linnaeus Univ. (Sweden); Halldor Janetzko, Univ. Konstanz (Germany); Ming Jiang, Lawrence Livermore National Lab. (United States); Alark Joshi, Boise State Univ. (United States); Robert R. Lewis, Washington State Univ. (United States); Guo-Shi Li, Exxon Mobil Corp. (United States); Peter Lindstrom, Lawrence Livermore National Lab. (United States); Lars Linsen, Jacobs Univ. Bremen gGmbH (Germany); Zhanping Liu, Kentucky State Univ. (United States); Aidong Lu, The Univ. of North Carolina at Charlotte (United States); Richard May, Pacific Northwest National Lab. (United States); Harald Obermaier, Univ. of California, Davis (United States); Donald A. Pellegrino, The Dow Chemical Co. (United States); Theresa-Marie Rhyne, Computer Graphics and E-Learning (United States); Tobias Schreck, Univ. Konstanz (Germany); Chad A. Steed, Oak Ridge National Lab. (United States); Kalpathi R. Subramanian, The Univ. of North Carolina at Charlotte (United States); Shigeo Takahashi, The Univ. of Tokyo (Japan); Chaoli Wang, Michigan Technological Univ. (United States); Ming-Hsuan Yang, Univ. of California, Merced (United States); Caroline Ziemkiewicz, Brown Univ. (United States)



Sponsored by:



### Monday 3 February

Location: Golden Gate 7 .....8:30 am to 8:40 am

#### Opening Remarks

Session Chair: Pak Chung Wong, Pacific Northwest National Lab. (United States)

#### Session 1

Location: Golden Gate 7 ..... Mon 8:40 am to 9:30 am

#### Biomedical Visualization

Session Chair: Thomas Wischgoll, Wright State Univ. (United States)

8:40 am: **FilooT: a visualization tool for exploring genomic data**, Mahshid Zeinaly, Mina Soltangheis, Christopher D. Shaw, Simon Fraser Univ. (Canada) ..... [9017-1]

9:05 am: **A framework for analysis of the upper airway from real-time MRI sequences**, Samuel de Sousa Silva, António L. J. Teixeira, Univ. de Aveiro (Portugal) ..... [9017-2]

#### Session 2

Location: Golden Gate 7 ..... Mon 9:30 am to 10:20 am

#### Cyber Security and Visualization

Session Chair: Thomas Wischgoll, Wright State Univ. (United States)

9:30 am: **VAFLE: visual analytics of firewall log events**, Mohammad Ghoniem, Ctr. de Recherche Public - Gabriel Lippmann (Luxembourg); Georgiy Shurkhovetsky, Modern Sciences and Arts Univ. (Egypt); Ahmed Bahey, Nile Univ. (Egypt); Benoît Otjacques, Ctr. de Recherche Public - Gabriel Lippmann (Luxembourg) ..... [9017-3]

9:55 am: **Configurable IP-space maps for large-scale, multi-source network data visual analysis and correlation**, Scott B. Miserendino, Corey Maynard, William E. Freeman, Northrop Grumman Corp. (United States) ..... [9017-4]

Coffee Break ..... Mon 10:20 am to 10:50 am

#### Session 3

Location: Golden Gate 7 ..... Mon 10:50 am to 11:40 am

#### Text Data Mining and Visualization

Session Chair: Ming C. Hao, Hewlett-Packard Labs. (United States)

10:50 am: **The CZSaw notes case study**, Eric Lee, Ankit Gupta, David Darvill, John C. Dill, Christopher D. Shaw, Robert Woodbury, Simon Fraser Univ. (Canada) ..... [9017-5]

11:15 am: **Linked visual analysis of structured datasets and document collections**, Sebastin Kolman, Ekaterina Galkina, Andrew S. Duffille, Yen Fu Luo, Vivek Gupta, Georges G. Grinstein, Univ. of Massachusetts Lowell (United States) ..... [9017-6]

#### Session 4

Location: Golden Gate 7 ..... Mon 11:40 am to 12:30 pm

#### Web-Based Visualization

Session Chair: Ming C. Hao, Hewlett-Packard Labs. (United States)

11:40 am: **A reference web architecture and patterns for real-time visual analytics on large streaming data**, Eser Kandogan, Danny Soroker, Steven Rohall, IBM Corp. (United States); Peter Bak, IBM Corp. (Israel); Frank van Ham, IBM Corp. (Netherlands); Jie Lu, IBM Corp. (United States); Harold J. Ship, IBM Corp. (Israel); Chun-Fu Wang, Univ. of California, Davis (United States); Jennifer Lai, IBM Corp. (United States) ..... [9017-7]

12:05 pm: **Visualizing confusion matrices for multidimensional signal detection correlational methods**, Yue Zhou, Thomas Wischgoll, Wright State Univ. (United States); Leslie M. Blaha, Air Force Research Lab. (United States); Ross A. Smith, Rhonda J. Vickery, Dynamics Research Corp. (United States) ..... [9017-8]

Lunch Break ..... Mon 12:30 pm to 2:00 pm

# Conference 9017 • Location: Golden Gate 7

**Location: Golden Gate 7 .....2:00 pm to 3:00 pm**

## Keynote Session I

Session Chair: **Pak Chung Wong**, Pacific Northwest National Lab. (United States)

2:00 pm: **What makes cybersecurity visualizations different from other types of visualization** (*Keynote Presentation*), Pak Chung Wong, Pacific Northwest National Lab. (United States)..... [9017-9]

## Session 5

**Location: Golden Gate 7 ..... Mon 3:00 pm to 3:25 pm**

### Machine Learning and Data Mining

Session Chair: **Pak Chung Wong**, Pacific Northwest National Lab. (United States)

3:00 pm: **User-driven sampling strategies in image exploitation**, Neal Harvey, Reid B. Porter, Los Alamos National Lab. (United States)[9017-10]

Coffee Break ..... Mon 3:25 pm to 4:00 pm

**Location: Golden Gate 7 .....4:00 pm to 5:25 pm**

### Poster Fast Forward I

Session Chair: **David L. Kao**, NASA Ames Research Ctr. (United States)

*In addition to their interactive paper presentations, the interactive paper authors will provide short oral presentations during the conference.*

## Tuesday 4 February

**Location: Continental Ballroom 5 .....8:30 am to 9:50 am**

### Plenary Session and Society Award Presentations

8:30 am: **Using fMRI To Reverse Engineer the Human Visual System** (*Plenary*), Jack L. Gallant, Univ. of California, Berkeley (United States)..... [9011-301]

## Session 6

**Location: Golden Gate 7 ..... Tue 10:20 am to 11:35 am**

### User Interface and Interaction

Session Chair: **Ming C. Hao**, Hewlett-Packard Labs. (United States)

10:20 am: **Collaborative data analysis with smart tangible devices**, Johannes Fuchs, Roman Rädle, Dominik Sacha, Fabian Fischer, Andreas Stoffel, Univ. Konstanz (Germany) ..... [9017-11]

10:45 am: **Visualization of off-screen data on tablets using context-providing bar graphs and scatter plots**, Peter S. Games, Alark Joshi, Boise State Univ. (United States) ..... [9017-12]

11:10 am: **HyFinBall: a two-handed, hybrid 2D/3D desktop VR interface for multi-dimensional visualization**, Isaac Cho, Xiaoyu Wang, Zachary J. Wartell, The Univ. of North Carolina at Charlotte (United States) . [9017-13]

## Session 7

**Location: Golden Gate 7 ..... Tue 11:35 am to 12:25 pm**

### Time Series Data Visualization and Analysis

Session Chair: **Ming C. Hao**, Hewlett-Packard Labs. (United States)

11:35 am: **Visualizing trends and clusters in ranked time-series data**, Michael B. Gousie, John Grady, Melissa Branagan, Wheaton College (United States)..... [9017-14]

12:00 pm: **Relating interesting quantitative time series patterns with text events and text features**, Franz Wanner, Tobias Schreck, Wolfgang Jentner, Lyubka Sharalieva, Daniel A. Keim, Univ. Konstanz (Germany) ..... [9017-15]

Lunch Break ..... Tue 12:25 pm to 2:00 pm

**Location: Golden Gate 7 .....2:00 pm to 3:00 pm**

### Keynote Session II

2:00 pm: **Just-in-time visual analytics and discovery** (*Keynote Presentation*), Eser Kandogan, IBM Almaden Research Ctr. (United States)..... [9017-16]

## Session 8

**Location: Golden Gate 7 ..... Tue 3:00 pm to 3:25 pm**

### Multidimensional Data Visualization

3:00 pm: **Visualization of multidimensional data with collocated paired coordinates and general line coordinates**, Boris Kovalevich, Central Washington Univ. (United States) ..... [9017-17]

Coffee Break ..... Tue 3:25 pm to 4:00 pm

**Location: Golden Gate 7 .....4:00 pm to 5:25 pm**

### Poster Fast Forward II

Session Chair: **Christopher D. Shaw**, Simon Fraser Univ. (Canada)

*In addition to their interactive paper presentations, the interactive paper authors will provide short oral presentations during the conference.*

### Interactive Paper Session-Tuesday

*Interactive papers will be placed on display after 3:30 pm on Tuesday. An interactive paper session, with authors present at their papers, will be held Tuesday evening, 5:30 to 6:45 pm. Refreshments will be served.*

**Location: Continental Ballroom and**

**Golden Gate Foyers ..... 5:30 pm to 6:45 pm**

**Evaluation in visualization: some issues and best practices**, Beatriz Sousa Santos, Paulo M. Dias, Univ. de Aveiro (Portugal) ..... [9017-23]

**Interactive word cloud for analyzing reviews**, HyunRyong Jung, FactSet Research Systems Inc. (United States)..... [9017-24]

**Stars advantages vs parallel coordinates (shape perception as visualization reserve)**, Vladimir Grishin, View Trends International (United States) ..... [9017-25]

**Possibility space for GIS suitability analysis**, Wutthigrai Boonsuk, Eastern Illinois Univ. (United States); Chris Harding, Univ. of Iowa (United States) ..... [9017-26]

**Improving chemical mapping algorithm and visualization in full-field hard x-ray spectroscopic imaging**, Cheng Chang, Wei Xu, Yu-Chen K. Chen-Wiegart, Jun Wang, Dantong Yu, Brookhaven National Lab. (United States) ..... [9017-27]

**Progressively consolidating historical visual explorations on new discoveries**, Kaiyu Zhao, Matthew O. Ward, Elke A. Rundensteiner, Huong N. Higgins, Worcester Polytechnic Institute (United States)..... [9017-28]

**Comparative case study between D3 and HighCharts on Lustre data visualization**, Omar M. El-Tayeby, Clark Atlanta Univ. (United States); Dwayne John, The National Institute for Computational Sciences (United States) and The Univ. of Tennessee Knoxville (United States); Pragnesh Patel, Scott Simmerman, The National Institute for Computational Sciences (United States) . . . . . [9017-29]

**Spatial partitioning algorithms for data visualization**, Raghuvveer Devulapalli, Mikael Quist, John G. Carlsson, Univ. of Minnesota (United States) . . . . . [9017-30]

**Visualization of probabilistic relationships in shape-maturity data for lunar craters**, Prasun Mahanti, Mark S. Robinson, Arizona State Univ. (United States) . . . . . [9017-31]

**SocialMood: an information visualization tool to measure the mood of the people in social networks**, Guilherme Oliveira de Amorim, Roberto Yuri Silva Franco, Rodolfo Barros Moraes, Bruno Nascimento Figueiredo, João Paulo Miranda dos Santos, José Alfredo Lira Dobrões, Ricardo Alexandre Afonso, Bianchi Serique Meiguins, Information Visualization Group (Brazil) . . . . . [9017-32]

**Technique and cue selection for graphical presentation of generic hyperdimensional data**, Lee M. Howard, Robert P. Burton, Brigham Young Univ. (United States) . . . . . [9017-33]

**Evaluation of stream surfaces using error quantification metrics**, Ayan Biswas, Han-Wei Shen, The Ohio State Univ. (United States) . . . [9017-34]

## Session 10

**Location: Golden Gate 7 . . . . .Wed 11:00 am to 12:15 pm**

### Flow Visualization

Session Chair: **David L. Kao**, NASA Ames Research Ctr. (United States)

11:00 am: **GlyphSea: visualizing vector fields**, Emmett McQuinn, IBM Almaden Research Ctr. (United States); Amit Chourasia, San Diego Supercomputer Ctr. (United States) and Univ. of California, San Diego (United States); Jürgen P. Schulze, California Institute for Telecommunications and Information Technology (United States) and Univ. of California, San Diego (United States); Jean-Bernard Minster, Scripps Institution of Oceanography (United States) and Univ. of California, San Diego (United States) . . . . . [9017-20]

11:25 am: **Simulation and visualization of velocity fields in simple electrokinetic devices**, Prasun Mahanti, Thomas Taylor, Douglas Cochran, Michael Keebaugh, Mark Hayes, Arizona State Univ. (United States) . . . . . [9017-21]

11:50 am: **Streamline similarity analysis using bag-of-features**, Yifei Li, Chaoli Wang, Ching-Kuang Shene, Michigan Technological Univ. (United States) . . . . . [9017-22]

**Location: Golden Gate 7 . . . . .12:15 pm to 12:30 pm**

### Closing Remarks

Session Chair: **Pak Chung Wong**, Pacific Northwest National Lab. (United States)

**Location: Continental Ballroom 4 . . . . .5:30 pm to 7:30 pm**

### Symposium Demonstration Session

A symposium-wide demonstration session will be open to attendees 5:30 to 7:30 pm Tuesday evening. Demonstrators will provide interactive, hands-on demonstrations of a wide-range of products related to Electronic Imaging.

## Wednesday 5 February

**Location: Continental Ballroom 5 . . . . .8:30 am to 9:50 am**

### Plenary Session and Conference Award Presentations

8:30 am: **Integrated Imaging: Creating Images from the Tight Integration of Algorithms, Computation, and Sensors (Plenary)**, Charles A. Bouman, Purdue Univ. (United States) . . . . . [9011-300]

Coffee Break . . . . . Wed 9:50 am to 10:10 am

## Session 9

**Location: Golden Gate 7 . . . . .Wed 10:10 am to 11:00 am**

### Abstract Rendering and Visualization

Session Chair: **David L. Kao**, NASA Ames Research Ctr. (United States)

10:10 am: **Visual abstraction of complex motion patterns**, Halldor Janetzko, Dominik Jäckle, Oliver Deussen, Daniel A. Keim, Univ. Konstanz (Germany) . . . . . [9017-18]

10:35 am: **Abstract rendering: out-of-core rendering for information visualization**, Joseph A. Cottam, Andrew Lumsdaine, Indiana Univ. (United States); Peter Wang, Continuum Analytics (United States)[9017-19]

# Conference 9018 • Location: Plaza B

Monday–Tuesday 3–4 February 2014 • Proceedings of SPIE Vol. 9018

## Measuring, Modeling, and Reproducing Material Appearance

*Conference Chairs:* **Maria V. Ortiz Segovia**, Océ Print Logic Technologies (France); **Philipp Urban**, Fraunhofer-Institut für Graphische Datenverarbeitung (Germany); **Jan P. Allebach**, Purdue Univ. (United States)

*Program Committee:* **Susan P. Farnand**, Rochester Institute of Technology (United States); **James A. Ferwerda**, Rochester Institute of Technology (United States); **Jon Yngve Hardeberg**, Gjøvik Univ. College (Norway); **Andreas Höpe**, Physikalisch-Technische Bundesanstalt (Germany); **E. J. J. Kirchner**, Akzo Nobel Coating B.V. (Netherlands); **Susanne Klein**, Hewlett-Packard Labs. (United Kingdom); **Carinna E. Parraman**, Univ. of the West of England (United Kingdom); **Sabine Süssstrunk**, Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Françoise Viénot**, Muséum National d'Histoire Naturelle (France)

### Monday 3 February

**Location: Plaza B .....8:30 am to 9:10 am**

#### **Keynote Presentation: Joint Session with Conferences 9014 and 9018**

Session Chair: **Jan P. Allebach**, Purdue Univ. (United States)

8:30 am: **Perceiving, measuring, and modeling 3D material appearance** (*Keynote Presentation*), Christopher W. Tyler, Smith-Kettlewell Eye Research Institute (United States) ..... [9018-1]

#### **Session 1**

**Location: Plaza B ..... Mon 9:10 am to 12:30 pm**

#### **Measuring**

Session Chair: **Jan P. Allebach**, Purdue Univ. (United States)

9:10 am: **Rapid determination of the photometric bidirectional scatter distribution function by use of a near field goniophotometer**, Frédéric B. Leloup, Katholieke Univ. Leuven (Belgium); Ward De Ketelaere, ETAP NV (Belgium); Peter Hanselaer, Katholieke Univ. Leuven (Belgium) [9018-2]

9:30 am: **Multidimensional reflectometry for industry (xD-Reflect) an European research project**, Andreas Höpe, Physikalisch-Technische Bundesanstalt (Germany); Annette Koo, Measurement Standards Lab. (New Zealand); Francisco Martinez Verdú, Univ. de Alicante (Spain); Frédéric B. Leloup, Katholieke Univ. Leuven (Belgium); Gaël Obein, Conservatoire National des Arts et Metiers (France); Gerd Wübbeler, Physikalisch-Technische Bundesanstalt (Germany); Joaquin Campos Acosta, Consejo Superior de Investigaciones Científicas (Spain); Paola Iacomussi, Istituto Elettrotecnico Nazionale Galileo Ferraris (Italy); Prit Jaanson, MIKES Mittatekniikan keskus (Finland); Stefan Källberg, SP Technical Research Institute of Sweden (Sweden); Marek Smíd, Czech Metrology Institute (Czech Republic) ..... [9018-3]

9:50 am: **Evaluation of the shape of the specular peak for high glossy surfaces** (*Invited Paper*), Gaël Obein, Shiraz Ouarets, Guillaume Ged, Conservatoire National des Arts et Metiers (France) ..... [9018-4]

Coffee Break ..... Mon 10:20 am to 10:50 am

10:50 am: **Analysis of aberrations and pixel information in goniometric multispectral imaging**, Julie Klein, Georg Schmücking, RWTH Aachen (Germany) ..... [9018-5]

11:10 am: **A line scanner based stereo method for high-resolution 3D reconstruction**, Pengchang Zhang, Yuji Ogane, Jay Arre O. Toque, Yusuke Murayama, Ari Ide-Ektestabi, Kyoto Univ. (Japan) ..... [9018-6]

11:30 am: **An investigation into the micro surface of artworks using alternative lighting techniques**, Flavia Tisato, Univ. degli Studi di Ferrara (Italy); Carinna E. Parraman, Univ. of the West of England (United Kingdom) ..... [9018-7]

11:50 am: **Topographical scanning and reproduction of near-planar surfaces of paintings**, Willemijn Elkhuizen, Tim Zaman, Technische Univ. Delft (Netherlands) ..... [9018-8]

12:10 pm: **State of the art of 3D scanning systems and inspection of textile surfaces**, Miguel Montilla, Sergio A. Orjuela Vargas, Univ. Antonio Nariño (Colombia); Wilfried Phillips, Univ. Gent (Belgium) ..... [9018-9]

Lunch Break ..... Mon 12:30 pm to 2:00 pm

#### **Session 2**

**Location: Plaza B ..... Mon 2:00 pm to 5:40 pm**

#### **Material Colors: Joint Session with Conferences 9015 and 9018**

Session Chairs: **Maria V. Ortiz Segovia**, Océ Print Logic Technologies (France); **Jon Yngve Hardeberg**, Gjøvik Univ. College (Norway)

2:00 pm: **Colour printing 7.0: goals, challenges, and accomplishments** (*Invited Paper*), Jon Yngve Hardeberg, Gjøvik Univ. College (Norway) ..... [9018-10]

2:30 pm: **Microscale halftone color image analysis: perspective of spectral color prediction modeling**, G. M. Atiqur Rahaman, Ole L. Norberg, Per Edström, Mid Sweden Univ. (Sweden) ..... [9015-5]

2:50 pm: **Reproducing the old masters: applying colour mixing and painting methodologies to inkjet printing**, Melissa K. Olen, Univ. of the West of England (United Kingdom); Joseph Padfield, The National Gallery (United Kingdom); Carinna E. Parraman, Univ. of the West of England (United Kingdom) ..... [9015-6]

3:10 pm: **Color prediction modeling for five-channel CMYcLm printing**, Yuan Yuan Qu, Paula Zitinski Elias, Sasan Gooran, Linköping Univ. (Sweden) ..... [9015-7]

Coffee Break ..... Mon 3:30 pm to 4:00 pm

4:00 pm: **Physical and optical dot gain: characterization and relation to dot shape and paper properties**, Mahziar Nemedanian, Daniel Nyström, Paula Zitinski Elias, Sasan Gooran, Linköping Univ. (Sweden) . . . [9015-8]

4:20 pm: **Estimating Neugebauer primaries for multi-channel spectral printing modeling**, Radovan Slavuj, Ludovic G. Coppel, Gjøvik Univ. College (Norway); Melissa Olen, University of the West of England (United Kingdom); Jon Yngve Hardeberg, Gjøvik Univ. College (Norway) [9018-11]

4:40 pm: **An interactive tool for gamut masking**, Ying Song, Cheryl Lau, Sabine Süssstrunk, Ecole Polytechnique Fédérale de Lausanne (Switzerland) ..... [9018-12]

5:00 pm: **A new connection space for low-dimensional spectral color management**, Steven Le Moan, Technische Univ. Darmstadt (Germany); Philipp Urban, Fraunhofer-Institut für Graphische Datenverarbeitung (Germany) ..... [9018-13]

5:20 pm: **Extension of Murray-Davies tone reproduction model by adding edge effect of halftone dots**, G. M. Atiqur Rahaman, Ole L. Norberg, Per Edström, Mid Sweden Univ. (Sweden) ..... [9018-14]

## Tuesday 4 February

**Location: Continental Ballroom 5 . . . . . 8:30 am to 9:50 am**

### Plenary Session and Society Award Presentations

8:30 am: **Using fMRI To Reverse Engineer the Human Visual System (Plenary)**, Jack L. Gallant, Univ. of California, Berkeley (United States) . . . . . [9011-301]

Coffee Break . . . . . Tue 9:50 am to 10:20 am

### Session 3

**Location: Plaza A . . . . . Tue 10:20 am to 12:20 pm**

### Perception and Appearance of Materials: Texture, Luminance, and Noise: Joint Session with Conferences 9014 and 9018

Session Chairs: **Philipp Urban**, Fraunhofer-Institut für Graphische Datenverarbeitung (Germany); **Bernice E. Rogowitz**, Visual Perspectives Consulting (United States)

10:20 am: **Roughness versus contrast in natural textures**, Pubudu M. Silva, Thrasyvoulos N. Pappas, Northwestern Univ. (United States); Huib de Ridder, René van Egmond, Technische Univ. Delft (Netherlands) . . . . . [9014-11]

10:40 am: **Mathematical limitations when choosing psychophysical methods: geometric versus linear grey scales**, Niels Dekker, Akzo Nobel Coating B.V. (Netherlands); Marcel P. Lucassen, LUCASSEN Colour Research (Netherlands); Eric J. J. Kirchner, Akzo Nobel Coating B.V. (Netherlands); Philipp Urban, Fraunhofer-Institut für Graphische Datenverarbeitung (Germany); Rafael Huertas Roa, Univ. de Granada (Spain) . . . . . [9018-15]

11:00 am: **The visual appearance and surface texture of materials according to the old masters**, Carinna E. Parraman, Univ. of the West of England (United Kingdom) . . . . . [9018-16]

11:20 am: **Investigation of visual attention priority in selection of objects with texture, crossed, and uncrossed disparities in 3D images**, Darya Khaustova, Jérôme Fournier, Emmanuel Wyckens, Orange SA (France); Olivier Le Meur, Univ. de Rennes 1 (France) . . . . . [9014-12]

11:40 am: **On pictures and stuff: image quality and material appearance**, James A. Ferwerda, Rochester Institute of Technology (United States) . . . . . [9018-17]

12:00 pm: **Memory texture as a mechanism of improvement in preference by adding noise**, Hiroyuki Kobayashi, Yinzhu Zhao, Naokazu Aoki, Chiba Univ. (Japan) . . . . . [9014-13]

Lunch Break . . . . . Tue 12:20 pm to 1:50 pm

### Session 4

**Location: Plaza B . . . . . Tue 1:50 pm to 3:20 pm**

### Modeling

Session Chair: **Sabine Süsstrunk**, Ecole Polytechnique Fédérale de Lausanne (Switzerland)

1:50 pm: **Modeling cloth at micron resolution (Invited Paper)**, Kavita Bala, Cornell Univ. (United States) . . . . . [9018-18]

2:20 pm: **Towards a better understanding of the color shift of effect coatings by densely sampled spectral BRDF measurement**, Alejandro Ferrero, Berta Bernad, Joaquin Campos Acosta, Consejo Superior de Investigaciones Científicas (Spain); Francisco Javier M. Martinez-Verdu, Esther Perales, Univ. de Alicante (Spain); Ivo van der Lans, Akzo Nobel N.V. (Netherlands); Eric J. J. Kirchner, Akzo Nobel Coating B.V. (Netherlands) . . . . . [9018-19]

2:40 pm: **Lateral light propagation and angular variation of the reflectance of paper**, Ludovic G. Coppel, Gjøvik Univ. College (Norway) . . . . . [9018-20]

3:00 pm: **Printing gloss effects in a 2.5D system**, Teun Baar, Océ Print Logic Technologies (France) and Télécom ParisTech (France); Sepideh Samadzadegan, Technische Univ. Darmstadt (Germany); Maria V. Ortiz Segovia, Océ Print Logic Technologies (France); Philipp Urban, Fraunhofer-Institut für Graphische Datenverarbeitung (Germany); Hans Brettel, Télécom ParisTech (France) . . . . . [9018-21]

Coffee Break . . . . . Tue 3:20 pm to 3:40 pm

### Session 5

**Location: Plaza B . . . . . Tue 3:40 pm to 5:30 pm**

### Reproduction

Session Chair: **Carinna E. Parraman**, Univ. of the West of England (United Kingdom)

3:40 pm: **Measured materials for rendering and visualization: applications, existing approaches, and open challenges (Invited Paper)**, Jan Meseth, RTT AG (Germany) . . . . . [9018-22]

4:10 pm: **Image ghosting reduction in lenticular relief prints**, Teun Baar, Océ Print Logic Technologies (France); Marjan Shahpaski, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Maria V. Ortiz Segovia, Océ Print Logic Technologies (France) . . . . . [9018-23]

4:30 pm: **Continuous tone printing in silicone from CNC milled matrices**, Stephen Hoskins, Peter MacCallion, Univ. of the West of England (United Kingdom) . . . . . [9018-24]

4:50 pm: **Characterization of relief printing**, Xing Liu, Purdue Univ. (United States); Lin Chen, Rochester Institute of Technology (United States); Maria V. Ortiz Segovia, Océ Print Logic Technologies (France); James A. Ferwerda, Rochester Institute of Technology (United States); Jan P. Allebach, Purdue Univ. (United States) . . . . . [9018-25]

5:10 pm: **Method for visualization and presentation of priceless old prints based on precise 3D scan**, Eryk Bunsch, Wilanow Palace Museum (Poland); Robert Sitnik, Warsaw Univ. of Technology (Poland) . . [9018-26]

**Location: Continental Ballroom 4 . . . . . 5:30 pm to 7:30 pm**

### Symposium Demonstration Session

A symposium-wide demonstration session will be open to attendees 5:30 to 7:30 pm Tuesday evening. Demonstrators will provide interactive, hands-on demonstrations of a wide-range of products related to Electronic Imaging.

## Wednesday 5 February

**Location: Continental Ballroom 5 . . . . . 8:30 am to 9:50 am**

### Plenary Session and Conference Award Presentations

8:30 am: **Integrated Imaging: Creating Images from the Tight Integration of Algorithms, Computation, and Sensors (Plenary)**, Charles A. Bouman, Purdue Univ. (United States) . . . . . [9011-300]

# Conference 9019 • Location: Continental Ballroom 1

Monday–Wednesday 3–5 February 2014 • Proceedings of SPIE Vol. 9019

## Image Processing: Algorithms and Systems XII

*Conference Chairs:* **Karen O. Egiazarian**, Tampere Univ. of Technology (Finland); **Sos S. Agaian**, The Univ. of Texas at San Antonio (United States); **Atanas P. Gotchev**, Tampere Univ. of Technology (Finland)

*Program Committee:* **Gözde B. Akar**, Middle East Technical Univ. (Turkey); **Junior Barrera**, Univ. de São Paulo (Brazil); **Jenny Benois-Pineau**, Bordeaux Univ. (France); **Giacomo Boracchi**, Politecnico di Milano (Italy); **Reiner Creutzburg**, Fachhochschule Brandenburg (Germany); **Paul D. Gader**, Univ. of Florida (United States); **John C. Handley**, Xerox Corp. (United States); **Vladimir V. Lukin**, National Aerospace Univ. (Ukraine); **Stephen Marshall**, Univ. of Strathclyde (United Kingdom); **Alessandro Neri**, Univ. degli Studi di Roma Tre (Italy); **Françoise Prêteux**, Mines ParisTech (France); **Gianni Ramponi**, Univ. degli Studi di Trieste (Italy); **Ivan W. Selesnick**, Polytechnic Institute of New York Univ. (United States); **Damir Sersic**, Univ. of Zagreb (Croatia)

### Monday 3 February

#### Session 1

**Location: Continental Ballroom 1 . . Mon 9:00 am to 10:10 am**

#### Image Filtering and Enhancement

Session Chair: **Karen O. Egiazarian**, Tampere Univ. of Technology (Finland)

9:00 am: **On the pass band of light-field displays** (*Invited Paper*), Atanas R. Boev, Robert Bregovic, Tampere Univ. of Technology (Finland) [9019-1]

9:30 am: **A novel method of filtration by the discrete heap transforms**, Artyom M. Grigoryan, Mehdi Hajinorozi, The Univ. of Texas at San Antonio (United States) . . . . . [9019-2]

9:50 am: **Alpha-rooting method of color image enhancement by discrete quaternion Fourier transform**, Artyom M. Grigoryan, Sos S. Agaian, The Univ. of Texas at San Antonio (United States) . . . . . [9019-3]

Coffee Break . . . . . Mon 10:10 am to 10:40 am

#### Session 2

**Location: Continental Ballroom 1 . Mon 10:40 am to 12:10 pm**

#### Interpolation, Motion, Estimation, and Impainting

Session Chair: **Atanas P. Gotchev**, Tampere Univ. of Technology (Finland)

10:40 am: **JEI Multiple description discrete cosine transform-based image coding using DC coefficient relocation and AC coefficient interpolation** (*Invited Paper*), Nafees Mansoor, A. K. M. M. Islam, Univ. Teknologi Malaysia (Malaysia); M. A. Razzak, Independent Univ., Bangladesh (Bangladesh) . . . . . [9019-5]

11:10 am: **Edge preserving motion estimation with occlusions correction for assisted 2D to 3D conversion**, Petr Pohl, Michael Sirotenko, Victor Bucha, Ekaterina Tolstaya, Samsung R&D Institute Rus (Russian Federation) . . . . . [9019-6]

11:30 am: **Exemplar-based inpainting using local binary patterns**, Viacheslav V. Voronin, Vladimir I. Marchuk, Nikolay V. Gapon, Roman A. Sizyakin, Don State Technical Univ. (Russian Federation); Karen O. Egiazarian, Tampere Univ. of Technology (Finland); Aleksandr I. Sherstobitov, Don State Technical Univ. (Russian Federation) . . . [9019-7]

11:50 am: **Local feature descriptor on base indexing 2D kernel of local polynomial approximation**, Aleksandr I. Sherstobitov, Vladimir I. Marchuk, Don State Technical Univ. (Russian Federation); Karen O. Egiazarian, Tampere Univ. of Technology (Finland); Viacheslav V. Voronin, Dmitry Timofeev, Don State Technical Univ. (Russian Federation) . [9019-8]

Lunch Break . . . . . Mon 12:10 pm to 2:20 pm

#### Session 3

**Location: Continental Ballroom 1 . . . Mon 2:20 pm to 3:20 pm**

#### Image Denoising I

Session Chair: **Karen O. Egiazarian**, Tampere Univ. of Technology (Finland)

2:20 pm: **Metric performance in similar blocks search and their use in collaborative 3D filtering of grayscale images**, Vladimir V. Lukin, Aleksey Rubel, National Aerospace Univ. (Ukraine); Karen O. Egiazarian, Tampere Univ. of Technology (Finland) . . . . . [9019-9]

2:40 pm: **Tensor transform based adaptive window size estimation**, Emiliano Morales, Artyom M. Grigoryan, Sos S. Agaian, The Univ. of Texas at San Antonio (United States) . . . . . [9019-11]

3:00 pm: **Generalized non local means filtering for image denoising**, Sudipto Dolui, Univ. of Pennsylvania (United States); Iván Camilo Salgado Patarroyo, Oleg Michailovich, Ivan Camilo Salgado Patarroyo, Univ. of Waterloo (Canada) . . . . . [9019-12]

Coffee Break . . . . . Mon 3:20 pm to 4:00 pm

#### Session 4

**Location: Continental Ballroom 1 . . . Mon 4:00 pm to 5:20 pm**

#### Image Processing Systems

Session Chair: **Sos Agaian**, The Univ. of Texas at San Antonio (United States)

4:00 pm: **Calibration of a dual PTZ cameras for stereo vision based on parallel particle swarm optimization method**, Yau-Zen Chang, Huai-Ming Wang, Chang Gung Univ. (Taiwan); Shih-Tseng Lee M.D., Chieh-Tsai Wu M.D., Chang Gung Memorial Hospital (Taiwan); Ming-Hsi Hsu, Chang Gung Univ. (Taiwan) . . . . . [9019-13]

4:20 pm: **Probabilistic person identification in TV news programs using image web database**, Marco Leo, Federica Battisti, Marco Carli, Alessandro Neri, Univ. degli Studi di Roma Tre (Italy) . . . . . [9019-14]

4:40 pm: **Spatial temporal features of thermal images for carpal tunnel syndrome detection**, Marco A. Ortega P., Kevin Estupiñan Roldan, Hernan D. Benitez Restrepo, Pontificia Univ. Javeriana, Cali Colombia) . . . . . [9019-15]

5:00 pm: **A speed-optimized RGB-Z capture system with improved denoising capabilities**, Aleksandra Chuchvara, Atanas P. Gotchev, Tampere Univ. of Technology (Finland) . . . . . [9019-16]

## Tuesday 4 February

**Location: Continental Ballroom 5 . . . . 8:30 am to 9:50 am**

### Plenary Session and Society Award Presentations

8:30 am: **Using fMRI To Reverse Engineer the Human Visual System (Plenary)**, Jack L. Gallant, Univ. of California, Berkeley (United States) . . . . . [9011-301]

Coffee Break . . . . . Tue 9:50 am to 10:20 am

### Session 5

**Location: Continental Ballroom 1 . . Tue 10:20 am to 12:00 pm**

### Image Analysis

Session Chair: **Sos Agaian**, The Univ. of Texas at San Antonio (United States)

10:20 am: **On a mathematical characterization of tri- and tetra-chromatic metamerism**, Alfredo Restrepo, Univ. de los Andes (Colombia) . . . . . [9019-17]

10:40 am: **Refractory neural nets and vision**, Thomas C. Fall, Kalyx Associates (United States) . . . . . [9019-18]

11:00 am: **Statistical shape analysis for image understanding and object recognition**, Peter F. Stiller, Texas A&M Univ. (United States) . . . . . [9019-19]

11:20 am: **A blind detection system for image contrast modification**, Federica Battisti, Marco Carli, Antonino Laudani, Francesco Riganti Fulginei, Univ. degli Studi di Roma Tre (Italy) . . . . . [9019-20]

11:40 am: **2D-fractal-based algorithms for nanoparticles characterisation**, Giuseppe Bonifazi, Silvia Serranti, Roberta Palmieri, Univ. degli Studi di Roma La Sapienza (Italy) . . . . . [9019-21]

Lunch Break . . . . . Tue 12:00 pm to 2:00 pm

### Session 6

**Location: Continental Ballroom 1 . . . . Tue 2:00 pm to 3:20 pm**

### Image Denoising II

Session Chair: **Karen O. Egiazarian**, Tampere Univ. of Technology (Finland)

2:00 pm: **Non-stationary noise estimation using dictionary learning and Gaussian mixture models**, James M. Hughes, LGS Innovations Inc. (United States); Daniel N. Rockmore, Dartmouth College (United States); Yang Wang, Michigan State Univ. (United States) . . . . . [9019-22]

2:20 pm: **Weighted denoising for phase unwrapping**, Satoshi Tomioka, Shusuke Nishiyama, Hokkaido Univ. (Japan) . . . . . [9019-23]

2:40 pm: **A sliding-window transform-domain technique for denoising of DSPI phase maps**, Asen Shulev, Bulgarian Academy of Sciences (Bulgaria); Atanas P. Gotchev, Tampere Univ. of Technology (Finland) . . . . . [9019-24]

3:00 pm: **A fast method of optimal directions dictionary learning algorithm for sparse decomposition with its application to image denoising**, Hossein Rabbani, Isfahan Univ. of Medical Sciences (Iran, Islamic Republic of) . . . . . [9019-25]

Coffee Break . . . . . Tue 3:20 pm to 4:00 pm

**Location: Continental Ballroom 1 . . . . 4:00 pm to 5:00 pm**

### Open Discussion

Session Chairs: **Karen O. Egiazarian**, Tampere Univ. of Technology (Finland); **Sos Agaian**, The Univ. of Texas at San Antonio (United States); **Atanas P. Gotchev**, Tampere Univ. of Technology (Finland)

**Location: Continental Ballroom 4 . . . . 5:30 pm to 7:30 pm**

### Symposium Demonstration Session

A symposium-wide demonstration session will be open to attendees 5:30 to 7:30 pm Tuesday evening. Demonstrators will provide interactive, hands-on demonstrations of a wide-range of products related to Electronic Imaging.

## Wednesday 5 February

**Location: Continental Ballroom 5 . . . . 8:30 am to 9:50 am**

### Plenary Session and Conference Award Presentations

8:30 am: **Integrated Imaging: Creating Images from the Tight Integration of Algorithms, Computation, and Sensors (Plenary)**, Charles A. Bouman, Purdue Univ. (United States) . . . . . [9011-300]

### Interactive Paper Session-Wednesday

*Interactive papers will be placed on display after 8:30 am on Wednesday. An interactive paper session, with authors present at their papers, will be held Wednesday morning, 9:50 to 11:10 am. Refreshments will be served.*

**Location: Continental Ballroom and**

**Golden Gate Foyers . . . . . 9:50 am to 11:10 am**

**Shape-dependent image processing tools for improved and automated response of adhering medulloblastoma cancer cell edges in a unique imaging system**, Frederick C. Weissbach, Brent M. Nowak, Sos S. Agaian, The Univ. of Texas at San Antonio (United States)[9019-29]

**Fibonacci thresholding: signal representation and morphological filters**, Artyom M. Grigoryan, Sos S. Agaian, The Univ. of Texas at San Antonio (United States) . . . . . [9019-30]

**Novel image darkness and brightness measures**, Sos S. Agaian, Mehdi Roopaei, Wuxia Chen, The Univ. of Texas at San Antonio (United States) . . . . . [9019-31]

**Image de-noising through symmetric, bell-shaped, and centered weighted median filters based sub-band decomposition**, Sos S. Agaian, Sirajul Salekin, The Univ. of Texas at San Antonio (United States) . . . . . [9019-32]

**Parametric rational unsharp masking for image enhancement**, Changzhe Yin, Yicong Zhou, Univ. of Macau (Macao, China); Sos S. Agaian, The Univ. of Texas at San Antonio (United States); C. L. Philip Chen, Univ. of Macau (Macao, China) . . . . . [9019-33]

**Spars presentation-based classification with position-weighted block dictionary**, Jun He, Bo Sun, Tian Zuo, Xuwen Wu, Lejun Yu, Fengxiang Ge, Beijing Normal Univ. (China); Chao Chen, Naval Academy of Armament (China) . . . . . [9019-34]

# Conference 9019 · Location: Continental Ballroom 1

## Session 7

Location: Continental Ballroom 1 . . . . . Wed 11:10 to 11:40 am

### Invited Presentation

Session Chairs: **Karen O. Egiazarian**, Tampere Univ. of Technology (Finland); **Sos S. Agaian**, The Univ. of Texas at San Antonio (United States)

11:10 am: **Alternating direction optimization for image segmentation using hidden Markov measure field models** (*Invited Paper*), José M. Bioucas-Dias, Filipe Condessa, Univ. Técnica de Lisboa (Portugal); Jelena Kovacevic, Carnegie Mellon Univ. (United States) . . . . . [9019-26]

Location: Continental Ballroom 1 . . . . . 11:40 am to 11:50 am

### The Scientific Merits of Til Aach: Introductory Words by the Conference Chairs

## Session 8

Location: Continental Ballroom 1 . Wed 11:50 am to 12:40 pm

### Special Session in Memory of Til Aach

Session Chairs: **Karen O. Egiazarian**, Tampere Univ. of Technology (Finland); **Sos Agaian**, The Univ. of Texas at San Antonio (United States); **Atanas P. Gotchev**, Tampere Univ. of Technology (Finland)

11:50 am: **Multispectral imaging and image processing** (*Invited Paper*), Julie Klein, RWTH Aachen (Germany) . . . . . [9019-27]

12:15 pm: **On the performance of multi-rate filter banks** (*Invited Paper*), Robert Bregovic, Atanas P. Gotchev, Tampere Univ. of Technology (Finland) . . . . . [9019-28]

## Computational Imaging XII

Conference Chairs: **Charles A. Bouman**, Purdue Univ. (United States); **Ken D. Sauer**, Univ. of Notre Dame (United States)

### Tuesday 4 February

**Location: Continental Ballroom 5 . . . . . 8:30 am to 9:50 am**

#### Plenary Session and Society Award Presentations

8:30 am: **Using fMRI To Reverse Engineer the Human Visual System (Plenary)**, Jack L. Gallant, Univ. of California, Berkeley (United States) . . . . . [9011-301]

**Location: Continental Ballroom 4 . . . . . 5:30 pm to 7:30 pm**

#### Symposium Demonstration Session

A symposium-wide demonstration session will be open to attendees 5:30 to 7:30 pm Tuesday evening. Demonstrators will provide interactive, hands-on demonstrations of a wide-range of products related to Electronic Imaging.

### Wednesday 5 February

**Location: Continental Ballroom 5 . . . . . 8:30 am to 9:50 am**

#### Plenary Session and Conference Award Presentations

8:30 am: **Integrated Imaging: Creating Images from the Tight Integration of Algorithms, Computation, and Sensors (Plenary)**, Charles A. Bouman, Purdue Univ. (United States) . . . . . [9011-300]

#### Interactive Paper Session-Wednesday

*Interactive papers will be placed on display after 8:30 am on Wednesday. An interactive paper session, with authors present at their papers, will be held Wednesday morning, 9:50 to 11:10 am. Refreshments will be served.*

**Location: Continental Ballroom and Golden Gate Foyers . . . . . 9:50 am to 11:10 am**

**Medical MR image compressed sensing reconstruction based on wavelet and L<sub>1</sub> norm optimization**, Xiaoming Huang, Beijing Jiaotong Univ. (China); Ivan Jambor, Harri Merisaari, Marko Pesola, Chunlei Han, H. J. Aronen, Univ. of Turku (Finland); Gangrong Qu, Beijing Jiaotong Univ. (China) . . . . . [9020-31]

**Texture mapping 3D models of indoor environments with noisy camera poses**, Peter Cheng, Michael Anderson, Stewart He, Avidesh Zakhor, Univ. of California, Berkeley (United States) . . . . . [9020-32]

**Spatial adaptive blending method for robust ultrasound image deconvolution**, Sung-chan Park, Samsung Advanced Institute of Technology (Korea, Republic of) . . . . . [9020-33]

**Reconstruction of compressively sampled ray space by using DCT basis and statistically-weighted L<sub>1</sub> norm optimization**, Qiang Yao, Keita Takahashi, Toshiaki Fujii, Nagoya Univ. (Japan) . . . . . [9020-34]

**Image matching in Bayer raw domain to de-noise low-light still images, optimized for real-time implementation**, Ilya V. Romanenko, Apical (United Kingdom); Eran Edirisinghe, Loughborough Univ. (United Kingdom) . . . . . [9020-35]

**Real-time focal stack compositing for handheld mobile cameras**, Mashhour Solh, Texas Instruments Inc. (United States) . . . . . [9020-36]

**Image deblurring using the direction dependence of camera resolution**, Yukio Hirai, Hiroyasu Yoshikawa, Masayoshi Shimizu, Fujitsu Labs., Ltd. (Japan) . . . . . [9020-37]

**Illumination modeling and optimization for indoor video surveillance environment**, Krishna Reddy Konda, Nicola Conci, Univ. degli Studi di Trento (Italy) . . . . . [9020-38]

**Nonlinear and non-Gaussian Bayesian-based handwriting beautification**, Cao Shi, Jianguo Xiao, Wenhua Jia, Canhui Xu, Peking Univ. (China) . . . . . [9020-39]

**Multi-exposure image fusion with compensation for multi-dimensional camera shake and foreground object movement**, Eran A. Edirisinghe, Manal Al-Rawahi, Sara Saravi, Loughborough Univ. (United Kingdom) . . . . . [9020-40]

**LCAV-31: a dataset for light field object recognition**, Alireza Ghasemi, Nelly J. Afonso, Martin Vetterli, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [9020-41]

**Scale-invariant representation of light field images for object recognition and tracking**, Alireza Ghasemi, Martin Vetterli, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [9020-42]

**Image indexing based on a circularity features**, Ana M. Herrera-Navarro, Univ. Autonoma de Queretaro (Mexico); Hugo Jiménez-Hernández, Ctr. de Ingeniería y Desarrollo Industrial (Mexico); Ivan Terol-Villalobos, CIDETEQ (Mexico) . . . . . [9020-43]

**Comparative analysis of the speed performance of texture analysis algorithms on a graphic processing unit (GPU)**, Jennifer C. Triana, Sergio A. Orjuela Vargas, Univ. Antonio Nariño (Colombia); Wilfried Philips, Univ. Gent (Belgium) . . . . . [9020-44]

#### Session 1

**Location: Plaza B . . . . . Wed 11:10 am to 12:10 pm**

#### Computational Imaging for Consumer Electronics

Session Chairs: **Charles A. Bouman**, Purdue Univ. (United States); **Ken D. Sauer**, Univ. of Notre Dame (United States)

11:10 am: **Video colorization based on optical flow and edge-oriented color propagation**, Mayu Otani, Nara Institute of Science and Technology (Japan); Hirohisa Hioki, Kyoto Univ. (Japan) . . . . . [9020-1]

11:30 am: **Image enhancement with blurred and noisy image pairs using dual edge-preserving filtering technique**, Yuushi Toyoda, Hiroyasu Yoshikawa, Masayoshi Shimizu, Fujitsu Labs., Ltd. (Japan) . . . . . [9020-3]

11:50 am: **Computational efficiency improvements for image colorization**, Chao Yu, Gaurav Sharma, Univ. of Rochester (United States); Hussein Aly, Military Technical College (Egypt) . . . . . [9020-4]

Lunch Break . . . . . Wed 12:10 pm to 2:00 pm

#### Session 2

**Location: Plaza B . . . . . Wed 2:00 pm to 3:40 pm**

#### Inverse Problems

Session Chairs: **Charles A. Bouman**, Purdue Univ. (United States); **Ken D. Sauer**, Univ. of Notre Dame (United States)

2:00 pm: **Architectures and algorithms for x-ray diffraction imaging**, David A. Castañón, Boston Univ (United States) . . . . . [9020-5]

2:20 pm: **Joint metal artifact reduction and material discrimination in x-ray CT using a learning-based graph-cut method**, Limor Martin, Ahmet Tuysuzoglu, Prakash Ishwar, William C. Karl, Boston Univ. (United States) . . . . . [9020-6]

# Conference 9020 · Location: Plaza B

2:40 pm: **Accurate estimation of noise correlations in a CT image**, Frédéric Noo, Marta Heilbrun, The Univ. of Utah (United States) . . . [9020-7]

3:00 pm: **Linear discriminant analysis (LDA) for rapid deconvolution of photon counting measurements by digital filtering**, Shane Z. Sullivan, Ryan D. Muir, Garth J. Simpson, Purdue Univ. (United States) . . . [9020-8]

3:20 pm: **Magnified neutron radiography with coded sources**, Philip R. Bingham, Hector J. Santos-Villalobos, Nickolay V. Lavrik, Oak Ridge National Lab. (United States); Jens Gregor, The Univ. of Tennessee (United States); Hassina Bilheux, Oak Ridge National Lab. (United States) [9020-9]

Coffee Break . . . . . Wed 3:40 pm to 4:00 pm

## Session 3

**Location: Plaza B . . . . . Wed 4:00 pm to 5:20 pm**

### Modeling and Analysis of Multidimensional Data

Session Chairs: **Charles A. Bouman**, Purdue Univ. (United States); **Ken D. Sauer**, Univ. of Notre Dame (United States)

4:00 pm: **A super-resolution algorithm for enhancement of flash lidar data: flight test results**, Alexander Bulyshev, Analytical Mechanics Associates, Inc. (United States); Farzin Amzajerdian, Vincent E. Roback, Robert A. Reisse, NASA Langley Research Ctr. (United States) . . [9020-10]

4:20 pm: **Automatic image assessment from facial attributes**, Ray Ptucha, David Kloosterman, Brian Mittelstaedt, Alexander Loui, Eastman Kodak Co. (United States) . . . . . [9020-11]

4:40 pm: **Closely spaced object discrimination computation using quantum annealing model**, John J. Tran, Information Sciences Institute (United States); Robert F. Lucas, The Univ. of Southern California (United States); Kevin J. Scully, Darren L. Semmen, The Aerospace Corp. (United States) . . . . . [9020-12]

5:00 pm: **3D quantitative microwave imaging from sparse measured data with Huber regularization**, Funing Bai, Aleksandra Pizurica, Univ. Gent (Belgium) . . . . . [9020-13]

## Thursday 6 February

### Session 4

**Location: Plaza B . . . . . Thu 8:30 am to 10:10 am**

### Tomographic Estimation

Session Chairs: **Charles A. Bouman**, Purdue Univ. (United States); **Ken D. Sauer**, Univ. of Notre Dame (United States)

8:30 am: **Novel tensor transform-based method of image reconstruction from limited-angle projection data**, Artyom M. Grigoryan, Nan Du, The Univ. of Texas at San Antonio (United States) . . . . . [9020-14]

8:50 am: **Statistical x-ray computed tomography from photon-starved measurements**, Zhiqian Chang, University of Notre Dame (United States); Jean-Baptiste Thibault, GE Healthcare (United States); Ken Sauer, University of Notre Dame (United States); Charles Bouman, Purdue University (United States) . . . . . [9020-15]

9:10 am: **Model-based iterative tomographic reconstruction with adaptive sparsifying transforms**, Luke Pfister, Yoram Bresler, Univ. of Illinois at Urbana-Champaign (United States) . . . . . [9020-16]

9:30 am: **Structured illumination for compressive x-ray diffraction tomography**, Joel A. Greenberg, Mehadi Hassan, Kalyani Krishnamurthy, David Brady, Duke Univ. (United States) . . . . . [9020-17]

9:50 am: **Generalized Huber functions for model-based reconstruction from anomalous data**, Singanallur Venkatakrisnan, Purdue Univ. (United States); Lawrence F. Drummy, Air Force Research Lab. (United States); Marc De Graef, Carnegie Mellon Univ. (United States); Jeff Simmons, Air Force Research Lab. (United States); Charles A. Bouman, Purdue Univ. (United States) . . . . . [9020-18]

Coffee Break . . . . . Thu 10:10 am to 10:40 am

### Session 5

**Location: Plaza B . . . . . Thu 10:40 am to 12:00 pm**

### Inverse Problems in Materials and Security

Session Chairs: **Charles A. Bouman**, Purdue Univ. (United States); **Ken D. Sauer**, Univ. of Notre Dame (United States)

10:40 am: **Effects of powder microstructure on CT number estimates**, Jeffrey S. Kallman, Sabrina dePiero, Stephen G. Azevedo, Harry E. Martz, Lawrence Livermore National Lab. (United States) . . . . . [9020-19]

11:00 am: **Coded aperture x-ray scatter tomography**, Andrew Holmgren, Kenneth P. MacCabe, Martin P. Tornai, David J. Brady, Duke Univ (United States) . . . . . [9020-20]

11:20 am: **Marked point process models for microscope images of materials**, Huixi Zhao, Mary L. Comer, Purdue Univ. (United States) . . . . . [9020-21]

11:40 am: **Model-based, one-sided, time-of-flight terahertz image reconstruction**, Stephen M. Schmitt, Jeffrey A. Fessler, Univ. of Michigan (United States); Greg D. Fichter, David A. Zimdars, Picometrix, LLC (United States) . . . . . [9020-22]

Lunch Break . . . . . Thu 12:00 pm to 2:00 pm

### Session 6

**Location: Plaza B . . . . . Thu 2:00 pm to 3:00 pm**

### Image Enhancement and Denoising

Session Chairs: **Charles A. Bouman**, Purdue Univ. (United States); **Ken D. Sauer**, Univ. of Notre Dame (United States)

2:00 pm: **Resolution enhancement and noise reduction using an array of cameras**, Ibrahim E. Pekkucuksen, Umit Batur, Texas Instruments Inc. (United States) . . . . . [9020-23]

2:20 pm: **Fast edge-preserving image denoising via group coordinate descent on the GPU**, Madison G. McGaffin, Jeffrey A. Fessler, Univ. of Michigan (United States) . . . . . [9020-24]

2:40 pm: **Signal processing to improve imagery from compressive sensing cameras under unstable illumination**, Donna Hewitt, Justin Fritz, Tyler Weston, James Tidman, Matt Herman, Lenore McMackin, InView Technology Corp. (United States) . . . . . [9020-25]

Coffee Break . . . . . Thu 3:00 pm to 3:40 pm

### Session 7

**Location: Plaza B . . . . . Thu 3:40 pm to 5:00 pm**

### Light Field Cameras and Algorithms

Session Chairs: **Charles A. Bouman**, Purdue Univ. (United States); **Ken D. Sauer**, Univ. of Notre Dame (United States)

3:40 pm: **Adaptive compressive sensing algorithm for video acquisition using a single-pixel camera**, Imama Noor, Univ. of Memphis (United States) . . . . . [9020-27]

4:00 pm: **Light field panorama by a plenoptic camera**, Zhou Xue, Loïc Baboulaz, Paolo Prandoni, Martin Vetterli, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [9020-28]

4:20 pm: **Efficient volumetric estimation from plenoptic data**, Paul Anglin, Stanley J. Reeves, Auburn Univ (United States) . . . . . [9020-29]

4:40 pm: **Computationally efficient background subtraction in the light field domain**, Alireza Ghasemi, Mahdad Hosseinikamal, Martin Vetterli, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [9020-30]

 = Published in the *Journal of Electronic Imaging*

# Conference 9021 · Location: Golden Gate 8

Wednesday–Thursday 5–6 February 2014 • Proceedings of SPIE Vol. 9021

## Document Recognition and Retrieval XXI

*Conference Chairs:* **Bertrand Couasnon**, Institut National des Sciences Appliquées de Rennes (France); **Eric K. Ringger**, Brigham Young Univ. (United States)

*Program Committee:* **Gady Agam**, Illinois Institute of Technology (United States); **Sameer K. Antani**, National Library of Medicine (United States); **Elisa H. Barney Smith**, Boise State Univ. (United States); **William A. Barrett**, Brigham Young Univ. (United States); **Kathrin Berkner**, Ricoh Innovations, Inc. (United States); **Hervé Déjean**, Xerox Research Ctr. Europe Grenoble (France); **Xiaoqing Ding**, Tsinghua Univ. (China); **David Scott Doermann**, Univ. of Maryland, College Park (United States); **Oleg D. Golubitsky**, Google Waterloo (Canada); **Jianying Hu**, IBM Thomas J. Watson Research Ctr. (United States); **Ergina Kavallieratou**, Univ. of the Aegean (Greece); **Christopher Kermorvant**, A2iA SA (France); **Laurence Likforman-Sulem**, Telecom ParisTech (France); **Xiaofan Lin**, A9.com, Inc. (United States); **Marcus Liwicki**, Deutsches Forschungszentrum für Künstliche Intelligenz GmbH (Germany); **Daniel P. Lopresti**, Lehigh Univ. (United States); **Umapada Pal**, Indian Statistical Institute (India); **Sargur N. Srihari**, Univ. at Buffalo (United States); **Venkata Subramaniam**, IBM India Research Lab. (India); **Kazem Taghva**, Univ. of Nevada, Las Vegas (United States); **George R. Thoma**, National Library of Medicine (United States); **Christian Viard-Gaudin**, Univ. de Nantes (France); **Berrin Yanikoglu**, Sabanci Univ. (Turkey); **Richard Zanibbi**, Rochester Institute of Technology (United States); **Jie Zou**, National Library of Medicine (United States)

Sponsored by:



**Tuesday 4 February**

**Location: Continental Ballroom 5 . . . . . 8:30 am to 9:50 am**

### Plenary Session and Society Award Presentations

8:30 am: **Using fMRI To Reverse Engineer the Human Visual System (Plenary)**, Jack L. Gallant, Univ. of California, Berkeley (United States) . . . . . [9011-301]

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**Wednesday 5 February**

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**Location: Continental Ballroom and Golden Gate Foyers . . . . . 9:50 am to 11:10 am**

**Two-stage approach to keyword spotting in handwritten documents**, Mehdi Haji, IMDS Software (Canada) and Concordia Univ. (Canada); Mohammad R. Ameri, Concordia University (Canada); Tien D. Bui, Ching Y. Suen, Concordia Univ. (Canada); Dominique Ponson, IMDS Software (Canada) . . . . . [9021-24]

**Extraction and labeling high-resolution images from PDF documents**, Suchet K. Chachra, Zhiyun Xue, Sameer Antani, Dina Demner-Fushman, George R. Thoma, National Library of Medicine (United States) . [9021-25]

**Structure analysis for plane geometry figures**, Tianxiao Feng, Xiaoqing Lu, Lu Liu, Keqiang Li, Zhi Tang, Peking Univ. (China) . . . . . [9021-26]

**On-line signature verification method by Laplacian spectral analysis and dynamic time warping**, Changting Li, Liangrui Peng, Changsong Liu, Xiaoqing Ding, Tsinghua Univ. (China) . . . . . [9021-27]

**A slant removal technique for document page**, Ergina Kavallieratou, Univ. of the Aegean (Greece) . . . . . [9021-28]

**Robust binarization of degraded document images using heuristics**, Jon Parker, Georgetown Univ. (United States) and Johns Hopkins Univ. (United States); Ophir Frieder, Gideon Frieder, Georgetown Univ. (United States) . . . . . [9021-30]

**A machine learning based lecture video segmentation and indexing algorithm**, Di Ma, Bingqing Xie, Gady Agam, Illinois Institute of Technology (United States) . . . . . [9021-31]

### Session 1

**Location: Golden Gate 8 . . . . . Wed 11:10 am to 12:30 pm**

### Handwriting

Session Chair: **Eric K. Ringger**, Brigham Young Univ. (United States)

11:10 am: **Writer identification on historical Glagolitic documents**, Stefan Fiel, Fabian Hollaus, Melanie Gau, Robert Sablatnig, Technische Univ. Wien (Austria) . . . . . [9021-1]

11:30 am: **Probabilistic modeling of children's handwriting**, Mukta Puri, Sargur N. Srihari, Univ. at Buffalo (United States); Lisa Hanson, Bureau of Criminal Apprehension Laboratory (United States) . . . . . [9021-2]

11:50 am: **Variational dynamic background model for keyword spotting in handwritten documents**, Gaurav Kumar, Univ. at Buffalo (United States); Safwan Wshah, Xerox Corp. (United States); Venu Govindaraju, Univ. at Buffalo (United States) . . . . . [9021-3]

12:10 pm: **Boosting bonsai trees for handwritten/printed text discrimination**, Yann Ricquebourg, Christian Raymond, Baptiste Poirriez, Aurélie Lemaitre, Bertrand Couasnon, Institut National des Sciences Appliquées de Rennes (France) . . . . . [9021-4]

Lunch Break . . . . . Wed 12:30 pm to 2:10 pm

### Session 2

**Location: Golden Gate 8 . . . . . Wed 2:10 pm to 2:40 pm**

### Form Classification

Session Chair: **Gady Agam**, Illinois Institute of Technology (United States)

2:10 pm: **Form similarity via Levenshtein distance between ortho-filtered logarithmic ruling-gap ratios**, George Nagy, Rensselaer Polytechnic Institute (United States); Daniel P. Lopresti, Lehigh Univ. (United States) . . . . . [9021-5]

2:30 pm: **Form classification and retrieval using bag of words with shape features of line structures**, Florian Kleber, Markus Diem, Robert Sablatnig, Technische Univ. Wien (Austria) . . . . . [9021-6]

# Conference 9021 · Location: Golden Gate 8

## Session 3

Location: Golden Gate 8 . . . . . Wed 2:50 pm to 3:40 pm

### Invited Presentation I

Session Chair: **Bertrand Couasnon**, Institut National des Sciences Appliquées de Rennes (France)

2:50 pm: **OCR for Google Books** (*Invited Paper*), Ray Smith, Ashok Popat, Google (United States) . . . . . [9021-7]

Coffee Break . . . . . Wed 3:40 pm to 4:10 pm

## Session 4

Location: Golden Gate 8 . . . . . Wed 4:10 pm to 5:10 pm

### Text Recognition

Session Chair: **Sameer K. Antani**, National Library of Medicine (United States)

4:10 pm: **Utilizing web data in identification and correction of OCR errors**, Kazem Taghva, Shivam Agarwal, Univ. of Nevada, Las Vegas (United States) . . . . . [9021-8]

4:30 pm: **How well does multiple OCR error correction generalize?**, William B. Lund, Eric K. Ringger, Brigham Young Univ. (United States); Daniel D. Walker, Microsoft Corp. (United States) . . . . . [9021-9]

4:50 pm: **Video text localization using wavelet and shearlet transforms**, Purnendu Banerjee, Bidyut B. Chaudhuri, Indian Statistical Institute (India) . . . . . [9021-10]

## Thursday 6 February

## Session 5

Location: Golden Gate 8 . . . . . Thu 8:50 am to 9:30 am

### Handwritten Text Line Segmentation

Session Chair: **Elisa H. Barney Smith**, Boise State Univ. (United States)

8:50 am: **A Markov chain based line segmentation framework for handwritten character recognition**, Yue Wu, Shengxin Zha, Huaigu Cao, Daben Liu, Raytheon BBN Technologies (United States); Premkumar Natarajan, The Univ. of Southern California (United States) . . . . . [9021-11]

9:10 am: **Handwritten text segmentation using blurred image**, Aurélie Lemaître, Jean Camillerapp, IRISA / INRIA Rennes (France); Bertrand Couasnon, Institut National des Sciences Appliquées de Rennes (France) . . . . . [9021-12]

## Session 6

Location: Golden Gate 8 . . . . . Thu 9:30 am to 10:20 am

### Invited Presentation II

Session Chair: **Eric K. Ringger**, Brigham Young Univ. (United States)

9:30 am: **What makes big visual data hard?** (*Invited Paper*), Alexei (Alyosha) Efros, Univ. of California, Berkeley (United States) . . . . . [9021-13]

Coffee Break . . . . . Thu 10:20 am to 10:50 am

## Session 7

Location: Golden Gate 8 . . . . . Thu 10:50 am to 12:30 pm

### Layout Analysis

Session Chair: **Daniel P. Lopresti**, Lehigh Univ. (United States)

10:50 am: **Optical music recognition on the International Music Score Library Project**, Christopher S. Raphael, Rong Jin, Indiana Univ. (United States) . . . . . [9021-14]

11:10 am: **Document flow segmentation for business applications**, Daher Hani, Abdel Belaïd, LORIA (France) and Univ. de Lorraine (France) . . . . . [9021-15]

11:30 am: **LearnPos: a new tool for interactive learning positioning**, Cères Carton, Aurélie Lemaître, Bertrand Couasnon, Institut National des Sciences Appliquées de Rennes (France) . . . . . [9021-16]

11:50 am: **Document page structure learning for fixed-layout e-books using conditional random fields**, Xin Tao, Zhi Tang, Canhui Xu, Peking Univ. (China) . . . . . [9021-17]

12:10 pm: **Automatic comic page image understanding based on edge segment analysis**, Dong Liu, Yongtao Wang, Zhi Tang, Luyuan Li, Liangcai Gao, Peking Univ. (China) . . . . . [9021-18]

Lunch Break . . . . . Thu 12:30 pm to 2:10 pm

## Session 8

Location: Golden Gate 8 . . . . . Thu 2:10 pm to 3:30 pm

### Information Retrieval

Session Chair: **Xiafan Lin**, A9.com, Inc. (United States)

2:10 pm: **Scalable ranked retrieval using document images**, Rajiv Jain, Douglas Oard, David Doermann, Univ. of Maryland, College Park (United States) . . . . . [9021-19]

2:30 pm: **A contour-based shape descriptor for biomedical image classification and retrieval**, Daekeun You, Sameer Antani, Dina Demner-Fushman, George R. Thoma, National Library of Medicine (United States) . . . . . [9021-20]

2:50 pm: **Semi-automated document image clustering and retrieval**, Markus Diem, Florian Kleber, Stefan Fiel, Robert Sablatnig, Technische Univ. Wien (Austria) . . . . . [9021-21]

3:10 pm: **Fast structural matching for document image retrieval through spatial databases**, Hongxing Gao, Maçal Rusiñol, Dimosthenis Karatzas, Josep Lladós, Univ. Autònoma de Barcelona (Spain) . . . . . [9021-22]

Coffee Break . . . . . Thu 3:30 pm to 4:00 pm

## Session 9

Location: Golden Gate 8 . . . . . Thu 4:00 pm to 4:20 pm

### Data Sets and Ground-Truthing

Session Chair: **Bertrand Couasnon**, Institut National des Sciences Appliquées de Rennes (France)

4:00 pm: **The Lehigh Steel Collection: a new open dataset for document recognition research**, Barri Bruno, Daniel P. Lopresti, Lehigh Univ. (United States) . . . . . [9021-23]

## PANEL DISCUSSION

Location: Golden Gate 8 . . . . . 4:20 pm to 5:00 pm

### Panel Discussion: Data Sets and Ground-Truthing

Panel Moderators: **Bertrand Couasnon**, Institut National des Sciences Appliquées de Rennes (France); **Eric K. Ringger**, Brigham Young Univ. (United States)

## Image Sensors and Imaging Systems 2014

Conference Chairs: **Ralf Widenhorn**, Portland State Univ. (United States); **Antoine Dupret**, Commissariat à l'Énergie Atomique (France)

Program Committee: **Morley M. Blouke**, Portland State Univ. (United States); **Erik Bodegom**, Portland State Univ. (United States); **Glenn H. Chapman**, Simon Fraser Univ. (Canada); **Arnaud Darmont**, Aghesa SPRL (Belgium); **James A. DiBella Sr.**, Truesense Imaging, Inc. (United States); **Boyd A. Fowler**, Google (United States); **Kevin J. Matherson**, Microsoft Corp. (United States); **Alice L. Reinheimer**, e2v (United States); **Franz Riedlberger**, Jazz Semiconductor, Inc. (United States); **Nobukazu Teranishi**, Univ. of Hyogo (Japan), Shizuoka Univ. (Japan); **Jean-Michel Tualle**, Univ. Paris 13 (France); **Xinyang Wang**, Chinese Academy of Sciences (China)

Sponsored by:



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**JEI** **Optical imaging of high frequency focused ultrasonic field using a Nomarski interferometer coupled with multichannel lock-in detection (Invited Paper)**, Smain Femmam, Univ. de Haute Alsace (France) . . . . . [9022-27]

**Iterative compressive sampling for hyperspectral images via source separation**, Simeon Kamdem Kuiteing, Mauro Barni, Univ. degli Studi di Siena (Italy) . . . . . [9022-28]

**Multiple object tracking and behavior analysis method for video surveillance applications**, Jie Su, Harbin Univ. of Science and Technology (China) . . . . . [9022-29]

**Hyperspectral imaging applied to end-of-life concrete recycling**, Silvia Serranti, Giuseppe Bonifazi, Univ. degli Studi di Roma La Sapienza (Italy) . . . . . [9022-30]

**A indirect time-of-flight measurement technique for sub-mm range resolution using impulse photocurrent response**, Takahiro Usui, Keita Yasutomi, Sangman Han, Taishi Takasawa, Keiichiro Kagawa, Shoji Kawahito, Shizuoka Univ. (Japan) . . . . . [9022-31]

**Theoretical study of an efficient bracketing camera system's architecture**, Amine Besrou, Univ. of Carthage (Tunisia); Hichem Snoussi, Univ. de Technologie Troyes (France); Mohamed Siala, Univ. of Carthage (Tunisia); Fatma Abdelkefi, Univ. of Carthage (Tunisia) . . . . . [9022-32]

**Location: Golden Gate 3 . . . . . 11:10 am to 11:20 am**

#### Opening Remarks

Session Chairs: **Antoine Dupret**, Commissariat à l'Énergie Atomique (France); **Ralf Widenhorn**, Portland State Univ. (United States)

#### Session 1

**Location: Continental Ballroom 8 . Wed 11:20 am to 12:40 pm**

#### High-Speed Sensors

Session Chairs: **Xinyang Wang**, Chinese Academy of Sciences (China); **Jean-Michel Tualle**, Univ. Paris 13 (France)

11:20 am: **A time-resolved image sensor for tubeless streak cameras**, Keita Yasutomi, Sangman Han, Min-Woong Seo, Taishi Takasawa, Keiichiro Kagawa, Shoji Kawahito, Shizuoka Univ. (Japan) . . . . . [9022-1]

11:40 am: **Pixel structure with 10 nsec fully charge transfer time for the 20M frame per second burst CMOS image sensor**, Ken Miyauchi, Tohru Takeda, Katsuhiko Hanzawa, Yasuhisa Tochigi, Shin Sakai, Rihito Kuroda, Tohoku Univ. (Japan); Hideki Tominaga, Ryuta Hirose, Kenji Takubo, Yasushi Kondo, Shimadzu Corp. (Japan); Shigetoshi Sugawa, Tohoku Univ. (Japan) . . . . . [9022-2]

12:00 pm: **Novel CMOS time-delay summation using single-photon counting for high-speed industrial and aerospace applications**, Munir M. El-Desouki, King Abdulaziz City for Science and Technology (Saudi Arabia) . . . . . [9022-3]

12:20 pm: **Ultra-high speed video capturing of time dependent dielectric breakdown of metal-oxide-silicon capacitor up to 10M frame per second**, Fan Shao, Daiki Kimoto, Kiichi Furukawa, Hidetake Sugo, Tohru Takeda, Ken Miyauchi, Yasuhisa Tochigi, Rihito Kuroda, Shigetoshi Sugawa, Tohoku Univ. (Japan) . . . . . [9022-4]

Lunch Break . . . . . Wed 12:40 pm to 2:00 pm

## Session 2

Location: Continental Ballroom 8 . . . Wed 2:00 pm to 3:20 pm

### Smart Sensors

Session Chairs: **Morley M. Blouke**, Portland State Univ. (United States);  
**Alice L. Reinheimer**, e2v (United States)

2:00 pm: **Low data rate architecture for smart image sensor**, Amani Darwish, Gilles Sicard, Laurent Fesquet, TIMA Lab. (France) . . . . [9022-5]

2:20 pm: **Frameless, time domain continuous image capture**, Henry G. Dietz, Univ. of Kentucky (United States) . . . . . [9022-6]

2:40 pm: **Digital vision sensor for collision avoidance and navigation**, Joseph H. Lin, Peter Grossmann, Daniel R. Schuette, MIT Lincoln Lab. (United States) . . . . . [9022-7]

3:00 pm: **Smart imaging for power-efficient extraction of Viola-Jones local descriptors**, Jorge Fernández-Berni, Ricardo A. Carmona-Galán, IMSE-CNM (Spain) and Univ. de Sevilla (Spain); Rocio del Río Fernández, Instituto de Microelectrónica de Sevilla (Spain) and Univ. de Sevilla (Spain); Juan A. Leñero-Bardallo, IMSE-CNM (Spain) and Univ. de Sevilla (Spain); Manuel Suarez-Cambre, Univ. de Santiago de Compostela (Spain); Ángel B. Rodríguez-Vázquez, IMSE-CNM (Spain) and Univ. de Sevilla (Spain) . . . . . [9022-8]

Coffee Break . . . . . Wed 3:20 pm to 4:00 pm

## Session 3

Location: Continental Ballroom 8 . . . Wed 4:00 pm to 5:20 pm

### High-Performance Sensors

Session Chair: **Kevin J. Matherson**, Microsoft Corp. (United States)

4:00 pm: **Time-to-digital converter using an analogue time stretcher for 3D time-of-flight camera**, Muhammad Tanveer, Luleå Univ. of Technology (Sweden); Ilkka Nissinen, Jan Nissinen, Juha T. Kostamovaara, Univ. of Oulu (Finland); Kalevi Hyyppä, Johan Borg, Jonny Johansson, Luleå Univ. of Technology (Sweden) . . . . . [9022-9]

4:20 pm: **Experiment on digital CDS with 33-M pixel 120-fps super hi-vision image sensor**, Jun Yonai, Toshio Yasue, Kazuya Kitamura, Tetsuya Hayashida, Toshihisa Watabe, Hiroshi Shimamoto, Japan Broadcasting Corp. (Japan); Shoji Kawahito, Shizuoka Univ. (Japan) . . . . . [9022-10]

4:40 pm: **Pixel structure for asymmetry removal in ToF 3D camera**, Byong Min Kang, Jungsoon Shin, Jaehyuk Choi, Dokyoon Kim, Samsung Advanced Institute of Technology (Korea, Republic of) . . . . . [9022-11]

5:00 pm: **A stimulated Raman scattering imager using high-speed lateral electric field modulator and lock-in pixels amplifiers**, Kamel Mars, Beak Guseul, Sangman Han, Taishi Takasawa, Keita Yasutomi, Keiichiro Kagawa, Shizuoka Univ. (Japan); Mamoru Hashimoto, Osaka Univ. (Japan); Shoji Kawahito, Shizuoka Univ. (Japan) . . . . . [9022-12]

## Thursday 6 February

### Session 4

Location: Golden Gate 3 . . . . . Thu 8:30 am to 10:10 am

### Noise and Characterization

Session Chairs: **Boyd A. Fowler**, Google (United States); **Franz Riedlberger**, Jazz Semiconductor, Inc. (United States)

8:30 am: **Estimating an image sensor's temperature by analysing its pixel's dark-signal: theoretical bounds and practical improvements on dark signal correction**, Julian Achatzi, Gregor Fischer, Fachhochschule Köln (Germany); Volker Zimmer, Leica Camera AG (Germany); Dietrich W. Paulus, Univ. Koblenz-Landau (Germany) . . . . . [9022-13]

8:50 am: **A statistical evaluation of effective time constants of random telegraph noise with various operation timings of in-pixel source follower transistors**, Akihiro Yonezawa, Rihito Kuroda, Toshiaki Obara, Akinobu Teramoto, Shigetoshi Sugawa, Tohoku Univ. (Japan) . . [9022-14]

9:10 am: **Correcting high density hot pixel defects in digital imagers**, Glenn H. Chapman, Rohit Thomas, Simon Fraser Univ. (Canada); Israel Koren, Zahava Koren, Univ. of Massachusetts Amherst (United States) . . . . . [9022-15]

9:30 am: **Comparison of two optimized readout chains for low light CIS**, Assim Boukhayma, CEA-LETI (France) and Ecole Polytechnique Fédérale de Lausanne (Switzerland); Arnaud Peizerat, CEA-LETI (France); Christian C.ENZ, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Antoine Dupret, Commissariat à l'Énergie Atomique (France) . . . [9022-16]

9:50 am: **Review of ADCs for imaging**, Juan A. Leñero-Bardallo, Jorge Fernández-Berni, Ángel B. Rodríguez-Vázquez, IMSE-CNM (Spain) and Univ. de Sevilla (Spain) . . . . . [9022-17]

Coffee Break . . . . . Thu 10:10 am to 10:50 am

### Session 5

Location: Golden Gate 3 . . . . . Thu 10:50 am to 12:30 pm

### Technological Improvements

Session Chairs: **James A. DiBella Sr.**, Truesense Imaging, Inc. (United States); **Nobukazu Teranishi**, Univ. of Hogo (Japan), Shizuoka Univ. (Japan)

10:50 am: **Color image sensor using stacked organic photoconductive films with transparent readout circuits separated by thin interlayer insulator**, Toshiakatsu Sakai, Hokuto Seo, Satoshi Aihara, Hiroshi Ohtake, Misao Kubota, NHK Science & Technical Research Labs. (Japan); Mamoru Furuta, Kochi Univ. of Technology (Japan) . . . . . [9022-18]

11:10 am: **Real-time compact multispectral imaging solutions using dichroic filter arrays**, Steve M. Smith, Dave Fish, Pixelteq, Inc. (United States) . . . . . [9022-19]

11:30 am: **A 1024x1 linear photodiode array sensor with fast readout speed flexible pixel-level integration time and high stability to UV light exposure**, Takahiro Akutsu, Shun Kawada, Yasumasa Koda, Taiki Nakazawa, Rihito Kuroda, Shigetoshi Sugawa, Tohoku Univ. (Japan) . . . . . [9022-20]

11:50 am: **A high fill-factor low dark leakage CMOS image sensor with shared-pixel design**, Min-Woong Seo, Keita Yasutomi, Keiichiro Kagawa, Shoji Kawahito, Shizuoka Univ. (Japan) . . . . . [9022-21]

12:10 pm: **Co-integration of a smart CMOS image sensor and a spatial light modulator for real-time optical phase modulation**, Timothe Laforest, Antoine Dupret, Arnaud Verdant, CEA-LETI-Minatec (France); François Ramaz, Ecole Supérieure de Physique et de Chimie Industrielles (France); Sylvain Gigan, Institut Langevin (France); Gilles Tessier, Ecole Supérieure de Physique et de Chimie Industrielles (France) . . . . [9022-22]

Lunch Break . . . . . Thu 12:30 pm to 2:00 pm

# Conference 9022 · Location: Continental Ballroom 8 and Golden Gate 3

## Session 6

Location: Golden Gate 3 . . . . . Thu 2:00 pm to 3:20 pm

### Applications

Session Chair: **Arnaud Darmont**, Aphesa SPRL (Belgium)

2:00 pm: **JEI** **Compressive sensing underwater active serial imaging systems**, Bing Ouyang, Fraser R. Dagleish, Frank M. Caimi, Anni K. Vuorenkoski, Walter B. Britton, Harbor Branch Oceanographic Institute (United States). . . . . [9022-23]

2:20 pm: **A CMOS time-of-flight range image sensor using draining only modulation structure**, Sangman Han, Keita Yasutomi, Keiichiro Kagawa, Shoji Kawahito, Shizuoka Univ. (Japan). . . . . [9022-24]

2:40 pm: **A high speed 2D time-to-impact algorithm targeted for smart image sensors**, Anders Astrom, Combitech AB (Sweden); Robert Forchheimer, Linköping Univ. (Sweden) . . . . . [9022-25]

3:00 pm: **Real-time 3D millimeter wave imaging using focal plane array of detectors**, Daniel Rozban, Avihai Aharon Akram, Amir Abramovich III, Ariel Univ. Ctr. of Samaria (Israel); Natan S. Kopeika, Assaf Levanon, Ben-Gurion Univ. of the Negev (Israel) . . . . . [9022-26]

Coffee Break . . . . . Thu 3:20 pm to 4:00 pm

<p>Location: Golden Gate 3 . . . . . Thu 4:00 pm to 5:00 pm</p> <p><b>Discussion</b></p>
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# Conference 9023 • Location: Continental Ballroom 2

Monday–Wednesday 3–5 February 2014 • Proceedings of SPIE Vol. 9023

## Digital Photography X

*Conference Chairs:* **Nitin Sampat**, Rochester Institute of Technology (United States); **Radka Tezaur**, Nikon Research Corp. of America (United States)

*Conference Co-Chairs:* **Sebastiano Battiato**, Univ. degli Studi di Catania (Italy); **Boyd A. Fowler**, Google (United States); **Todor G. Georgiev**, Qualcomm Inc. (United States); **Francisco H. Imai**, Canon U.S.A., Inc. (United States); **Andrew Lumsdaine**, Indiana Univ. (United States); **Kevin J. Matherson**, Microsoft Corp. (United States); **Dietmar Wüller**, Image Engineering GmbH & Co. KG (Germany)

*Program Committee:* **Erhardt Barth**, Univ. zu Lübeck (Germany); **Donald J. Baxter**, STMicroelectronics Ltd. (United Kingdom); **Kathrin Berkner**, Ricoh Innovations, Inc. (United States); **Ajit S. Bopardikar**, Samsung Electronics, India Software Operations Ltd. (India); **Frédéric Cao**, DxO Labs (France); **Peter B. Catrysse**, Stanford Univ. (United States); **Jeff Chien**, Adobe Systems Inc. (United States); **Lauren A. Christopher**, Indiana Univ.-Purdue Univ. Indianapolis (United States); **Jeffrey M. DiCarlo**, Intuitive Surgical, Inc. (United States); **Henry G. Dietz**, Univ. of Kentucky (United States); **Alexandru F. Drimborean**, Tesseract (FotoNation) Ireland Ltd. (Ireland); **Paolo Favaro**, Univ. der Künste Berlin (Germany); **Robert D. Fiete**, ITT Exelis (United States); **Sergio R. Goma**, Qualcomm Inc. (United States); **Mirko Guarnera**, STMicroelectronics (Italy); **Bahadır K. Gunturk**, Louisiana State Univ. (United States); **Li Hong**, Nikon Research Corp. of America (United States); **Paul M. Hubel**, Apple Inc. (United States); **Xiaoyun Jiang**, Qualcomm Inc. (United States); **George John**, Microsoft Corp. (United States); **Michael A. Kriss**, MAK Consultants (United States); **Jiangtao Kuang**, OmniVision Technologies, Inc. (United States); **Feng Li**, Apple Inc. (United States); **Jingqiang Dylan Li**, Lifesize Communications, Inc. (United States); **Manuel Martinez**, Univ. de València (Spain); **Lingfei Meng**, Ricoh Innovations, Inc. (United States); **Jon S. McElvain**, Dolby Labs., Inc. (United States); **Bo Mu**, BAE Systems (United States); **Seishi Ohmori**, Nikon Corp. (Japan); **Joni Oja**, Nokia Research Ctr. (Finland); **Shmuel Peleg**, The Hebrew Univ. of Jerusalem (Israel); **Kari A. Pulli**, NVIDIA Corp. (United States); **John R. Reinert-Nash**, Lifetouch, Inc. (United States); **Brian G. Rodricks**, Image Engineering GmbH & Co. KG (United States); **Mårten Sjöström**, Mid Sweden Univ. (Sweden); **Filippo D. Stanco**, Univ. degli Studi di Catania (Italy); **Qun Sun**, GalaxyCore, Inc. (United States); **Sabine Süsstrunk**, Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Touraj Tajbakhsh**, Apple Inc. (United States); **Zhan Yu**, Univ. of Delaware (United States); **Jingyi Yu**, Univ. of Delaware (United States); **Ashok Veeraraghavan**, Rice Univ. (United States); **Thomas Vogelsang**, Rambus Inc. (United States); **Michael Wang**, Intel Corp. (United States); **Weihua Xiong**, OmniVision Technologies, Inc. (United States); **Alireza Yasan**, Foveon Inc. (United States); **Lei Zhang**, The Hong Kong Polytechnic Univ. (Hong Kong, China)

### Monday 3 February

#### Session 1

**Location: Continental Ballroom 2 . . Mon 8:50 am to 10:10 am**

#### Computational Photography

Session Chair: **Andrew Lumsdaine**, Indiana Univ. (United States)

8:50 am: **JBI A hardware validated unified model of multi-bit temporally and spatially oversampled image sensors with conditional reset**, Thomas Vogelsang, David G. Stork, Rambus Inc. (United States); Michael Guidash, Rambus, Inc. (United States) . . . . . [9023-1]

9:10 am: **All-glass wafer-level lens technology for array cameras**, Palle Dinesen, AAC Technologies (Denmark) . . . . . [9023-2]

9:30 am: **Real time algorithm invariant to natural lighting with LBP techniques through an adaptive thresholding implemented in GPU processors**, Sergio A. Orjuela Vargas, Jennifer C. Triana, Andres Rodriguez, Univ. Antonio Nariño (Colombia); Wilfried Phillips, Univ. Gent (Belgium); Juan Pablo Yañez, Univ. Antonio Nariño (Colombia) . . . [9023-3]

9:50 am: **Embedded FIR filter design for real-time refocusing using a standard plenoptic video camera**, Christopher Hahne, Univ. of Bedfordshire (United Kingdom) . . . . . [9023-4]

Coffee Break . . . . . Mon 10:10 am to 10:50 am

#### Session 2

**Location: Continental Ballroom 2 . Mon 10:50 am to 12:30 pm**

#### Mobile Photography

Session Chair: **Sebastiano Battiato**, Univ. degli Studi di Catania (Italy)

10:50 am: **Mobile multi-flash photography**, Xinqing Guo, Univ. of Delaware (United States); Jin Sun, Univ. of Maryland, College Park (United States); Zhan Yu, Univ. of Delaware (United States); Haibin Ling, Temple Univ. (United States); Jingyi Yu, Univ. of Delaware (United States) [9023-5]

11:10 am: **Stereo vision based depth of field rendering on a mobile device**, Qiaosong Wang, Zhan Yu, Univ. of Delaware (United States); Christopher Rasmussen, University of Delaware (United States); Jingyi Yu, Univ. of Delaware (United States) . . . . . [9023-6]

11:30 am: **Comparison of approaches for mobile document image analysis using server supported smartphones**, Suleyman Ozarslan, P. E. Eren, Middle East Technical Univ. (Turkey) . . . . . [9023-7]

11:50 am: **UV curing adhesives optimized for UV replication processes used in micro optical applications**, Andreas Kraft, Markus Brehm, DELO Industrial Adhesives (Germany) . . . . . [9023-8]

12:10 pm: **Mobile microscopy on the move**, Woei-Ming S. Lee, Australian National Univ. (Australia) . . . . . [9023-9]

Lunch Break . . . . . Mon 12:30 pm to 2:20 pm

#### Session 3

**Location: Continental Ballroom 2 . . . Mon 2:20 pm to 5:00 pm**

#### Image Quality Evaluation Methods/Standards for Mobile and Digital Photography: Joint Session with Conferences 9016 and 9023

Session Chairs: **Dietmar Wüller**, Image Engineering GmbH & Co. KG (Germany); **Sophie Triantaphillidou**, Univ. of Westminster (United Kingdom); **Robin B. Jenkin**, Aptina Imaging Corp. (United States)

2:20 pm: **No training blind image quality assessment**, Ying Chu, Xi'an Jiaotong Univ. (China) and Shenzhen Univ. (China); Xuanqin Mou, Xi'an Jiaotong Univ. (China); Zhen Ji, Shenzhen Univ. (China) . . . . . [9023-10]

2:40 pm: **Description of texture loss using the dead leaves target: current issues and a new intrinsic approach**, Uwe Artmann, Leonie Kirk, Image Engineering GmbH & Co. KG (Germany) . . . . . [9023-11]

3:00 pm: **Electronic trigger for capacitive touchscreen and extension of ISO 15781 standard time lags measurements to smartphones**, François-Xavier Bucher, Frédéric Cao, Clément Viard, Frédéric Guichard, DxO Labs (France) . . . . . [9023-12]

Coffee Break . . . . . Mon 3:20 pm to 3:40 pm

# Conference 9023 · Location: Continental Ballroom 2

3:40 pm: **JPEG ringing artifact visibility evaluation**, Sirui Hu, Zygmunt Pizlo, Jan P. Allebach, Purdue Univ. (United States) . . . . . [9016-14]

4:00 pm: **Mobile phone camera benchmarking: combination of camera speed and image quality**, Veli-Tapani Peltoketo, Sofica Ltd. (Finland) . . . . . [9016-15]

4:20 pm: **Device and algorithms for camera timing evaluation**, Lucie Masson, Frédéric Cao, Clément Viard, Frédéric Guichard, DxO Labs (France) . . . . . [9016-16]

4:40 pm: **Embedded signal approach to image texture reproduction analysis**, Peter D. Burns, Burns Digital Imaging (United States); Donald J. Baxter, STMicroelectronics Ltd. (United Kingdom) . . . . . [9016-17]

2:40 pm: **Image sensor noise profiling by voting based curve fitting**, Sebastiano Battiato, Giovanni Puglisi, Rosetta Rizzo, Univ. degli Studi di Catania (Italy); Angelo Bosco, Arcangelo R. Bruna, STMicroelectronics (Italy) . . . . . [9023-21]

3:00 pm: **JEI Color correction pipeline optimization for digital cameras**, Simone Bianco, Univ. degli Studi di Milano-Bicocca (Italy); Arcangelo R. Bruna, Filippo Naccari, STMicroelectronics (Italy); Raimondo Schettini, Univ. degli Studi di Milano-Bicocca (Italy) . . . . . [9023-22]

3:20 pm: **Analysis of a 64x64 matrix of direct color sensors based on spectrally tunable pixels**, Giacomo Langfelder, Alessandro Caspani, Antonio F. Longoni, Edoardo Linari, Politecnico di Milano (Italy) . [9023-28]

Coffee Break . . . . . Tue 3:40 pm to 4:00 pm

## Tuesday 4 February

**Location: Continental Ballroom 5 . . . . . 8:30 am to 9:50 am**

### Plenary Session and Society Award Presentations

8:30 am: **Using fMRI To Reverse Engineer the Human Visual System (Plenary)**, Jack L. Gallant, Univ. of California, Berkeley (United States) . . . . . [9011-301]

Coffee Break . . . . . Tue 9:50 am to 10:20 am

### Session 4

**Location: Continental Ballroom 2 . . Tue 10:20 am to 12:20 pm**

#### Blur

Session Chair: **Radka Tezaur**, Nikon Research Corp. of America (United States)

10:20 am: **Space-varying blur kernel estimation and image deblurring**, Qinchun Qian, Bahadır K. Gunturk, Louisiana State Univ. (United States) . . . . . [9023-13]

10:40 am: **Super-resolution restoration of motion blurred images**, Qinchun Qian, Bahadır K. Gunturk, Louisiana State Univ. (United States) . . . . . [9023-14]

11:00 am: **To denoise or deblur: parameter optimization for imaging systems**, Kaushik Mitra, Rice Univ. (United States); Oliver Cossairt, Northwestern Univ. (United States); Ashok Veeraraghavan, Rice Univ. (United States) . . . . . [9023-15]

11:20 am: **Depth from defocus using the mean spectral ratio**, David P. Morgan-Mar, Matthew R. Arnison, Canon Information Systems Research Australia Pty. Ltd. (Australia) . . . . . [9023-16]

11:40 am: **An extensive empirical evaluation of focus measures for digital photography**, Hashim Mir, Peter Xu, Peter van Beek, Univ. of Waterloo (Canada) . . . . . [9023-17]

12:00 pm: **Out-of-focus point spread functions**, Henry G. Dietz, Univ. of Kentucky (United States) . . . . . [9023-18]

Lunch Break . . . . . Tue 12:20 pm to 2:00 pm

### Session 5

**Location: Continental Ballroom 2 . . . Tue 2:00 pm to 3:40 pm**

#### Image Processing Pipeline and Camera Characterization

Session Chair: **Nitin Sampat**, Rochester Institute of Technology (United States)

2:00 pm: **Automating the design of image processing pipelines for novel color filter arrays: local, linear, learned (L3) method**, Qiyuan Tian, Stanford Univ. (United States); Steven P. Lansel, Olympus America Inc. (United States); Joyce E. Farrell, Brian A. Wandell, Stanford Univ. (United States) . . . . . [9023-19]

2:20 pm: **Minimized-Laplacian residual interpolation for color image demosaicking**, Kiku Daisuke, Yusuke Monno, Masayuki Tanaka, Masatoshi Okutomi, Tokyo Institute of Technology (Japan) . . . . [9023-20]

**Location: Continental Ballroom 2 . . . . . 4:00 pm to 5:00 pm**

#### Discussion Session: Mobile Capture: What's Necessary To Make It The Only Cameras We Use?

**Location: Continental Ballroom 4 . . . . . 5:30 pm to 7:30 pm**

#### Symposium Demonstration Session

A symposium-wide demonstration session will be open to attendees 5:30 to 7:30 pm Tuesday evening. Demonstrators will provide interactive, hands-on demonstrations of a wide-range of products related to Electronic Imaging.

## Wednesday 5 February

**Location: Continental Ballroom 5 . . . . . 8:30 am to 9:50 am**

### Plenary Session and Conference Award Presentations

8:30 am: **Integrated Imaging: Creating Images from the Tight Integration of Algorithms, Computation, and Sensors (Plenary)**, Charles A. Bouman, Purdue Univ. (United States) . . . . . [9011-300]

#### Interactive Paper Session-Wednesday

*Interactive papers will be placed on display after 8:30 am on Wednesday. An interactive paper session, with authors present at their papers, will be held Wednesday morning, 9:50 to 11:10 am. Refreshments will be served.*

**Location: Continental Ballroom and Golden Gate Foyers . . . . . 9:50 am to 11:10 am**

**A method of mobile display (OLED/LCD) sharpness assessment through the perceptual brightness and edge characteristic of display and image**, Min Woo Lee, Seul Ki Jang, Samsung Electronics Co., Ltd. (Korea, Republic of) . . . . . [9023-35]

**Spatial adaptive upsampling filter for HDR image based on multiple luminance range**, Qian Chen, Guan-Ming Su, Peng Yin, Dolby Labs., Inc. (United States) . . . . . [9023-36]

**A classification-and-reconstruction approach for a single image super-resolution by a sparse representation**, YingYing Fan, Masayuki Tanaka, Masatoshi Okutomi, Tokyo Institute of Technology (Japan) . . . . . [9023-38]

**LoG acts as a good feature in the task of image quality assessment**, Xuanqin Mou, Wufeng Xue, Congmin Chen, Xi'an Jiaotong Univ. (China); Lei Zhang, The Hong Kong Polytechnic Univ. (Hong Kong, China) [9023-39]

**Sharpness enhancement for mobile devices**, Seul Ki Jang, Hyun Hee Park, Jee Young Yeom, Jong Ho Kim, Min Woo Lee, Samsung Electronics Co., Ltd. (Korea, Republic of) . . . . . [9023-40]

**White constancy method for mobile displays**, Ji Young Yum, Hyun Hee Park, Seul Ki Jang, Jae Hyang Lee, Jong Man Kim, Ji Young Yi, Min Woo Lee, Samsung Electronics Co., Ltd. (Korea, Republic of) . . . . . [9023-41]

**JEI** = Published in the *Journal of Electronic Imaging*

# Conference 9023 · Location: Continental Ballroom 2

## Session 6

Location: Continental Ballroom 2 . Wed 11:10 am to 12:30 pm

### Computer Vision and Applications

Session Chair: **Todor G. Georgiev**, Qualcomm Inc. (United States)

11:10 am: **JEI Improved method of finding the illuminant direction of a sphere**, Richard Dosselmann, Xue Dong Yang, Univ. of Regina (Canada) . . . . . [9023-23]

11:30 am: **Light transport matrix recovery for nearly planar objects**, Niranjana Thanikachalam, Loïc A. Baboulaz, Paolo Prandoni, Martin Vetterli, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [9023-24]

11:50 am: **The color of water: using underwater photography to assess water quality**, John W. Breneman IV, Henryk Blasinski, Joyce E. Farrell, Stanford Univ. (United States) . . . . . [9023-25]

12:10 pm: **Surveillance system of power transmission line via object recognition and 3D vision computation**, YuanXin Zhang, Xuanqin Mou, Xi'an Jiaotong Univ. (China) . . . . . [9023-26]

Lunch Break . . . . . Wed 12:30 pm to 2:20 pm

## Session 7

Location: Continental Ballroom 2 . . . Wed 2:20 pm to 3:20 pm

### Color

Session Chair: **Francisco H. Imai**, Canon U.S.A., Inc. (United States)

2:20 pm: **Metamer density estimation using Gaussian mixture prior with identical spherical variances**, Yusuke Murayama, Pengchang Zhang, Ari Ide-Ektessabi, Kyoto Univ. (Japan) . . . . . [9023-27]

2:40 pm: **Absolute colorimetric characterization of a DSLR camera**, Giuseppe Claudio Guarnera, Simone Bianco, Raimondo Schettini, Univ. degli Studi di Milano-Bicocca (Italy) . . . . . [9023-29]

3:00 pm: **Simultaneous capturing of RGB and additional band images using hybrid color filter array**, Daisuke Kiku, Yusuke Monno, Masayuki Tanaka, Masatoshi Okutomi, Tokyo Institute of Technology (Japan) . . . . . [9023-30]

Coffee Break . . . . . Wed 3:20 pm to 4:00 pm

## Session 8

Location: Continental Ballroom 2 . . . Wed 4:00 pm to 5:20 pm

### HDR

Session Chair: **Kevin J. Matherson**, Microsoft Corp. (United States)

4:00 pm: **Badly exposed object recovery using images captured under disparate conditions**, Florian M. Savoy, Univ. of Illinois at Urbana-Champaign (Singapore) and École Polytechnique Fédérale de Lausanne (Switzerland); Vassilios Vonikakis, Stefan Winkler, Advanced Digital Sciences Ctr. (Singapore); Sabine Süsstrunk, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [9023-31]

4:20 pm: **Creating cinematic wide gamut HDR-video for the evaluation of tone mapping operators and HDR-displays**, Jan Froehlich, Andreas Schilling, Eberhard Karls Univ. Tübingen (Germany); Stefan Grandinetti, Simon Walter, Bernd Eberhardt, Hochschule der Medien (Germany); Harald Brendel, Arnold & Richter Cine Technik GmbH & Co. Betriebs KG (Germany) . . . . . [9023-32]

4:40 pm: **Cost optimized multi-camera array for high quality video with very high dynamic range**, Joachim Keinert, Marcus Wetzel, Fraunhofer-Institut für Integrierte Schaltungen (IIS) (Germany); Michael Schöberl, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Peter Schäfer, Frederik Zilly, Fraunhofer-Institut für Integrierte Schaltungen (IIS) (Germany); Michel Bätz, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Siegfried Föbel, Fraunhofer-Institut für Integrierte Schaltungen (IIS) (Germany); André Kaup, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) . . . . . [9023-33]

5:00 pm: **The effect of split pixel image sensor technology on MTF measurements**, Brian M. Deegan, Valeo Vision Systems (Ireland)[9023-34]

# Conference 9024 • Location: Golden Gate 5

Monday–Tuesday 3–4 February 2014 • Proceedings of SPIE Vol. 9024

## Image Processing: Machine Vision Applications VII

*Conference Chairs:* **Kurt S. Niel**, Upper Austria Univ. of Applied Sciences (Austria); **Philip R. Bingham**, Oak Ridge National Lab. (United States)

*Program Committee:* **Ewald Fauster**, vatron GmbH (Austria); **Daniel Fecker**, Technische Univ. Braunschweig (Germany); **Steven P. Floeder**, 3M Co. (United States); **David Fofi**, Univ. de Bourgogne (France); **Shaun Gleason**, National Oceanography Ctr. (United Kingdom); **Keith Jenkins**, The Univ. of Southern California (United States); **Olivier Laligant**, Univ. de Bourgogne (France); **Edmund Y. Lam**, The Univ. of Hong Kong (Hong Kong, China); **Fabrice Meriaudeau**, Univ. de Bourgogne (France); **Hamed Sari-Sarraf**, Texas Tech Univ. (United States); **Ivan W. Selesnick**, Polytechnic Institute of New York Univ. (United States); **Ralph Seulin**, Univ. de Bourgogne (France); **Christophe Stolz**, Univ. de Bourgogne (France); **Vincent C. Paquit**, Oak Ridge National Lab. (United States); **Gerald Zauner**, FH OÖ Forschungs & Entwicklungs GmbH (Austria)

### Monday 3 February

#### Session 1

**Location: Golden Gate 5 . . . . . Mon 8:50 am to 10:20 am**

#### Industrial Machine Vision Applications

Session Chair: **Philip R. Bingham**, Oak Ridge National Lab. (United States)

8:50 am: **Machine vision based quality inspection of flat glass products**, Gerald Zauner, Martin Schagerl, FH OÖ Forschungs & Entwicklungs GmbH (Austria) . . . . . [9024-2]

9:10 am: **Stain defect detection for mobile phone camera modules**, Sehee Hong, Chulhee Lee, Yonsei Univ. (Korea, Republic of) . . . . [9024-3]

9:30 am: **A novel automatic full-scale inspecting system for banknote printing plates**, Jian Zhang Sr., Li Feng, Jibing Lu, Qingwang Qin, Security Printing Institute of People's Bank of China (China) . . . . . [9024-4]

9:50 am: **Possible future trends and developments in industrial machine vision**, Kurt S. Niel, Upper Austria Univ. of Applied Sciences (Austria) . . . . . [9024-5]

Coffee Break . . . . . Mon 10:20 am to 10:50 am

#### Session 2

**Location: Golden Gate 5 . . . . . Mon 10:50 am to 12:10 pm**

#### Computational Vision and Imaging Techniques I

Session Chair: **Gerald Zauner**, FH OÖ Forschungs & Entwicklungs GmbH (Austria)

10:50 am: **Symbolic feature detection for image understanding**, Sinem Aslan, Ege Univ. (Turkey); Ceyhun B. Akgul, Bülent Sankur, Bogaziçi Univ. (Turkey) . . . . . [9024-6]

11:10 am: **Depth and all-in-focus images obtained by multi-line-scan light-field approach**, Svorad Štolc, AIT Austrian Institute of Technology GmbH (Austria) and Institute of Measurement Science (Slovakia); Reinhold Huber-Mörk, Branislav Holländer, AIT Austrian Institute of Technology GmbH (Austria); Daniel Soukup, Austrian Research Ctrs. GmbH (Austria) . . . . . [9024-7]

11:30 am: **An image projection system that avoids image projection on all-except-of-the-screen objects that are in the area covered by output projector light**, Viacheslav Sabirov, Skolkovo Institute of Science and Technology (Russian Federation) . . . . . [9024-8]

11:50 am: **Line detection in a noisy environment with weighted Radon transform**, Boris A. Alpatov, Pavel V. Babayan, Nikita Y. Shubin, Ryazan State Radio Engineering Univ. (Russian Federation) . . . . . [9024-9]

Lunch Break . . . . . Mon 12:10 pm to 2:00 pm

#### Session 3

**Location: Golden Gate 5 . . . . . Mon 2:00 pm to 3:20 pm**

#### Computational Vision and Imaging Techniques II

Session Chair: **Kurt S. Niel**, Upper Austria Univ. of Applied Sciences (Austria)

2:00 pm: **Efficient adaptive thresholding with image masks**, Young-Taek Oh, Young-Kyoo Hwang, Jung-Bae Kim, Won-Chul Bang, Samsung Advanced Institute of Technology (Korea, Republic of) . . . . . [9024-10]

2:20 pm: **A shape-preserving image binarization method**, Jingu Heo, Samsung Advanced Institute of Technology (Korea, Republic of) [9024-11]

2:40 pm: **Illumination-invariant pattern recognition using fringe-adjusted joint transform correlator and monogenic signal**, Paheding Sidike, Vijayan K. Asari, Univ. of Dayton (United States); Mohammad S. Alam, Univ. of South Alabama (United States) . . . . . [9024-12]

3:00 pm: **Illumination invariant 3D change detection**, Yakov Diskin, Vijayan K. Asari, Univ. of Dayton (United States) . . . . . [9024-13]

### Tuesday 4 February

**Location: Continental Ballroom 5 . . . . . 8:30 am to 9:50 am**

#### Plenary Session and Society Award Presentations

8:30 am: **Using fMRI To Reverse Engineer the Human Visual System (Plenary)**, Jack L. Gallant, Univ. of California, Berkeley (United States) . . . . . [9011-301]

Coffee Break . . . . . Tue 9:50 am to 10:20 am

#### Session 4

**Location: Golden Gate 5 . . . . . Tue 10:20 am to 12:20 pm**

#### Thermal, Color, and/or Spectroscopic Imaging Algorithms and Applications

Session Chair: **Gerald Zauner**, FH OÖ Forschungs & Entwicklungs GmbH (Austria)

10:20 am: **High throughput imaging and analysis for biological interpretation of agricultural plants and environmental interaction**, Hyundae Hong, Jasenka Benac, Daniel Riggsbee, Keith A. Koutsky, Monsanto Co. (United States) . . . . . [9024-14]

10:40 am: **Interactive quantification of complex objects in microscopy images**, Reid B. Porter, Christy Ruggiero, Neal Harvey, Los Alamos National Lab. (United States) . . . . . [9024-15]

11:00 am: **On the use of MKL for cooking action recognition**, Simone Bianco, Gianluigi Ciocca, Paolo Napoletano, Raimondo Schettini, Univ. degli Studi di Milano-Bicocca (Italy) . . . . . [9024-16]

11:20 am: **Video-based automatic vehicle classification based on axle detection**, Xinhua Xiao, Zhuo Yao, Chia Yung Han, Xuefu Zhou, William G. Wee, Wei Heng, Univ. of Cincinnati (United States) . . . . . [9024-17]

# Conference 9024 · Location: Golden Gate 5

11:40 am: **Hyperspectral estimation using RGB color for foodborne pathogen detection on agar plates**, Seung-Chul Yoon, Tae-Sung Shin, William R. Windham, Bosoon Park, Kurt C. Lawrence, Young-Wook Seo, Agricultural Research Service (United States). . . . . [9024-18]

12:00 pm: **Improved wheal detection from skin prick test images**, Orhan Bulan, Xerox Corp. (United States). . . . . [9024-19]

Lunch Break . . . . . Tue 12:20 pm to 2:00 pm

## Session 5

**Location: Golden Gate 5 . . . . . Tue 2:00 pm to 3:20 pm**

### Image-Related Pattern Recognition Techniques and Applications

Session Chair: **Kurt S. Niel**, Upper Austria Univ. of Applied Sciences (Austria)

2:00 pm: **Face recognition by detection of matching cliques of points**, Fred W Stentiford, Univ. College London (United Kingdom) . . . . [9024-20]

2:20 pm: **Scoring recognizability of faces for security applications**, Simone Bianco, Gianluigi Ciocca, Giuseppe Claudio Guarnera, Univ. degli Studi di Milano-Bicocca (Italy); Andrea Scaggiante, Bettini S.r.l. (Italy); Raimondo Schettini, Univ. degli Studi di Milano-Bicocca (Italy) . . [9024-21]

2:40 pm: **Structure-from-motion reconstruction based on weighted hamming descriptors**, Guoyu Lu, Vincent Ly, Chandra Kambhampettu, Univ. of Delaware (United States) . . . . . [9024-22]

3:00 pm: **JIEI New online signature acquisition system**, Messaoud Mostefai, Adel Oulefki, Abbadi Belkacem, Samira Djebani, Abderraouf Bouziane, Univ. of Bordj Bou Arreridj (Algeria); Youssef Chahir, Univ. de Caen Basse-Normandie (France) . . . . . [9024-23]

### Interactive Paper Session-Tuesday

*Interactive papers will be placed on display after 3:30 pm on Tuesday. An interactive paper session, with authors present at their papers, will be held Tuesday evening, 5:30 to 6:45 pm. Refreshments will be served.*

**Location: Continental Ballroom and Golden Gate Foyers . . . . . 5:30 pm to 6:45 pm**

**An attentive multi-camera system**, Paolo Napoletano, Francesco Tisato, Univ. degli Studi di Milano-Bicocca (Italy). . . . . [9024-1]

**Object detection in MOUT: evaluation of hybrid approaches for confirmation and rejection of object detection hypotheses**, Juergen Metzler, Daniel Manger, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany). . . . . [9024-24]

**Improving the classification of texture by multifractal analysis with discrepancy, distance, and Lacunarity spectra**, Mohamed Khider, Univ. des Sciences et de la Technologie Houari Boumediene (Algeria). [9024-25]

**Image thresholding using standard deviation**, Jung-Min Sung, Dae-Chul Kim, Bong-Yeol Choi, Yeong-Ho Ha, Kyungpook National Univ. (Korea, Republic of) . . . . . [9024-26]

**Soft brush touch image sensing based on planar optical waveguide sensor system**, Jeong Dae Suh, Joo-Hang Lee, Ahyun Lee, Electronics and Telecommunications Research Institute (Korea, Republic of) [9024-27]

**Hyperspectral imaging applied to process and quality control in waste recycling plants**, Silvia Serranti, Giuseppe Bonifazi, Univ. degli Studi di Roma La Sapienza (Italy). . . . . [9024-28]

**Eye tracking using correlation filters**, Mahmut Karakaya, David S. Bolme, Christopher B. Boehnen, Oak Ridge National Lab. (United States) . . . . . [9024-29]

**An efficient automatic object recognition method based on region similarity: application to roof detection from orthophotoplans**, Abdellatif Eldrissi, Univ. de Technologie de Belfort-Montbéliard (France) and Univ. Abdelmalek Essadi (Morocco); Youssef Elmerabet, Univ. de Technologie de Belfort-Montbéliard (France) and Univ. Ibn Tofail (Morocco); Yassine Ruichek, Univ. de Technologie de Belfort-Montbéliard (France); Ahmed Moussa, Univ. Abdelmalek Essadi (Morocco); Cyril Meurie, Univ. de Technologie de Belfort-Montbéliard (France) . . [9024-30]

**An uniformity algorithm for high-speed fixed-array printers**, Kartheek Chandu, Mikel J. Stanich, Larry M. Ernst, Ricoh Production Print Solutions, LLC (United States); Sreenath Rao Vantaram, Intel Corp. (United States) . . . . . [9024-31]

**Location: Continental Ballroom 4 . . . . .5:30 pm to 7:30 pm**

### Symposium Demonstration Session

A symposium-wide demonstration session will be open to attendees 5:30 to 7:30 pm Tuesday evening. Demonstrators will provide interactive, hands-on demonstrations of a wide-range of products related to Electronic Imaging.

## Wednesday 5 February

**Location: Continental Ballroom 5 . . . . .8:30 am to 9:50 am**

### Plenary Session and Conference Award Presentations

8:30 am: **Integrated Imaging: Creating Images from the Tight Integration of Algorithms, Computation, and Sensors (Plenary)**, Charles A. Bouman, Purdue Univ. (United States) . . . . . [9011-300]

# Conference 9025 • Location: Golden Gate 5

Wednesday–Thursday 5–6 February 2014 • Proceedings of SPIE Vol. 9025

## Intelligent Robots and Computer Vision XXXI: Algorithms and Techniques

*Conference Chairs:* **Juha Röning**, Univ. of Oulu (Finland); **David Casasent**, Carnegie Mellon Univ. (United States)

*Program Committee:* **Norbert Lauinger**, CORRSYS 3D Sensors AG (Germany); **Dah Jye Lee**, Brigham Young Univ. (United States); **Charles A. McPherson**, Draper Lab. (United States); **Kurt S. Niel**, Fachhochschule Wels (Austria); **Yoshihiko Nomura**, Mie Univ. (Japan); **Daniel Raviv**, Florida Atlantic Univ. (United States); **Bernard L. Theisen**, U.S. Army Tank Automotive Research, Development and Engineering Ctr. (United States); **Dili Zhang**, Monotype Imaging (United States); **Lucas Paletta**, JOANNEUM RESEARCH Forschungsgesellschaft mbH (Austria)

### Tuesday 4 February

**Location: Continental Ballroom 5 . . . . .8:30 am to 9:50 am**

#### Plenary Session and Society Award Presentations

8:30 am: **Using fMRI To Reverse Engineer the Human Visual System (Plenary)**, Jack L. Gallant, Univ. of California, Berkeley (United States) . . . . . [9011-301]

**Location: Continental Ballroom 4 . . . . .5:30 pm to 7:30 pm**

#### Symposium Demonstration Session

A symposium-wide demonstration session will be open to attendees 5:30 to 7:30 pm Tuesday evening. Demonstrators will provide interactive, hands-on demonstrations of a wide-range of products related to Electronic Imaging.

### Wednesday 5 February

**Location: Continental Ballroom 5 . . . . .8:30 am to 9:50 am**

#### Plenary Session and Conference Award Presentations

8:30 am: **Integrated Imaging: Creating Images from the Tight Integration of Algorithms, Computation, and Sensors (Plenary)**, Charles A. Bouman, Purdue Univ. (United States) . . . . . [9011-300]

#### Interactive Paper Session-Wednesday

*Interactive papers will be placed on display after 8:30 am on Wednesday. An interactive paper session, with authors present at their papers, will be held Wednesday morning, 9:50 to 11:10 am. Refreshments will be served.*

**Location: Continental Ballroom and Golden Gate Foyers . . . . .9:50 am to 11:10 am**

**OpenCLIPP: OpenCL integrated performance primitives library for computer vision applications**, Moulay A. Akhloufi, Antoine Campagna, Ctr of Robotics and Vision (Canada) . . . . . [9025-31]

**An intelligent hybrid behavior coordination system for an autonomous mobile robot**, Chaomin Luo, Mohan Krishnan, Mark Paulik, Samer Fallouh, Univ. of Detroit Mercy (United States) . . . . . [9025-32]

**Increasing signal-to-noise ratio of registered images by using light spatial noise portrait of camera's photosensor**, Nikolay N. Evtkhiev, Pavel A. Cheremkhin, Vitaly V. Krasnov, Vladislav G. Rodin, Sergey N. Starikov, National Research Nuclear Univ. MEPhI (Russian Federation) . . . . . [9025-33]

**Color back projection for fruit maturity evaluation**, Dong Zhang, Sun Yat-Sen Univ. (China); Dah Jye Lee, Alok Desai, Brigham Young Univ. (United States) . . . . . [9025-34]

**Unmanned ground vehicle: controls and dynamics**, Ebrahim F. Attarwala, Pranav Maheshwari, Kumar Keshav, Pranjal Jain, Arpit Gupta, Kriti Gupta, Ravi Yadav, Indian Institute of Technology Bombay (India) . . . . . [9025-35]

**A super-fast algorithm for self grouping in a 2D binary picture**, Chialun John Hu, SunnyFuture (United States) . . . . . [9025-36]

### Session 1

**Location: Golden Gate 5 . . . . .Wed 11:10 am to 12:50 pm**

#### Intelligent Mobile Robot Methods and Advancements

Session Chairs: **Juha Röning**, Univ. of Oulu (Finland); **David Casasent**, Carnegie Mellon Univ. (United States)

11:10 am: **Routine learning for robot's task planning**, Antti Tikanmäki, Sandra T. Feliu, Juha Röning, Univ. of Oulu (Finland) . . . . . [9025-1]

11:30 am: **A novel lidar-driven two-level approach for real-time unmanned ground vehicle navigation and map building**, Chaomin Luo, Bo Cui, Xingzhong Zhang, Mohan Krishnan, Mark Paulik, Univ. of Detroit Mercy (United States) . . . . . [9025-2]

11:50 am: **The 21st annual intelligent ground vehicle competition: robotists for the future**, Bernard L. Theisen, U.S. Army Tank Automotive Research, Development and Engineering Ctr. (United States) . . . . [9025-3]

12:10 pm: **Surveillance and detection technology research based on panoramic depth vision system for public emergencies on-site inspection**, Weijia Feng, Tianjin Univ. (China); Juha Röning, Univ. of Oulu (Finland); Yi Tian, Huazhi Sun, Xirong Ma, Tianjin Normal Univ. (China) . . . . . [9025-4]

12:30 pm: **Self-localization for an autonomous mobile robot based on an omni-directional vision system**, Shu-Yin Chiang, Ming Chuan Univ. (Taiwan); Kuang-Yu Lin, Tsorng-Lin Chia, Ming Chuan University (Taiwan) . . . . . [9025-5]

Lunch Break . . . . .Wed 12:50 pm to 2:00 pm

### Session 2

**Location: Golden Gate 5 . . . . .Wed 2:00 pm to 3:40 pm**

#### Computer Vision Algorithms and Applications

Session Chair: **Kurt S. Niel**, Upper Austria Univ. of Applied Sciences (Austria)

2:00 pm: **High-speed object matching and localization using gradient orientation features**, Xinyu Xu, Peter van Beek, Xiao-Fan Feng, Sharp Labs. of America, Inc. (United States) . . . . . [9025-6]

2:20 pm: **Automatic lip reading by using multimodal visual features**, Shohei Takahashi, Jun Ohya, Waseda Univ. (Japan) . . . . . [9025-7]

2:40 pm: **A Viola-Jones based hybrid face detection framework**, Thomas M. Murphy, Randy Broussard, Robert C. Schultz, Ryan Rakvic, Hau Ngo, U.S. Naval Academy (United States) . . . . . [9025-8]

3:00 pm: **Towards automatic identification of mismatched image pairs through loop constraints**, Armagan Elibol, KAIST (Korea, Republic of) and Yýldýz Teknik Üniv. (Turkey); Jinwhan Kim, KAIST (Korea, Republic of); Nuno Gracias, Rafael Garcia, Univ. de Girona (Spain) . . . . . [9025-9]

3:20 pm: **Using short-wave infrared imaging for fruit quality evaluation**, Dong Zhang, Sun Yat-Sen Univ. (China); Dah Jye Lee, Alok Desai, Brigham Young Univ. (United States) . . . . . [9025-10]

Coffee Break . . . . .Wed 3:40 pm to 4:00 pm

# Conference 9025 · Location: Golden Gate 5

## Session 3

Location: Golden Gate 5 . . . . . Wed 4:00 pm to 5:00 pm

### Mobile Cognitive System

Session Chair: **Lucas Paletta**, JOANNEUM RESEARCH  
Forschungsgesellschaft mbH (Austria)

4:00 pm: **Disaster scene partial reconstruction driven by attentive search of an operator wearing the gaze machine** (*Invited Paper*), Flora Pirri, Bruno Cafaro, Valsamis Ntouskos, Manuel Ruiz, Univ. degli Studi di Roma La Sapienza (Italy) . . . . . [9025-12]

4:20 pm: **Planning perception and action for cognitive mobile manipulators** (*Invited Paper*), Andre Gaschler, Svetlana Nogina, Technische Univ. München (Germany); Ronald P. A. Petrick, Univ of Edinburgh (United Kingdom); Alois Knoll, Technische Univ. München (Germany) . . . . . [9025-13]

4:40 pm: **Continuous 3D recovery of human gaze using multisensory tracking**, Lucas Paletta, JOANNEUM RESEARCH Forschungsgesellschaft mbH (Austria) . . . . . [9025-14]

## Thursday 6 February

### Session 4

Location: Golden Gate 5 . . . . . Thu 8:30 am to 10:30 am

### Localization, Tracking, and Scene Analysis

Session Chair: **Terrell Nathan Mundhenk**, HRL Labs., LLC (United States)

8:30 am: **Motion lecture annotation system to learn Naginata performances**, Daisuke Kobayashi, Ryota Sakamoyo, Yoshihiko Nomura, Mie Univ. (Japan) . . . . . [9025-15]

8:50 am: **Illumination-robust people tracking using a smart camera network**, Nyan Bo Bo, Peter Van Hese, Junzhi Guan, Sebastian Gruenwedel, Jorge Oswaldo Niño-Castaneda, Dimitri Van Cauwelaert, Dirk Van Haerenborgh, Peter Veelaert, Wilfried Philips, Univ. Gent (Belgium) . . . . . [9025-16]

9:10 am: **Image-based indoor localization system based on 3D SfM model**, Guoyu Lu, Chandra Kambhmettu, Univ. of Delaware (United States) . . . . . [9025-17]

9:30 am: **Using probabilistic model as feature descriptor on a smartphone device for autonomous navigation of unmanned ground vehicles**, Alok Desai, Dah Jye Lee, Brigham Young Univ. (United States) . . . . . [9025-18]

9:50 am: **Relative localization in urban environment using exclusively RGB-D cameras**, Marie-Anne Mittet, Pierre Grussenmeyer, Tania Landes, Institut National des Sciences Appliquées de Strasbourg (France) [9025-19]

10:10 am: **Classification and segmentation of orbital space based objects against terrestrial distractors for the purpose of finding holes in shape from motion 3D reconstruction**, Terrell Nathan Mundhenk, Arturo Flores, Heiko Hoffman, HRL Labs., LLC (United States) . . [9025-20]

Coffee Break . . . . . Thu 10:30 am to 10:50 am

## Session 5

Location: Golden Gate 5 . . . . . Thu 10:50 am to 12:30 pm

### 3D Vision

Session Chair: **Yoshihiko Nomura**, Mie Univ. (Japan)

10:50 am: **Discrete and continuous curvature computation for real data**, Dirk J. Colbry, Michigan State Univ. (United States); Neelima Shrikhande, Central Michigan Univ. (United States) . . . . . [9025-21]

11:10 am: **An evaluation of attention models for use in SLAM**, Samuel Dodge, Lina Karam, Arizona State Univ. (United States) . . . . . [9025-22]

11:30 am: **3D vision system for intelligent milking robot automation**, Moulay A. Akhloufi, Ctr of Robotics and Vision (Canada) . . . . . [9025-23]

11:50 am: **SDTP: a robust method for interest point detection on 3D range images**, Shandong Wang, Lujin Gong, Hui Zhang, Yongjie Zhang, Haibing Ren, Samsung Advanced Institute of Technology (China); Seon-Min Rhee, Hyong-Euk Lee, Samsung Advanced Institute of Technology (Korea, Republic of) . . . . . [9025-24]

12:10 pm: **Real time moving object detection using motor signal and depth map for robot car**, Hao Wu, Wan-Chi Siu, The Hong Kong Polytechnic Univ. (Hong Kong, China) . . . . . [9025-25]

Lunch Break . . . . . Thu 12:30 pm to 2:00 pm

### Session 6

Location: Golden Gate 5 . . . . . Thu 2:00 pm to 3:40 pm

### Outdoor Robotics

Session Chair: **Bernard L. Theisen**, U.S. Army Tank Automotive Research, Development and Engineering Ctr. (United States)

2:00 pm: **Research and development of Ro-boat: an autonomous river cleaning robot**, Aakash Sinha, Omnipresent Robot Technologies Pvt. Ltd. (India) and Lockheed Martin Corp. (United States) and Carnegie Mellon Univ. (United States); Prashant Bhardwaj, Omnipresent Robot Technologies Pvt. Ltd. (India) and Manav Rachna College Of Engineering (India); Bipul Vaibhav, Omnipresent Robot Technologies Pvt. Ltd. (India) and Indian Institute Of Technology Guwahati (India); Noor Mohommad, Omnipresent Robot Technologies Pvt. Ltd. (India) and National Institute Of Technology, Warangal (India) . . . . . [9025-26]

2:20 pm: **Real-time, resource-constrained object classification on a micro-air vehicle**, Louis Buck, Laura E. Ray, Dartmouth College (United States) . . . . . [9025-27]

2:40 pm: **ARM-based system integration and testing for ROBO: application for precision agriculture**, Aditya Goyal, Shubham Mehrotra, Birla Institute of Technology and Science, Pilani (India); Shashikant Sadistap, Sai K. Vaddadi, Central Electronics Engineering Research Institute (India) . . . . . [9025-28]

3:00 pm: **New vision system and navigation algorithm for an autonomous ground vehicle**, Hokchhay Tann, Bicky Shakya, Alex Merchen, Ben Williams, Abhishek Khanal, Jiajia Zhao, David J Ahlgren, Trinity College (United States) . . . . . [9025-29]

3:20 pm: **An effective trace-guided wavefront navigation and map-building approach for autonomous mobile robots**, Chaomin Luo, Mohan Krishnan, Mark Paulik, Univ. of Detroit Mercy (United States); Gene Eu Jan, Institute of Electrical Engineering, National Taipei University (Taiwan) . . . . . [9025-30]

# Conference 9026 • Location: Golden Gate 4

Monday–Wednesday 3–5 February 2014 • Proceedings of SPIE Vol. 9026

## Video Surveillance and Transportation Imaging Applications 2014

*Conference Chairs:* **Robert P. Loce**, Xerox Corp. (United States); **Eli Saber**, Rochester Institute of Technology (United States)

*Program Committee:* **Ghassan Al-Regib**, Georgia Institute of Technology (United States); **Vijayan K. Asari**, Univ. of Dayton (United States); **Raja Bala**, Xerox Corp. (United States); **Farhan Baqai**, Apple Inc. (United States); **Alessandro Bevilacqua**, Univ. degli Studi di Bologna (Italy); **Philip M. Birch**, Univ. of Sussex (United Kingdom); **Alberto Broggi**, Univ. degli Studi di Parma (Italy); **Yang Cai**, Carnegie Mellon Univ. (United States); **Peter H. N. de With**, Technische Univ. Eindhoven (Netherlands); **Sohail A. Dianat**, Rochester Institute of Technology (United States); **Hassan Foroosh**, Univ. of Central Florida (United States); **Prudhvi Gurram**, U.S. Army Research Lab. (United States); **Mustafa I. Jaber**, IPPLEX Holdings (United States); **Bo Ling**, Migma Systems, Inc. (United States); **Fa-Long Luo**, Element CXI, Inc. (United States); **Sharathchandra Pankanti**, IBM Thomas J. Watson Research Ctr. (United States); **Peter Paul**, Xerox Corp. (United States); **Andreas E. Savakis**, Rochester Institute of Technology (United States); **Dan Schonfeld**, Univ. of Illinois at Chicago (United States); **Oliver Sidla**, SLR Engineering OG (Austria); **Sreenath Rao Vantaram**, Intel Corp. (United States); **Yaowu Xu**, Google (United States)

### Monday 3 February

#### Session 1

Location: Golden Gate 4 . . . . . Mon 8:30 am to 10:10 am

#### Video Surveillance

Session Chair: **Robert Loce**, Xerox Corp. (United States)

8:30 am: **PHACT: parallel HOG and correlation tracking**, Waqas Hassan, Philip M. Birch, Rupert C. Young, Christopher R. Chatwin, Univ. of Sussex (United Kingdom). . . . . [9026-1]

8:50 am: **Improved edge directed Super resolution with hardware realization for surveillance, transportation, and multimedia applications**, Yue Wang, Osborn F. de Lima, Eli Saber, Rochester Institute of Technology (United States); Kurt R. Bengtson, Hewlett-Packard Co. (United States). . . . . [9026-2]

9:10 am: **Rotation-invariant histogram features for threat object detection on pipeline right-of-way**, Alex Mathew, Vijayan K. Asari, Univ. of Dayton (United States) . . . . . [9026-3]

9:30 am: **Development of a multispectral active stereo vision system for video surveillance applications**, Sanjeev Kumar Malik, Balasubramanian Raman, Indian Institute of Technology Roorkee (India). . . . . [9026-4]

9:50 am: **Extrinsic self-calibration of multiple cameras with non-overlapping views in vehicles**, Frank Pagel, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [9026-5]

Coffee Break . . . . . Mon 10:10 am to 10:40 am

#### Session 2

Location: Golden Gate 4 . . . . . Mon 10:40 am to 12:30 pm

#### Event Detection and Classification

Session Chair: **Vijayan K. Asari**, Univ. of Dayton (United States)

10:40 am: **Video anomaly detection for transportation applications (Invited Paper)**, Raja Bala, Xerox Corp. (United States) . . . . . [9026-6]

11:10 am: **Real-time anomaly detection in dense crowded scenes**, Habib Ullah, Nicola Conci, Univ. degli Studi di Trento (Italy) . . . . . [9026-7]

11:30 am: **Enhancing event detection in video using robust background and quality modeling**, John M. Irvine, Richard J. Wood, David Reed, Brian K. Collins, Draper Lab. (United States) . . . . . [9026-8]

11:50 am: **Driver workload monitoring in heavy good vehicles and on powered two-wheelers**, Pasi Pyykönen, Matti H. Kutila, Timo Niemeläinen, VTT Technical Research Ctr. of Finland (Finland); Andrea Saccagno, Ficomirrors Italia S.r.l. (Italy); David Daurenjou, Serge Boverie, Continental Automotive France SAS (France). . . . . [9026-9]

12:10 pm: **JEI Video retargeting based on group of frames**, Chee-Sun Won, Hai Thanh Nguyen, Dongguk Univ. (Korea, Republic of) . . . [9026-10]

Lunch Break . . . . . Mon 12:30 pm to 2:00 pm

#### Session 3

Location: Golden Gate 4 . . . . . Mon 2:00 pm to 3:20 pm

#### Person and Action Detection

Session Chair: **Peter H. N. de With**, Technische Univ. Eindhoven (Netherlands)

2:00 pm: **Person detection: state of the art and applications**, Adrien Descamps, Cyril Carincotte, Multitel A.S.B.L. (Belgium); Bernard Gosselin, Faculté Polytechnique de Mons (Belgium) . . . . . [9026-11]

2:20 pm: **Real-time detection of small faces in HD videos**, Seungji Yang, Kyung Hoon Bae, SK Telecom (Korea, Republic of) . . . . . [9026-12]

2:40 pm: **Human behavior understanding for assisted living by means of hierarchical context free grammars**, Andrea Rosani, Nicola Conci, Francesco G. De Natale, Univ. degli Studi di Trento (Italy) . . . . . [9026-13]

3:00 pm: **Human interaction recognition through two-phase sparse coding**, Bo Zhang, Nicola Conci, Francesco G. De Natale, Univ. degli Studi di Trento (Italy). . . . . [9026-14]

Coffee Break . . . . . Mon 3:20 pm to 4:00 pm

# Conference 9026 · Location: Golden Gate 4

## Session 4

Location: Golden Gate 4 . . . . . Mon 4:00 pm to 5:20 pm

### Human Body Action

Session Chair: **Peter H. N. de With**, Technische Univ. Eindhoven (Netherlands)

4:00 pm: **Representing activities with layers of velocity statistics for multiple human action recognition in surveillance applications**, Fabio Martínez Carrillo Jr., Univ. Nacional de Colombia (Colombia); Antoine Manzanera, Ecole Nationale Supérieure de Techniques Avancées (France); Eduardo Romero Castro M.D., Univ. Nacional de Colombia (Colombia) . . . . . [9026-15]

4:20 pm: **Optical flow based Kalman filter for body joint prediction and tracking using local binary pattern matching**, Binu M. Nair, Univ. of Dayton (United States); Kimberley D. Kendrick, Central State Univ. (United States); Ronald F. Tuttle, Air Force Institute of Technology (United States); Vijayan K. Asari, Univ. of Dayton (United States) . . . . . [9026-16]

4:40 pm: **Application-driven merging and analysis of person trajectories for distributed smart camera networks**, Juergen Metzler, Eduardo Monari, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); Colin Kuntzsch, Leibniz Univ. Hannover (Germany) . . [9026-17]

5:00 pm: **Real time human versus animal classification using pyro-electric sensor array and hidden Markov model**, Jakir Hossen, Eddie L. Jacobs, Univ. of Memphis (United States); Srikant Chari, Consultant (United States) . . . . . [9026-18]

## Tuesday 4 February

Location: Continental Ballroom 5 . . . . . 8:30 am to 9:50 am

### Plenary Session and Society Award Presentations

8:30 am: **Using fMRI To Reverse Engineer the Human Visual System (Plenary)**, Jack L. Gallant, Univ. of California, Berkeley (United States) . . . . . [9011-301]

Coffee Break . . . . . Tue 9:50 am to 10:10 am

## Session 5

Location: Golden Gate 4 . . . . . Tue 10:10 am to 12:00 pm

### Transportation Imaging I

Session Chair: **Raja Bala**, Xerox Corp. (United States)

10:10 am: **Vision for intelligent vehicles: holistic perception of dynamic vehicle surround and driver behavior (Invited Paper)**, Mohan M. Trivedi, Univ. of California, San Diego (United States) . . . . . [9026-19]

10:40 am: **Optimizing video mosaics for short-term change detection by UAV**, Günter Saur, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [9026-20]

11:00 am: **Real-time traffic jam detection and localization running on smart camera**, Yuriy Lipetski, Gernot Loibner, SLR Engineering GmbH (Austria); Michael Ulm, Wolfgang Ponweiser, AIT Austrian Institute of Technology GmbH (Austria); Oliver Sidla, SLR Engineering GmbH (Austria) . . . . . [9026-21]

11:20 am: **Video-based traffic monitoring and prediction**, Shradha Chaudhary, Indian Institute of Technology Delhi (India); Vikash K. Maurya, Indu Sreedevi, Delhi Technological Univ. (India); Santanu Chaudhury, Indian Institute of Technology Delhi (India) . . . . . [9026-22]

11:40 am: **A feedback based method for binarization of license plate images**, Mandar Sovani, Subhash Challa, The Univ. of Melbourne (Australia) and SenSen Networks Pty Ltd. (Australia); Marimuthu Palaniswami, The Univ. of Melbourne (Australia); Duc Vo, SenSen Networks Pty Ltd. (Australia) . . . . . [9026-24]

Lunch Break . . . . . Tue 12:00 pm to 2:00 pm

## Session 6

Location: Golden Gate 4 . . . . . Tue 2:00 pm to 3:20 pm

### Transportation Imaging II

Session Chair: **Oliver Sidla**, SLR Engineering GmbH (Austria)

2:00 pm: **Video-based real-time on-street parking occupancy detection system**, Orhan Bulan, Robert P. Loce, Wencheng Wu, Yao Rong Wang, Edgar A. Bernal, Zhigang Fan, Xerox Corp. (United States) . . . . . [9026-25]

2:20 pm: **Automatic parking lot occupancy computation using motion tracking**, Francisco Justo, Hari Kalva, Daniel Raviv, Florida Atlantic Univ. (United States) . . . . . [9026-26]

2:40 pm: **Methods for vehicle detection and vehicle presence analysis**, Oliver Sidla, Yuriy Lipetski, SLR Engineering GmbH (Austria) . . . [9026-27]

3:00 pm: **Object instance recognition using motion cues and instance specific appearance models**, Arne Schumann, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany) . . . . . [9026-28]

Coffee Break . . . . . Tue 3:20 pm to 4:00 pm

## Session 7

Location: Golden Gate 4 . . . . . Tue 4:00 pm to 5:20 pm

### Applications of Video Surveillance

Session Chair: **Oliver Sidla**, SLR Engineering GmbH (Austria)

4:00 pm: **Real-time change detection for countering improvised explosive devices**, Dennis W. J. M. van de Wouw, Technische Univ. Eindhoven (Netherlands) and ViNotion B.V. (Netherlands); Kris van Rens, Egbert G. T. Jaspers, ViNotion B.V. (Netherlands); Peter H. N. de With, Technische Univ. Eindhoven (Netherlands) . . . . . [9026-29]

4:20 pm: **Use of automated video analysis for the evaluation of bicycle movement and interaction**, Heather A. Twaddle, Tobias Schendzielorz, Technische Univ. München (Germany); Oliver Fakler, TRANSVER GmbH (Germany) . . . . . [9026-30]

4:40 pm: **Mutation detection for inventories of traffic signs from street-level panoramic images**, Lykele Hazelhoff, Ivo M. Creusen, CycloMedia Technology B.V. (Netherlands) and Technische Univ. Eindhoven (Netherlands); Peter H. N. de With, Technische Univ. Eindhoven (Netherlands) . . . . . [9026-31]

5:00 pm: **Automatic extraction of direction information in road sign imagery obtained by mobile mapping system**, Junhee Youn, Korea Institute of Construction Technology (Korea, Republic of); Gi Hong Kim, Gangneung-Wonju National Univ. (Korea, Republic of); Kyusoo Chong, Korea Institute of Construction Technology (Korea, Republic of) . [9026-32]

Location: Continental Ballroom 4 . . . . . 5:30 pm to 7:30 pm

### Symposium Demonstration Session

A symposium-wide demonstration session will be open to attendees 5:30 to 7:30 pm Tuesday evening. Demonstrators will provide interactive, hands-on demonstrations of a wide-range of products related to Electronic Imaging.

**Wednesday 5 February**

**Location: Continental Ballroom 5 . . . . . 8:30 am to 9:50 am**

**Plenary Session and Conference Award Presentations**

8:30 am: **Integrated Imaging: Creating Images from the Tight Integration of Algorithms, Computation, and Sensors (Plenary)**, Charles A. Bouman, Purdue Univ. (United States) . . . . . [9011-300]

**Interactive Paper Session-Wednesday**

*Interactive papers will be placed on display after 8:30 am on Wednesday. An interactive paper session, with authors present at their papers, will be held Wednesday morning, 9:50 to 11:10 am. Refreshments will be served.*

**Location: Continental Ballroom and Golden Gate Foyers . . . . . 9:50 am to 11:10 am**

**Downhill simplex approach for vehicle headlights detection**, Ho-Joong Kang, Kyoung Ho Choi, Mokpo National Univ. (Korea, Republic of); Ho-Kun Kim, SEO Electronics Co., Ltd. (Korea, Republic of); iL-Whan Oh, Mokpo National Univ (Korea, Republic of) . . . . . [9026-23]

**Template matching based people tracking using a smart camera network**, Junzhi Guan, Peter Van Hese, Jorge Oswaldo Niño-Castaneda, Nyan Bo Bo, Sebastian Gruenwedel, Dirk Van Haerenborgh, Dimitri Van Cauwelaert, Peter Veelaert, Wilfried Philips, Univ. Gent (Belgium) [9026-33]

**Embedded image enhancement for high-throughput cameras**, Stan Geerts, Prodrive B.V. (Netherlands) and Technische Univ. Eindhoven (Netherlands); Dion Cornelissen, Prodrive B.V. (Netherlands); Peter H. N. de With, Technische Univ. Eindhoven (Netherlands) . . . . . [9026-34]

**On-road anomaly detection by multimodal sensor analysis and multimedia processing**, Fatih Orhan, Anel Research & Development Co. (Turkey); Erhan P. Eren, Middle East Technical Univ. (Turkey) . . . [9026-35]

**Modeling human dynamics with free-context grammars**, Juan M. García-Huerta, Hugo Jiménez-Hernández, Ctr. para el Desarrollo Tecnológico Industrial (Mexico); Ana M. Herrera-Navarro, Univ. Autónoma de Querétaro (Mexico); Teresa Hernández-Díaz, Ctr. para el Desarrollo Tecnológico Industrial (Mexico); Ivan Terol-Villalobos, CIDETEQ (Mexico) . . . . . [9026-36]

**Overtaking vehicles detection and localization for driver assistance**, Chung-Lin Huang, Asia Univ. (Taiwan) . . . . . [9026-37]

**License plate location using SIFT and SVM**, Roberto M. Souza, Mariana P. Bento, Univ. Estadual de Campinas (Brazil); Rubens C. Machado, Ctr. de Tecnologia da Informacao Renato Archer (Brazil); Roberto A. Lotufo, Univ. Estadual de Campinas (Brazil) . . . . . [9026-38]

**An integrated framework for detecting suspicious behaviors in video surveillance**, Thi Thi Zin, Pyke Tin, Hiromitsu Hama, Takashi Toriu, Osaka City Univ. (Japan) . . . . . [9026-39]

**A novel approach to extract closed foreground object contours in video surveillance**, Giounona Tzanidou, Eran A. Edirisinghe, Loughborough Univ. (United Kingdom) . . . . . [9026-40]

# Conference 9027 • Location: Golden Gate 2

Wednesday–Thursday 5–6 February 2014 • Proceedings of SPIE Vol. 9027

## Imaging and Multimedia Analytics in a Web and Mobile World 2014

*Conference Chairs:* **Qian Lin**, Hewlett-Packard Labs. (United States); **Jan P. Allebach**, Purdue Univ. (United States); **Zhigang Fan**, Consultant (United States)

*Program Committee:* **Patricia Albanese**, Rochester Institute of Technology (United States); **Vijayan K. Asari**, Univ. of Dayton (United States); **Susanne C. Boll**, Carl von Ossietzky Univ. Oldenburg (Germany); **Reiner Fageth**, CeWe Color AG & Co. OHG (Germany); **Yuli Gao**, Google (United States); **Michael J. Gormish**, Ricoh Innovations, Inc. (United States); **Meichun Hsu**, Hewlett-Packard Labs. (United States); **Andrew A. Hunter**, Hewlett-Packard Labs. (United Kingdom); **Xiaofan Lin**, A9.com, Inc. (United States); **Jerry Liu**, Hewlett-Packard Labs. (United States); **Yonghong Tian**, Peking Univ. (China); **Shengjin Wang**, Tsinghua Univ. (China); **Wiley H. Wang**, Shutterfly (United States); **Rong Yan**, Facebook Inc. (United States); **Yonghui Zhao**, Apple Inc. (United States)

### Tuesday 4 February

**Location: Continental Ballroom 5 . . . . .8:30 am to 9:50 am**

#### Plenary Session and Society Award Presentations

8:30 am: **Using fMRI To Reverse Engineer the Human Visual System (Plenary)**, Jack L. Gallant, Univ. of California, Berkeley (United States) . . . . . [9011-301]

**Location: Continental Ballroom 4 . . . . .5:30 pm to 7:30 pm**

#### Symposium Demonstration Session

A symposium-wide demonstration session will be open to attendees 5:30 to 7:30 pm Tuesday evening. Demonstrators will provide interactive, hands-on demonstrations of a wide-range of products related to Electronic Imaging.

### Wednesday 5 February

**Location: Continental Ballroom 5 . . . . .8:30 am to 9:50 am**

#### Plenary Session and Conference Award Presentations

8:30 am: **Integrated Imaging: Creating Images from the Tight Integration of Algorithms, Computation, and Sensors (Plenary)**, Charles A. Bouman, Purdue Univ. (United States) . . . . . [9011-300]

#### Interactive Paper Session-Wednesday

*Interactive papers will be placed on display after 8:30 am on Wednesday. An interactive paper session, with authors present at their papers, will be held Wednesday morning, 9:50 to 11:10 am. Refreshments will be served.*

**Location: Continental Ballroom and Golden Gate Foyers . . . . .9:50 am to 11:10 am**

**Adaptive agglomerative clustering using hybrid features for image categorization**, Karina Damico, Roxanne L. Canosa, Rochester Institute of Technology (United States) . . . . . [9027-15]

**A comparison of histogram distance metrics for content-based image retrieval**, Qianwen Zhang, Roxanne L. Canosa, Rochester Institute of Technology (United States) . . . . . [9027-16]

**Video salient event classification using audio features**, Francesca Gasparini, Gianluigi Ciocca, Silvia Corchs, Univ. degli Studi di Milano-Bicocca (Italy) . . . . . [9027-20]

### Session 1

**Location: Golden Gate 2 . . . . .Wed 11:10 am to 12:40 pm**

#### Online Photo and Imaging Services

11:10 am: **Representing videos in tangible products (Invited Paper)**, Reiner Fageth, CeWe Color AG & Co. OHG (Germany) . . . . . [9027-1]

11:40 am: **Aesthetic quality inference for online fashion shopping**, Ming Chen, Jan P. Allebach, Purdue Univ. (United States) . . . . . [9027-2]

12:00 pm: **Smart album: instant photo book creation across multiple platforms**, Wiley H. Wang, Mixbook (United States) . . . . . [9027-3]

12:20 pm: **Full-color visibility model using CSF which varies spatially with local luminance**, Alastair M. Reed, David Berfanger, Yang Bai, Digimarc Corp. (United States) . . . . . [9027-4]

Lunch Break . . . . .Wed 12:40 pm to 2:00 pm

### Session 2

**Location: Golden Gate 2 . . . . .Wed 2:00 pm to 3:20 pm**

#### Text Recognition in Mobile Applications

2:00 pm: **Text recognition and correction for automated data collection by mobile devices**, Suleyman Ozarslan, P. Erhan Eren, Middle East Technical Univ. (Turkey) . . . . . [9027-5]

2:20 pm: **Text vectorization based on character recognition and character stroke modeling**, Zhigang Fan, Xerox Corp (United States); Bingfeng Zhou, Peking University (China); Francis Tse, Xerox Corp. (United States) . . . . . [9027-6]

2:40 pm: **Visual improvement for bad handwriting based on Monte-Carlo method**, Cao Shi, Jianguo Xiao, Wenhua Jia, Canhui Xu, Peking Univ. (China) . . . . . [9027-7]

3:00 pm: **Image processing for drawing recognition**, Rustem Feyzkhanov, SKTech (Russian Federation) . . . . . [9027-8]

Coffee Break . . . . .Wed 3:20 pm to 4:00 pm

## Session 3

Location: Golden Gate 2 . . . . . Wed 4:00 pm to 5:00 pm

### Web and Social Media

4:00 pm: **A web-based video annotation system for crowdsourcing surveillance videos**, Neeraj J. Gadgil, Khalid Tahboub, Purdue Univ. (United States); David Kirsh, Univ. of California, San Diego (United States); Edward J. Delp III, Purdue Univ. (United States). . . . . [9027-9]

4:20 pm: **A Markov chain model for image ranking system in social networks**, Thi Thi Zin, Pyke Tin, Takashi Toriu, Hiromitsu Hama, Osaka City Univ. (Japan) . . . . . [9027-10]

4:40 pm: **Video quality assessment for web content mirroring**, Ye He, Purdue Univ. (United States); Kevin Fei, Gus Fernandez, Google (United States); Edward J. Delp III, Purdue Univ. (United States) . . . . . [9027-11]

## Thursday 6 February

### Session 4

Location: Golden Gate 2 . . . . . Thu 9:30 am to 10:10 am

### Image, Video, and Multimedia Analytics I

9:30 am: **Evolving background recovery**, Come Genetet, Gady Agam, Illinois Institute of Technology (United States) . . . . . [9027-13]

9:50 am: **HEVC compressed domain content-based video signature for copy detection and video retrieval**, Khalid Tahboub, Neeraj J. Gadgil, Mary L. Comer, Edward J. Delp III, Purdue Univ. (United States). [9027-14]

Coffee Break . . . . . Thu 10:10 am to 10:40 am

### Session 5

Location: Golden Gate 2 . . . . . Thu 10:40 am to 12:10 pm

### Image, Video, and Multimedia Analytics II

10:40 am: **Technology survey on video face tracking** (*Invited Paper*), Tong Zhang, Hewlett-Packard Labs. (United States); Herman Martins Martins Gomes, UFCG (Brazil) . . . . . [9027-17]

11:10 am: **Textural discrimination in unconstrained environment**, Fatema Albaloooshi, Vijayan K. Asari, Univ. of Dayton (United States) . . . . . [9027-18]

11:30 am: **Image denoising by multiple layer block matching and 3D filtering**, Zhigang Fan, Xerox Corp (United States) . . . . . [9027-19]

11:50 am: **Compact binary hashing for music retrieval**, Jin Soo Seo, Gangneung-Wonju National Univ. (Korea, Republic of) . . . . . [9027-21]

Lunch Break . . . . . Thu 12:10 pm to 2:00 pm

### Session 6

Location: Golden Gate 2 . . . . . Thu 2:00 pm to 3:20 pm

### Face/Human Body Recognition and Detection

2:00 pm: **Efficient eye detection using HOG-PCA descriptor**, Andreas E. Savakis, Riti Sharma, Rochester Institute of Technology (United States); Mrityunjay Kumar, RealID (United States) . . . . . [9027-22]

2:20 pm: **Exploiting articulated structure for hand tracking**, Prabhu Kaliamoorthi, Ramakrishna Kakarala, Nanyang Technological Univ. (Singapore) . . . . . [9027-23]

2:40 pm: **Adaptive weighted local textural features for illumination, expression, and occlusion invariant face recognition**, Chen Cui, Vijayan K. Asari, Univ. of Dayton (United States). . . . . [9027-24]

3:00 pm: **Research on the face pattern space division in images based on their different views**, He Zhixiang, Xiaoqing Ding, Chi Fang, Yanwei Wang, Tsinghua Univ. (China) . . . . . [9027-25]

# Conference 9028 • Location: Golden Gate 3

Monday–Wednesday 3–5 February 2014 • Proceedings of SPIE Vol. 9028

## Media Watermarking, Security, and Forensics 2014

*Conference Chairs:* **Adnan M. Alattar**, Digimarc Corp. (United States); **Nasir D. Memon**, Polytechnic Institute of New York Univ. (United States); **Chad D. Heitzenrater**, Air Force Research Lab. (United States)

*Program Committee:* **Mauro Barni**, Univ. degli Studi di Siena (Italy); **Sebastiano Battiato**, Univ. degli Studi di Catania (Italy); **Jeffrey A. Bloom**, Sirius XM Satellite Radio (United States); **Scott A. Craver**, Binghamton Univ. (United States); **Edward J. Delp III**, Purdue Univ. (United States); **Jana Dittmann**, Otto-von-Guericke-Univ. Magdeburg (Germany); **Gwenaël Doërr**, Technicolor S.A. (France); **Tomas Filler**, Digimarc Corp. (United States); **Jessica Fridrich**, Binghamton Univ. (United States); **Anthony T.S. Ho**, Univ. of Surrey (United Kingdom); **Jiwu Huang**, Sun Yat-Sen Univ. (China); **Ton Kalker**, DTS, Inc. (United States); **Andrew D. Ker**, Univ. of Oxford (United Kingdom); **Alex Chichung Kot**, Nanyang Technological Univ. (Singapore); **Chang-Tsun Li**, The Univ. of Warwick (United Kingdom); **Pierre Moulin**, Univ. of Illinois at Urbana-Champaign (United States); **Regunathan Radhakrishnan**, Pivotal Systems (United States); **Husrev Taha Sencar**, TOBB Univ. of Economics and Technology (Turkey); **Gaurav Sharma**, Univ. of Rochester (United States); **Yun Qing Shi**, New Jersey Institute of Technology (United States); **Ashwin Swaminathan**, Qualcomm Inc. (United States); **Claus Vielhauer**, Fachhochschule Brandenburg (Germany); **Svyatoslav V. Voloshynovskiy**, Univ. of Geneva (Switzerland); **Chang Dong Yoo**, KAIST (Korea, Republic of)

### Monday 3 February

#### Session 1

**Location: Golden Gate 3 . . . . . Mon 8:30 am to 10:10 am**

#### Steganography

Session Chair: **Jessica Fridrich**, Binghamton Univ. (United States)

8:30 am: **Challenging the doctrines of JPEG steganography**, Vojtech Holub, Jessica Fridrich, Binghamton Univ. (United States) . . . . . [9028-1]

8:55 am: **Linguistic steganography on Twitter: personalised language modeling with manual interaction**, Alex D. Wilson, Phil Blunsom, Andrew D. Ker, Univ. of Oxford (United Kingdom) . . . . . [9028-2]

9:20 am: **Detection of content adaptive LSB matching: a game theory approach**, Tomas Denmark, Jessica Fridrich, Binghamton Univ. (United States) . . . . . [9028-3]

9:45 am: **Further study on security of S-UNIWARD**, Tomas Denmark, Jessica Fridrich, Vojtech Holub, Binghamton Univ. (United States) [9028-34]

Coffee Break . . . . . Mon 10:10 am to 10:30 am

#### Session 2

**Location: Golden Gate 3 . . . . . Mon 10:30 am to 12:10 pm**

#### Biometrics and Watermarking

Session Chair: **Svyatoslav V. Voloshynovskiy**, Univ. of Geneva (Switzerland)

10:30 am: **Are you threatening me?: Towards smart detectors in watermarking**, Mauro Barni, Univ. degli Studi di Siena (Italy); Pedro Comesaña-Alfaro, Fernando Pérez-González, Univ. de Vigo (Spain); Benedetta Tondi, Univ. degli Studi di Siena (Italy) . . . . . [9028-5]

10:55 am: **On accuracy, robustness, and security of bag-of-word search systems**, Svyatoslav V. Voloshynovskiy, Maurits Diephuis, Dimche Kostadinov, Farzad Farhadzadeh, Taras Holotyak, Univ. of Geneva (Switzerland) . . . . . [9028-6]

11:20 am: **An enhanced feature set for pattern recognition based contrast enhancement of contact-less captured latent fingerprints in digitized crime scene forensics**, Mario Hildebrandt, Jana Dittmann, Otto-von-Guericke-Univ. Magdeburg (Germany); Claus Vielhauer, Fachhochschule Brandenburg (Germany) . . . . . [9028-7]

11:45 am: **Robust human face recognition based on locality preserving sparse over complete block approximation**, Dimche Kostadinov, Svyatoslav V. Voloshynovskiy, Sohrab Ferdowsi, Univ. of Geneva (Switzerland) . . . . . [9028-8]

Lunch Break . . . . . Mon 12:10 pm to 1:45 pm

**Location: Golden Gate 3 . . . . . 1:45 pm to 2:00 pm**

#### Video/Demo I

**Location: Golden Gate 3 . . . . . 2:00 pm to 3:00 pm**

#### Keynote Session I

Session Chair: **Tomas Filler**, Digimarc Corp. (United States)

2:00 pm: **Digital wallet and mobile payment (Keynote Presentation)**, Sunil K. Jain, Intel Corp. (United States) . . . . . [9028-9]

#### Session 3

**Location: Golden Gate 3 . . . . . Mon 3:00 pm to 6:00 pm**

#### Watermarking

Session Chair: **Gwenaël Doërr**, Technicolor S.A. (France)

3:00 pm: **Blind detection for disparity-coherent stereo video watermarking**, Cesar Burini, Séverine Baudry, Gwenaël Doërr, Technicolor S.A. (France) . . . . . [9028-10]

Coffee Break . . . . . Mon 3:25 pm to 3:55 pm

3:55 pm: **Tuple decoders for traitor tracing schemes**, Jan-Jaap Oosterwijk, Technische Univ. Eindhoven (Netherlands) and Irdeto B.V. (Netherlands); Thijs Laarhoven, Technische Univ. Eindhoven (Netherlands); Jeroen Doumen, Irdeto Access B.V. (Netherlands) . . . . . [9028-11]

4:20 pm: **Feature-based watermark localization in digital capture systems**, Vojtech Holub, Tomas Filler, Digimarc Corp. (United States) . . . . . [9028-12]

4:45 pm: **Self-synchronization for spread spectrum audio watermarks after time scale modification**, Andrew Nadeau, Gaurav Sharma, Univ. of Rochester (United States) . . . . . [9028-13]

5:10 pm: **Drift-free MPEG-4 AVC semi-fragile watermarking**, Marwen Hasnaoui, Mihai Mitrea, Télécom SudParis (France) . . . . . [9028-14]

5:35 pm: **Watermarking textures in video games**, Huajian Liu, Waldemar Berchtold, Marcel Schäfer, Martin Steinebach, Fraunhofer-Institut für Sichere Informations-Technologie (Germany) . . . . . [9028-4]

## Tuesday 4 February

**Location: Continental Ballroom 5 . . . . . 8:30 am to 9:50 am**

### Plenary Session and Society Award Presentations

8:30 am: **Using fMRI To Reverse Engineer the Human Visual System (Plenary)**, Jack L. Gallant, Univ. of California, Berkeley (United States) . . . . . [9011-301]

Coffee Break . . . . . Tue 9:50 am to 10:30 am

### Session 4

**Location: Golden Gate 3 . . . . . Tue 10:30 am to 12:10 pm**

### Steganalysis

Session Chair: **Andrew D. Ker**, Univ. of Oxford (United Kingdom)

10:30 am: **Cover estimation and payload location using Markov random fields**, Tu-Thach Quach, Sandia National Labs. (United States) . . . . . [9028-15]

10:55 am: **A mishmash of methods for mitigating the model mismatch mess**, Andrew D. Ker, Univ. of Oxford (United Kingdom); Tomas Pevny, Czech Technical Univ. in Prague (Czech Republic) . . . . . [9028-16]

11:20 am: **Study of cover source mismatch in steganalysis and ways to mitigate its impact**, Jan Kodovsky, Vahid Sedighi, Jessica Fridrich, Binghamton Univ. (United States) . . . . . [9028-17]

11:45 am: **Implementing the projected spatial rich features on a GPU**, Andrew D. Ker, Univ. of Oxford (United Kingdom) . . . . . [9028-18]

Lunch Break . . . . . Tue 12:10 pm to 1:45 pm

**Location: Golden Gate 3 . . . . . 1:45 pm to 2:00 pm**

### Video/Demo II: Konica Minolta Laboratory

1:45 pm: **Self-verifiable paper documents and automatic content verification**, Yibin Tian, Xiaonong Zhan, Chaohong Wu, Wei Ming, Konica Minolta Systems Lab. (United States) . . . . . [9028-35]

**Location: Golden Gate 3 . . . . . 2:00 pm to 3:00 pm**

### Keynote Session II

Session Chair: **Adnan M. Alattar**, Digimarc Corp. (United States)

2:00 pm: **Piracy conversion: the role of content protection and forensics (Keynote Presentation)**, Richard Atkinson, Adobe Systems Inc. (United States) . . . . . [9028-19]

### Session 5

**Location: Golden Gate 3 . . . . . Tue 3:00 pm to 5:35 pm**

### Identification

Session Chairs: **Ton Kalker**, DTS, Inc. (United States); **Gaurav Sharma**, Univ. of Rochester (United States)

3:00 pm: **Estimation of lens distortion correction from single images**, Miroslav Goljan, Jessica Fridrich, Binghamton Univ. (United States) . . . . . [9028-20]

Coffee Break . . . . . Tue 3:25 pm to 3:55 pm

3:55 pm: **A reference estimator based on composite sensor pattern noise for source device identification**, Ruizhe Li, Chang-Tsun Li, Yu Guan, The Univ. of Warwick (United Kingdom) . . . . . [9028-21]

4:20 pm: **Content identification: binary content fingerprinting versus binary content encoding**, Sohrab Ferdowsi, Svyatoslav V. Voloshynovskiy, Dimche Kostadinov, Univ. of Geneva (Switzerland) . . . . . [9028-22]

4:45 pm: **Additive attacks on speaker recognition**, Alireza Farrokh Baroughi, Scott A. Craver, Binghamton Univ. (United States) . . . [9028-23]

5:10 pm: **Robust hashing for 3D models**, Waldemar Berchtold, Marcel Schäfer, Michael Rettig, Martin Steinebach, Fraunhofer-Institut für Sichere Informations-Technologie (Germany) . . . . . [9028-24]

**Location: Continental Ballroom 4 . . . . . 5:30 pm to 7:30 pm**

### Symposium Demonstration Session

A symposium-wide demonstration session will be open to attendees 5:30 to 7:30 pm Tuesday evening. Demonstrators will provide interactive, hands-on demonstrations of a wide-range of products related to Electronic Imaging.

## Wednesday 5 February

**Location: Continental Ballroom 5 . . . . . 8:30 am to 9:50 am**

### Plenary Session and Conference Award Presentations

8:30 am: **Integrated Imaging: Creating Images from the Tight Integration of Algorithms, Computation, and Sensors (Plenary)**, Charles A. Bouman, Purdue Univ. (United States) . . . . . [9011-300]

Coffee Break . . . . . Wed 9:50 am to 10:55 am

### Session 6

**Location: Golden Gate 3 . . . . . Wed 10:55 am to 12:10 pm**

### Authentication

Session Chair: **Sebastiano Battiato**, Univ. degli Studi di Catania (Italy)

10:55 am: **Content authentication for printed images utilizing high capacity data hiding**, Orhan Bulan, Xerox Corp. (United States); Gaurav Sharma, Univ. of Rochester (United States) . . . . . [9028-25]

11:20 am: **A framework for fast and secure packaging identification on mobile phones**, Svyatoslav V. Voloshynovskiy, Maurits Diephuis, Taras Holotyak, Nabil Stendardo, Univ. of Geneva (Switzerland); Bruno Keel, U-NICA Group (Switzerland) . . . . . [9028-26]

11:45 am: **Printer technology authentication from micrometric scan of a single printed dot**, Yves Delignon, Quoc Thong Nguyen, Télécom Lille 1 (France); Lionel Chagas, Institut National Polytechnique de Grenoble (France); François Septier, Télécom Lille 1 (France) . . . . . [9028-27]

Lunch Break . . . . . Wed 12:10 pm to 1:45 pm

**Location: Golden Gate 3 . . . . . 1:45 pm to 2:00 pm**

### Video/Demo III

**Location: Golden Gate 3 . . . . . 2:00 pm to 3:00 pm**

### Keynote Session III

Session Chair: **Nasir D. Memon**, Polytechnic Institute of New York Univ. (United States)

2:00 pm: **Photo forensics from shadows and shading (Keynote Presentation)**, Hany Farid, Dartmouth College (United States) [9028-28]

# Conference 9028 · Location: Golden Gate 3

## Session 7

Location: Golden Gate 3 . . . . . Wed 3:00 pm to 5:35 pm

### Forensics

Session Chair: **Mauro Barni**, Univ. degli Studi di Siena (Italy)

3:00 pm: **Digitized locksmith forensics: automated detection and segmentation of toolmarks on highly structured surfaces using a fusion of 3D CLSM intensity, topography, and texture data**, Eric Clausing, Claus Vielhauer, Otto-von-Guericke-Univ. Magdeburg (Germany) and Fachhochschule Brandenburg (Germany); Jana Dittmann, Otto-von-Guericke-Univ. Magdeburg (Germany) . . . . . [9028-29]

Coffee Break . . . . . Wed 3:25 pm to 3:55 pm

3:55 pm: **Two improved forensic methods of detecting contrast enhancement in digital images**, Xufeng Lin, Xingjie Wei, Chang-Tsun Li, The Univ. of Warwick (United Kingdom) . . . . . [9028-30]

4:20 pm: **Copy-move forgery detection from printed images**, Irene Amerini, Univ. degli Studi di Firenze (Italy); Roberto Caldelli, Univ. degli Studi di Firenze (Italy) and Consorzio Nazionale Interuniversitario per le Telecomunicazioni (Italy); Alberto Del Bimbo, Univ. degli Studi di Firenze (Italy); Andrea Di Fuccia, Anna Paola Rizzo, Luigi Saravo, Prime Minister Office (Italy) . . . . . [9028-31]

4:45 pm: **Countering anti-forensics by means of data fusion**, Marco Fontani, Mauro Barni, Univ. degli Studi di Siena (Italy) . . . . . [9028-32]

5:10 pm: **Image counter-forensics based on feature injection**, Massimo Iuliani, Simone Rossetto, Univ. degli Studi di Firenze (Italy); Tiziano Bianchi, Politecnico di Torino (Italy); Alessia De Rosa, Alessandro Piva, Univ. degli Studi di Firenze (Italy); Mauro Barni, Univ. degli Studi di Siena (Italy) . . . . . [9028-33]

Location: Golden Gate 3 . . . . . 5:35 pm to 5:45 pm

### Concluding Remarks

# Conference 9029 • Location: Golden Gate 4

Wednesday–Thursday 5–6 February 2014 • Proceedings of SPIE Vol. 9029

## Visual Information Processing and Communication V

*Conference Chairs:* **Amir Said**, LG Electronics MobileComm U.S.A., Inc. (United States); **Onur G. Guleryuz**, LG Electronics MobileComm U.S.A., Inc. (United States); **Robert L. Stevenson**, Univ. of Notre Dame (United States)

*Program Committee:* **John G. Apostolopoulos**, Hewlett-Packard Labs. (United States); **Vasudev Bhaskaran**, Qualcomm Inc. (United States); **Mireille Boutin**, Purdue Univ. (United States); **Chang Wen Chen**, Univ. at Buffalo (United States); **Gerard de Haan**, Philips Research Nederland B.V. (Netherlands); **Edward J. Delp III**, Purdue Univ. (United States); **Eric Dubois**, Univ. of Ottawa (Canada); **Frederic Dufaux**, Telecom ParisTech (France); **Keigo Hirakawa**, Univ. of Dayton (United States); **Marta Karczewicz**, Qualcomm Inc. (United States); **Lisimachos Paul Kondi**, Univ. of Ioannina (Greece); **Janusz Konrad**, Boston Univ. (United States); **Chun-Chieh Jay Kuo**, The Univ. of Southern California (United States); **Peyman Milanfar**, Univ. of California, Santa Cruz (United States); **Antonio Ortega**, The Univ. of Southern California (United States); **Thrasyloulos N. Pappas**, Northwestern Univ. (United States); **William A. Pearlman**, Rensselaer Polytechnic Institute (United States); **Fernando Pereira**, Instituto de Telecomunicações (Portugal); **Béatrice Pesquet-Popescu**, Telecom ParisTech (France); **Majid Rabbani**, Eastman Kodak Co. (United States); **Eli Saber**, Rochester Institute of Technology (United States); **Dan Schonfeld**, Univ. of Illinois at Chicago (United States); **Andrew Segall**, Sharp Labs. of America, Inc. (United States); **Gaurav Sharma**, Univ. of Rochester (United States); **Andrew G. Tescher**, AGT Associates (United States); **Anthony Vetro**, Mitsubishi Electric Research Labs. (United States); **John W. Woods**, Rensselaer Polytechnic Institute (United States); **Wenwu Zhu**, Tsinghua Univ. (China)

### Tuesday 4 February

**Location: Continental Ballroom 5 . . . . .8:30 am to 9:50 am**

#### Plenary Session and Society Award Presentations

8:30 am: **Using fMRI To Reverse Engineer the Human Visual System (Plenary)**, Jack L. Gallant, Univ. of California, Berkeley (United States) . . . . . [9011-301]

**Location: Continental Ballroom 4 . . . . .5:30 pm to 7:30 pm**

#### Symposium Demonstration Session

A symposium-wide demonstration session will be open to attendees 5:30 to 7:30 pm Tuesday evening. Demonstrators will provide interactive, hands-on demonstrations of a wide-range of products related to Electronic Imaging.

### Wednesday 5 February

**Location: Continental Ballroom 5 . . . . .8:30 am to 9:50 am**

#### Plenary Session and Conference Award Presentations

8:30 am: **Integrated Imaging: Creating Images from the Tight Integration of Algorithms, Computation, and Sensors (Plenary)**, Charles A. Bouman, Purdue Univ. (United States) . . . . . [9011-300]

Coffee Break . . . . . Wed 9:50 am to 11:10 am

#### Session 1

**Location: Golden Gate 4 . . . . .Wed 11:10 am to 12:30 pm**

#### Video Processing and Compression I

Session Chairs: **Amir Said**, LG Electronics MobileComm U.S.A., Inc. (United States); **Onur G. Guleryuz**, LG Electronics MobileComm U.S.A., Inc. (United States); **Robert L. Stevenson**, Univ. of Notre Dame (United States)

11:10 am: **An all-zero blocks early detection method for high-efficiency video coding**, Zhenguang Lv, Peking Univ. (China); Ronggang Wang, Peking Univ. Shenzhen Graduate School (China) . . . . . [9029-1]

11:30 am: **Low-cost multi-hypothesis motion compensation for video coding**, Lei Chen, Ronggang Wang, Peking Univ. Shenzhen Graduate School (China); Siwei Ma, Institute of Digital Media, Peking University (China) . . . . . [9029-2]

11:50 am: **An optimized template matching approach to intra coding in video/image compression**, Hui Su, Google Inc. (United States) and University of Maryland (United States); Jingning Han, Yaowu Xu, Google (United States) . . . . . [9029-3]

12:10 pm: **Motion estimation optimization tools for the emerging high efficiency video coding (HEVC)**, Abdelrahman Abdelazim, Wassim Masri, Bassam Noaman, The American Univ. of the Middle East (Kuwait) [9029-4]

Lunch Break . . . . . Wed 12:30 pm to 2:00 pm

#### Session 2

**Location: Golden Gate 4 . . . . .Wed 2:00 pm to 3:20 pm**

#### Video Processing and Compression II

Session Chairs: **Amir Said**, LG Electronics MobileComm U.S.A., Inc. (United States); **Onur G. Guleryuz**, LG Electronics MobileComm U.S.A., Inc. (United States); **Robert L. Stevenson**, Univ. of Notre Dame (United States)

2:00 pm: **Efficient determination of intra predictability in H.264/AVC and similar codecs**, Seyfullah H. Oguz, Qualcomm Inc. (United States) . . . . . [9029-5]

2:20 pm: **Backwards compatible high dynamic range video compression**, Vladimir Dolzhenko, Eran A. Edirisindhe, Loughborough Univ. (United Kingdom); Vyacheslav Chesnokov, Apical Imaging (United Kingdom) . . . . . [9029-6]

2:40 pm: **Role-based adaptation for video conferencing in healthcare applications**, Oscar Figuerola Salas, Hari Kalva, Antonio Escudero, Ankur Agarwal, Florida Atlantic Univ. (United States) . . . . . [9029-7]

3:00 pm: **JEM Video compressed sensing using iterative self-similarity modeling and residual reconstruction**, Yookyung Kim, Samsung Advanced Institute of Technology (Korea, Republic of); Han Oh, Samsung Electro-Mechanics (Korea, Republic of); Ali Bilgin, The Univ. of Arizona (United States) . . . . . [9029-8]

Coffee Break . . . . . Wed 3:20 pm to 4:00 pm

 = Published in the *Journal of Electronic Imaging*

# Conference 9029 · Location: Golden Gate 4

## Session 3

Location: Golden Gate 4 . . . . . Wed 4:00 pm to 5:20 pm

### Image Processing

Session Chairs: **Amir Said**, LG Electronics MobileComm U.S.A., Inc. (United States); **Onur G. Guleryuz**, LG Electronics MobileComm U.S.A., Inc. (United States); **Robert L. Stevenson**, Univ. of Notre Dame (United States)

4:00 pm: **A novel error metric for parametric fitting of point spread functions**, Jonathan D. Simpkins, Robert L. Stevenson, Univ. of Notre Dame (United States) . . . . . [9029-9]

4:20 pm: **Joint deblurring and demosaicking of raw image data with motion blur**, Ruiwen Zhen, Robert L. Stevenson, Univ. of Notre Dame (United States) . . . . . [9029-10]

4:40 pm: **Parametric phase information based 2D Cepstrum PSF estimation method for blind de-convolution of ultrasound imaging**, Jooyoung Kang, Sung-Chan Park, Jung-ho Kim, Jongkeun Song, SAMSUNG Electronics Co., Ltd. (Korea, Republic of) . . . . . [9029-11]

5:00 pm: **Dual tree complex wavelet transform based shadow detection and removal from moving objects**, Manish Khare, Rajneesh K. Srivastava, Ashish Khare, Univ. of Allahabad (India) . . . . . [9029-12]

## Thursday 6 February

### Session 4

Location: Golden Gate 4 . . . . . Thu 8:30 am to 10:10 am

### Computer Vision

Session Chairs: **Amir Said**, LG Electronics MobileComm U.S.A., Inc. (United States); **Onur G. Guleryuz**, LG Electronics MobileComm U.S.A., Inc. (United States); **Robert L. Stevenson**, Univ. of Notre Dame (United States)

8:30 am: **Recognition combined human pose tracking using single depth images**, Wonjun Kim, ByungIn Yoo, Jae-Joon Han, Changkyu Choi, Samsung Advanced Institute of Technology (Korea, Republic of) [9029-13]

8:50 am: **Video-based facial discomfort analysis for infants**, Eleni Fotiadou, Svitlana Zinger, Technische Univ. Eindhoven (Netherlands); Walter Tjon a Ten, Sidarto Bambang Oetomo, Maxima Medisch Centrum (Netherlands); Peter H. N. de With, Technische Univ. Eindhoven (Netherlands) . . . . . [9029-14]

9:10 am: **Onomatopoeia characters extraction from comic images using constrained Delaunay triangulation**, Xiangping Liu, Kenji Shoji, Hiroshi Mori, Fubito Toyama, Utsunomiya Univ. (Japan) . . . . . [9029-15]

9:30 am: **Improved global-sampling matting using sequential pair-selection strategy**, Ahmad F. Al-Kabbany, Eric Dubois, Univ. of Ottawa (Canada) . . . . . [9029-16]

9:50 am: **Register multimodal images of range information**, Yong Li, Beijing Univ. of Posts and Telecommunications (China); Robert L. Stevenson, Univ. of Notre Dame (United States) . . . . . [9029-17]

Coffee Break . . . . . Thu 10:10 am to 10:30 am

## Session 5

Location: Golden Gate 4 . . . . . Thu 10:30 am to 12:45 pm

### Heterogeneous Computing Systems for High-Performance and Low-Power Signal Processing I

Session Chairs: **Michael Frank**, LG Electronics Inc. (United States); **Shereef Shehata**, LG Electronics Inc. (United States)

10:30 am: **Overview and importance of heterogeneous computing systems for imaging applications** (*Invited Paper*), Michael Frank, LG Electronics Inc. (United States) . . . . . [9029-18]

10:45 am: **HSA overview and how it impacts image processing** (*Keynote Presentation*), Phil Rogers, AMD (United States) and HSA Foundation (United States) . . . . . [9029-19]

11:30 am: **Intro to OpenCL 2.0 by example: imaging processing and OpenCV** (*Invited Paper*), Harris Gasparakis, AMD (United States) [9029-20]

12:00 pm: **Introduction to android RenderScript** (*Invited Paper*), Tim Murray, Google (United States) . . . . . [9029-21]

Lunch Break . . . . . Thu 12:45 pm to 2:00 pm

## Session 6

Location: Golden Gate 4 . . . . . Thu 2:00 pm to 4:30 pm

### Heterogeneous Computing Systems for High-Performance and Low-Power Signal Processing II

2:00 pm: **Deeper look into HSA architecture and its runtime** (*Invited Paper*), Ben Sander, AMD (United States) . . . . . [9029-22]

2:40 pm: **Image processing on mobile SOC using ARM Mali GPU** (*Invited Paper*), Akshay Agarwal, ARM Inc. (United States) . . . . . [9029-23]

Coffee Break . . . . . Thu 3:10 pm to 4:00 pm

4:00 pm: **Imaging algorithms and implementations using RenderScript in mobile systems** (*Invited Paper*), Shereef Shehata, Mahesh Renduchintala, LG Electronics Inc. (United States) . . . . . [9029-24]

# Conference 9030 • Location: Golden Gate 2

Monday–Wednesday 3–5 February 2014 • Proceedings of SPIE Vol. 9030

## Mobile Devices and Multimedia: Enabling Technologies, Algorithms, and Applications 2014

*Conference Chairs:* **Reiner Creutzburg**, Fachhochschule Brandenburg (Germany); **David Akopian**, The Univ. of Texas at San Antonio (United States)

*Program Committee:* **John Adcock**, FX Palo Alto Lab. (United States); **Sos S. Agaian**, The Univ. of Texas at San Antonio (United States); **Faouzi Alaya Cheikh**, Gjøvik Univ. College (Norway); **Noboru Babaguchi**, Osaka Univ. (Japan); **Nina T. Bhatti**, Hewlett-Packard Labs. (United States); **Chang Wen Chen**, Univ. at Buffalo (United States); **Philip C. L. Chen**, Univ. of Macau (Macao, China); **Tat-Seng Chua**, National Univ. of Singapore (Singapore); **David E. Cook**, Consultant (Namibia); **Matthew L. Cooper**, FX Palo Alto Lab. (United States); **Kenneth J. Crisler**, Motorola, Inc. (United States); **Francesco G. B. De Natale**, Univ. degli Studi di Trento (Italy); **Alberto Del Bimbo**, Univ. degli Studi di Firenze (Italy); **Stefan Edlich**, Technische Fachhochschule Berlin (Germany); **Atanas P. Gotchev**, Tampere Univ. of Technology (Finland); **Alan Hanjalic**, Technische Univ. Delft (Netherlands); **Alexander G. Hauptmann**, Carnegie Mellon Univ. (United States); **Winston H. Hsu**, National Taiwan Univ. (Taiwan); **Gang Hua**, Stevens Institute of Technology (United States); **Catalin Lacatus**, Telcordia Technologies, Inc. (United States); **Xin Li**, West Virginia Univ. (United States); **Qian Lin**, Hewlett-Packard Labs. (United States); **Gabriel G. Marcu**, Apple Inc. (United States); **Vasileios Mezaris**, Informatics and Telematics Institute (Greece); **Chong-Wah Ngo**, City Univ. of Hong Kong (Hong Kong, China); **Sethuraman Panchanathan**, Arizona State Univ. (United States); **Kari A. Pulli**, NVIDIA Corp. (United States); **V. Krishnan Ramanujan**, The Univ. of Texas Health Science Ctr. at San Antonio (United States); **René Rosenbaum**, Univ. of California, Davis (United States); **Yong Rui**, Microsoft Corp. (China); **Olli Silvén**, Univ. of Oulu (Finland); **John R. Smith**, IBM Thomas J. Watson Research Ctr. (United States); **Hari Sundaram**, Arizona State Univ. (United States); **Jarmo Henrik Takala**, Tampere Univ. of Technology (Finland); **Marius Tico**, Nokia Research Ctr. (Finland); **Meng Wang**, National Univ. of Singapore (Singapore); **Rong Yan**, Facebook Inc. (United States); **Jun Yang**, Facebook Inc. (United States)

### Monday 3 February

#### Session 1

**Location: Golden Gate 2 . . . . . Mon 9:30 am to 10:10 am**

#### Multimedia Content for Education

Session Chairs: **Reiner Creutzburg**, Fachhochschule Brandenburg (Germany); **David Akopian**, The Univ. of Texas at San Antonio (United States)

9:30 am: **Conception of a course for professional training and education in the field of computer and mobile forensics, Part II: network forensics and penetration testing**, Knut Kröger, Reiner Creutzburg, Fachhochschule Brandenburg (Germany). . . . . [9030-1]

9:50 am: **Remote laboratory content delivery in radio-communications**, Achot Matevosyan, Rudresh Gandhinagar Ekanthappa, Rodrigo Escobar, David Akopian, The Univ. of Texas at San Antonio (United States) [9030-2]

Coffee Break . . . . . Mon 10:10 am to 10:50 am

#### Session 2

**Location: Golden Gate 2 . . . . . Mon 10:50 am to 12:30 pm**

#### Emerging Mobile Applications and Enabling Technologies

Session Chairs: **Reiner Creutzburg**, Fachhochschule Brandenburg (Germany); **David Akopian**, The Univ. of Texas at San Antonio (United States)

10:50 am: **Accessing multimedia content from mobile applications using semantic web technologies**, Joern Kreutel, Andrea Gerlach, Beuth Hochschule für Technik Berlin (Germany); Stefanie Klekamp, Kristin Schulz, Humboldt-Univ. zu Berlin (Germany) . . . . . [9030-3]

11:10 am: **Real-time global illumination on mobile device**, Minsu Ahn, Inwoo Ha, SAMSUNG Electronics Co., Ltd. (Korea, Republic of); Hyong-Euk Lee, Samsung Advanced Institute of Technology (Korea, Republic of); Dokyoon Kim, SAMSUNG Electronics Co., Ltd. (Korea, Republic of) . . . . . [9030-4]

11:30 am: **Micro modules for mobile shape, color, and spectral imaging with smartpads in industry, biology, and medicine**, Dietrich Hofmann, Paul-Gerald Dittrich, Eric Düntsch, Daniel Kraus, SpectroNet (Germany); Nicolaus Hettler, Angelika Murr, CDA GmbH (Germany)[9030-5]

11:50 am: **A mobile phone user interface for image-based dietary assessment**, Ziad Ahmad, Purdue Univ. (United States); Nitin Khanna, Graphic Era Univ. (India); Carol J. Boushey, Cancer Research Ctr. of Hawai'i (United States); Edward J. Delp III, Purdue Univ. (United States) . . . . . [9030-6]

12:10 pm: **Interactive real-time media streaming with reliable communication**, Xunyu Pan, Kevin M. Free, Frostburg State Univ. (United States) . . . . . [9030-7]

Lunch Break . . . . . Mon 12:30 pm to 2:00 pm

#### Session 3

**Location: Golden Gate 2 . . . . . Mon 2:00 pm to 3:20 pm**

#### Coding and Algorithms

Session Chair: **Sos Agaian**, The Univ. of Texas at San Antonio (United States)

2:00 pm: **Efficient burst image compression using H.265/HEVC**, Hoda Roodaki-Lavasani, Tampere Univ. of Technology (Finland); Jani Lainema, Nokia Corp. (Finland). . . . . [9030-8]

2:20 pm: **MPEG-4 solutions for virtualizing RDP-based applications**, Bojan Joveski, Mihai Mitrea, Rama Rao Ganji, Télécom SudParis (France) . . . . . [9030-9]

2:40 pm: **Evaluation of the emerging scalable high efficiency video coding (SHVC) standard for video stream adaptation in lossy mobile networks**, James M. Nightingale, Qi Wang, Christos Grecos, Univ. of the West of Scotland (United Kingdom); Sergio R. Goma, Qualcomm Inc. (United States). . . . . [9030-10]

3:00 pm: **Spatial domain entertainment audio decompression/compression**, Yiu Keung Chan, Consultant (Hong Kong, China); Ka Him K. Tam, Hong Kong Aircraft Engineering Co. Ltd. (Hong Kong, China) . . . . . [9030-11]

Coffee Break . . . . . Mon 3:20 pm to 4:00 pm

# Conference 9030 · Location: Golden Gate 2

## Session 4

**Location: Golden Gate 2 . . . . . Mon 4:00 pm to 5:20 pm**

### Multimedia and Mobile Content

Session Chair: **David Akopian**, The Univ. of Texas at San Antonio (United States)

4:00 pm: **Power efficient imaging for mobile displays**, Chihao Xu, Tobias Jung, Daniel Schaefer, Univ. des Saarlandes (Germany) . . . . . [9030-12]

4:20 pm: **Combining spherical harmonics and point lights for real-time photorealistic rendering**, Inwoo Ha, James D. Kim, Hyungwook Lee, SAMSUNG Electronics Co., Ltd. (Korea, Republic of) . . . . . [9030-13]

4:40 pm: **Fast ice image retrieval based on a multilayer system**, Guoyu Lu, Chandra Kambhmettu, Univ. of Delaware (United States) . . [9030-14]

5:00 pm: **Multi-frame knowledge based text enhancement for mobile phone captured videos**, Suleyman Ozarslan, P. Erhan Eren, Middle East Technical Univ. (Turkey) . . . . . [9030-15]

**Human activity recognition by smartphones regardless of device orientation**, Jafet A. Morales, David Akopian, Sos Agaian, The Univ. of Texas at San Antonio (United States) . . . . . [9030-19]

**Conception, implementation, and test of a Windows registry forensic tool**, Knut Kröger, Reiner Creutzburg, Christian Leube, Fachhochschule Brandenburg (Germany) . . . . . [9030-20]

**Virtual tutorials, Wikipedia books, and multimedia-based teaching for blended learning support in a course on algorithms and data structures**, Jenny Knackmuss, Reiner Creutzburg, Fachhochschule Brandenburg (Germany) . . . . . [9030-21]

**Hacking and securing the AR.Drone 2.0 quadcopter: investigations for improving the security of a toy**, Ricardo Band, Johann-Sebastian Pleban, Reiner Creutzburg, Fachhochschule Brandenburg (Germany) . . [9030-22]

**A new 1D parameter-control chaotic framework**, Zhongyun Hua, Yicong Zhou, Chi-Man Pun, C. L. Philip Chen, Univ. of Macau (Macao, China) . . . . . [9030-23]

**A new collage steganographic algorithm using cartoon design**, Shuang Yi, Yicong Zhou, Chi-Man Pun, Univ. of Macau (Macao, China); C. L. Philip Chen, Univ. of Macao (Macao, China). . . . . [9030-24]

**Fixed tile rate codec for bandwidth saving in video processors**, Vladimir Lachine, Chon-Tam Le Dinh, Dinh Kha Le, Jeffrey Wong, Qualcomm Inc. (Canada) . . . . . [9030-25]

## Tuesday 4 February

**Location: Continental Ballroom 5 . . . . . 8:30 am to 9:50 am**

### Plenary Session and Society Award Presentations

8:30 am: **Using fMRI To Reverse Engineer the Human Visual System (Plenary)**, Jack L. Gallant, Univ. of California, Berkeley (United States) . . . . . [9011-301]

**Location: Continental Ballroom 4 . . . . . 5:30 pm to 7:30 pm**

### Symposium Demonstration Session

A symposium-wide demonstration session will be open to attendees 5:30 to 7:30 pm Tuesday evening. Demonstrators will provide interactive, hands-on demonstrations of a wide-range of products related to Electronic Imaging.

## Wednesday 5 February

**Location: Continental Ballroom 5 . . . . . 8:30 am to 9:50 am**

### Plenary Session and Conference Award Presentations

8:30 am: **Integrated Imaging: Creating Images from the Tight Integration of Algorithms, Computation, and Sensors (Plenary)**, Charles A. Bouman, Purdue Univ. (United States) . . . . . [9011-300]

### Interactive Paper Session-Wednesday

*Interactive papers will be placed on display after 8:30 am on Wednesday. An interactive paper session, with authors present at their papers, will be held Wednesday morning, 9:50 to 11:10 am. Refreshments will be served.*

**Location: Continental Ballroom and Golden Gate Foyers . . . . . 9:50 am to 11:10 am**

**Possibilities for retracing of copyright violations on current video game consoles by optical disk analysis**, Frank Irmmler, Reiner Creutzburg, Fachhochschule Brandenburg (Germany). . . . . [9030-16]

**Fault tolerant position fingerprinting algorithm**, Mohammadhafez Bazrafshan, The Univ. of Texas at San Antonio (United States) . . [9030-17]

**Indoor positioning system using fingerprinting of WLAN multipath signals for mobile devices**, Anirban Saha, David Akopian, The Univ. of Texas at San Antonio (United States) . . . . . [9030-18]

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Yu, Jingyi 9023 Program Committee, [9023-5] S2, [9023-6] S2  
Yu, Lejun [9019-34] SPWed  
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- Zakhor, Avidah [9020-32] SPWed  
Zaman, Tim [9018-8] S1  
Zanibbi, Richard 9021 Program Committee  
**Zauner, Gerald** 9024 Program Committee, 9024 S2 Session Chair, 9024 S4 Session Chair, [9024-2] S1  
Zeinaly, Mahshid [9017-1] S1  
Zeise, Eric K. 9016 Program Committee  
**Zeng, Kai** [9014-26] S5  
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Zhao, Yonghui 9027 Program Committee  
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Zhou, Samuel 9011 Program Committee  
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Zhou, Xuefu [9024-17] S4  
**Zhou, Yicong** [9019-33] SPWed, [9030-23] SPWed, [9030-24] SPWed  
Zhou, Yue [9017-8] S4  
**Zhu, Wenwu** 9029 Program Committee  
Zhu, Yi [9014-32] S7  
Ziemkiewicz, Caroline 9017 Program Committee  
Zilly, Frederik [9023-33] S8  
Zimdars, David A. [9020-22] S5  
Zimmer, Volker [9022-13] S4  
**Zin, Thi Thi** [9026-39] SPWed, [9027-10] S3  
Zinger, Svitlana [9029-14] S4  
Zitinski Elias, Paula [9015-7] S2, [9015-8] S2  
Zou, Bochao [9011-24] S7  
Zou, Jie 9021 Program Committee  
Zuo, Tian [9019-34] SPWed

# General Information

## Electronic Imaging 2014

Hilton San Francisco Union Square  
33 O'Farrell Street, San Francisco, CA 94102

## Onsite Registration and Badge Pick-Up Hours

Sunday 2 February . . . . . 7:00 am to 4:00 pm  
Monday 3 February . . . . . 7:00 am to 4:00 pm  
Tuesday 4 February . . . . . 7:30 am to 4:00 pm  
Wednesday 5 February . . . . . 7:30 am to 5:00 pm  
Thursday 6 February . . . . . 7:30 am to noon

## Conference Registration

Conference registration includes: access to all symposium conferences, Interactive Paper and Demonstration Sessions, Exhibition, coffee breaks, All-Conference Reception, and choice of conference proceedings: printed or CD. Courses are not automatically included; you can add a course registration with your conference registration.

## Short Course Registration and Course Notes

Course-only registration

Sunday 2 February . . . . . 7:00 am to 10:00 am

Courses and workshops are priced separately. Course-only registration includes your selected course(s), course notes, coffee breaks, and admittance to the exhibition.

## Short Courses Notes

Short courses will take place in various meeting rooms at the Hilton San Francisco, Union Square. Room assignments are noted on the course admission tickets and distributed with registration materials.

## Cashier

*Registration Area*

Open during registration hours

IS&T cashier can assist with registration payments, adding a short course, receipts, and badge corrections.

## Refund Information

To cover bank charges and processing fees, there is a cancellation fee of \$75 until 27 January 2014. After that date, the cancellation fee is 50% of the total plus \$75. All requests for refunds must be made in writing. No refunds will be given after 27 February 2014.

## Speaker AV Preparation

Open during Registration Hours

Each conference room has an LCD projector, screen, lapel microphone, and laser pointer. All presenters are encouraged to visit the Speaker AV Prep Room to confirm that their presentation is compatible with the audiovisual equipment supplied in the conference rooms. Speakers who have requested special equipment, prior to the request deadline, are asked to report to the AV Prep Room to confirm their requested equipment is available. No shared laptops are provided.

## Interactive Paper Set-Up Instructions

Tuesday Poster Session authors can set up on Tuesday, 8 am, and Wednesday Poster Session authors can set up 7 am on Wednesday. Pushpins are provided; other supplies can be obtained at the Conference Registration Desk. Authors must remove poster papers at the conclusion of the Interactive Session; posters not removed are considered unwanted and will be removed by staff and discarded. Neither sponsoring Society assumes responsibility for posters left up before or after the Interactive Paper Session.

## Business Center

In-house Business Center/FedEx Office for all of your printing and faxing needs

Monday through Friday . . . . . 6:30 am – 7:00 pm

Saturday & Sunday . . . . . 9:00 am – 5:00 pm

## IS&T Bookstore and Membership Booth

IS&T publishes and/or distributes technical materials on a broad range of subjects pertinent to the field of electronic imaging. In addition to titles from leading scientific publishers, IS&T showcases proceedings from its Digital Printing Technologies, Digital Fabrication, Archiving and Color Imaging conferences, as well as selected books on related topics. Information on upcoming meetings and membership, and gratis copies of journals are also available.

## SPIE Bookstore

The SPIE Bookstore is your source for the latest SPIE Press Books, Proceedings, and Education and Professional Development materials.

## Policies

### Granting Attendee Registration and Admission

IS&T/SPIE, or their officially designated event management, in their sole discretion, reserves the right to accept or decline an individual's registration for an event. Further, IS&T/SPIE, or event management, reserves the right to prohibit entry or remove any individual whether registered or not, be they attendees, exhibitors, representatives, or vendors, who in their sole opinion are not, or whose conduct is not, in keeping with the character and purpose of the event. Without limiting the foregoing, IS&T/SPIE and event management reserve the right to remove or refuse entry to any attendee, exhibitor, representative, or vendor who has registered or gained access under false pretenses, provided false information, or for any other reason whatsoever that they deem is cause under the circumstances.

### Misconduct Policy

IS&T/SPIE is a professional, not-for-profit society committed to providing valuable conference and exhibition experiences. IS&T/SPIE is dedicated to equal opportunity and treatment for all its members and meeting attendees. Attendees are expected to be respectful to other attendees, IS&T/SPIE staff, and contractors. Harassment and other misconduct will not be tolerated; violators will be asked to leave the event.

### Identification

To verify registered participants and provide a measure of security, IS&T/SPIE will ask attendees to present a government-issued Photo ID at registration to collect registration materials.

Individuals are not allowed to pick up badges for attendees other than themselves. Further, attendees may not have some other person participate in their place at any conference-related activity. Such other individuals will be required to register on their own behalf to participate.

### Capture and Use of a Person's Image

By registering for an IS&T/SPIE event, I grant full permission to IS&T/SPIE to capture, store, use, and/or reproduce my image or likeness by any audio and/or visual recording technique (including electronic/digital photographs or videos), and create derivative works of these images and recordings in any IS&T/SPIE media now known or later developed, for any legitimate IS&T/SPIE marketing or promotional purpose.

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### Payment Method

Registrants for paid elements of the event, who do not provide a method of payment, will not be able to complete their registration. Individuals with incomplete registrations will not be able to attend the conference until payment has been made. IS&T/SPIE accepts VISA, MasterCard, American Express, Discover, Diner's Club, checks and wire transfers. Onsite registrations can also pay with Cash.

### Authors/Coauthors

- By submitting an abstract, you agree to the following conditions:
- An author or coauthor (including keynote, invited, and solicited speakers) will register at the author registration rate, attend the meeting, and make the presentation as scheduled.
  - A full-length manuscript (6 pages minimum) for any accepted oral or poster presentation will be submitted for publication in the IS&T/SPIE Digital Library, printed conference Proceedings, and CD. (Some IS&T/SPIE events have other requirements that the author is made aware of at the time of submission.)
  - Only papers presented at the conference and received according to publication guidelines and timelines will be published in the conference Proceedings and IS&T/SPIE Digital Library (or via the requirements of that event).

### Audio, Video, Digital Recording Policy

Conferences, courses, and poster sessions: For copyright reasons, recordings of any kind are prohibited without prior written consent of the presenter. Attendees may not capture nor use the materials presented in any meeting room without written permission. Consent forms are available at Speaker Check-In. Individuals not complying with this policy will be asked to leave a given session and asked to surrender their recording media.

Exhibition Hall: For security and courtesy reasons, recordings of any kind are prohibited unless one has explicit permission from on-site company representatives. Individuals not complying with this policy will be asked to surrender their recording media and to leave the exhibition hall.

Your registration signifies your agreement to be photographed or videotaped by IS&T/SPIE in the course of normal business. Such photos and video may be used in IS&T/SPIE marketing materials or other IS&T/SPIE promotional items.

# General Information

## Laser Pointer Safety Information/Policy

IS&T/SPIE supplies tested and safety-approved laser pointers for all conference meeting rooms. For safety reasons, IS&T/SPIE requests that presenters use provided laser pointers.

Use of a personal laser pointer represents user's acceptance of liability for use of a non-IS&T/SPIE-supplied laser pointer. If you choose to use your own laser pointer, it must be tested to ensure <5 mW power output. Laser pointers in Class II and IIIa (<5 mW) are eye safe if power output is correct, but output must be verified because manufacturer labeling may not match actual output. Come to Speaker Check-In and test your laser pointer on our power meter. You are required to sign a waiver releasing IS&T/SPIE of any liability for use of potentially non-safe, personal laser pointers. Misuse of any laser pointer can lead to eye damage.

## Underage Persons on Exhibition Floor Policy

For safety and insurance reasons, no one under the age of 16 will be allowed in the exhibition area during move-in and move-out. During open exhibition hours, only children over the age of 12 accompanied by an adult will be allowed in the exhibition area.

## Unauthorized Solicitation Policy

Unauthorized solicitation in the Exhibition Hall is prohibited. Any nonexhibiting manufacturer or supplier observed to be distributing information or soliciting business in the aisles, or in another company's booth, will be asked to leave immediately.

## Unsecured Items Policy

Personal belongings should not be left unattended in meeting rooms or public areas. Unattended items are subject to removal by security. IS&T/SPIE is not responsible for items left unattended.

## Wireless Internet Service Policy

At IS&T/SPIE events where wireless is included with your registration, IS&T/SPIE provides wireless access for attendees during the conference and exhibition but cannot guarantee full coverage in all locations, all of the time. Please be respectful of your time and usage so that all attendees are able to access the internet.

Excessive usage (e.g., streaming video, gaming, multiple devices) reduces bandwidth and increases cost for all attendees. No routers may be attached to the network. Properly secure your computer before accessing the public wireless network. Failure to do so may allow unauthorized access to your laptop as well as potentially introduce viruses to your computer and/or presentation. IS&T/SPIE is not responsible for computer viruses or other computer damage.

## Mobile Phones and Related Devices Policy

Mobile phones, tablets, laptops, pagers, and any similar electronic devices should be silenced during conference sessions. Please exit the conference room before answering or beginning a phone conversation.

## Smoking

For the health and consideration of all attendees, smoking is not permitted at any event elements, such as but not limited to: plenaries, conferences, workshops, courses, poster sessions, hosted meal functions, receptions, and in the exhibit hall. Most facilities also prohibit smoking in all or specific areas. Attendees should obey any signs preventing or authorizing smoking in specified locations.

## Hold Harmless

Attendee agrees to release and hold harmless IS&T/SPIE from any and all claims, demands, and causes of action arising out of or relating to your participation in the event you are registering to participate in and use of any associated facilities or hotels.

## Event Cancellation

If for some unforeseen reason IS&T/SPIE should have to cancel the event, registration fees processed will be refunded to registrants. Registrants will be responsible for cancellation of travel arrangements or housing reservations and the applicable fees.

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**Gaurav Sharma, *Editor-in-Chief***

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# Electronic Imaging

SCIENCE AND TECHNOLOGY

2-6 February 2014

Vol#	Title (Editor)	Prepublication Price
9011	<b>Stereoscopic Displays and Applications XXV</b> (Woods, Holliman, Favallora) . . . . .	\$100
9012	<b>The Engineering Reality of Virtual Reality 2014</b> (Dolinsky, McDowall) . . . . .	\$53
9013	<b>Three-Dimensional Image Processing, Measurement (3DIPM), and Applications 2014</b> (Baskurt, Sitnik) . . . . .	\$45
9014	<b>Human Vision and Electronic Imaging XIX</b> (Rogowitz, Pappas, de Ridder) . . . . .	\$80
✓ 9015	<b>Color Imaging XIX: Displaying, Processing, Hardcopy, and Applications</b> (Eschbach, Marcu, Rizzi) . . . . .	\$60
✓ 9016	<b>Image Quality and System Performance XI</b> (Triantaphillidou, Larabi) . . . . .	\$60
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9028	<b>Media Watermarking, Security, and Forensics 2014</b> (Alattar, Memon, Heitzenrater) . . . . .	\$60
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9030	<b>Mobile Devices and Multimedia: Enabling Technologies, Algorithms, and Applications 2014</b> (Creutzburg, Akopian) . . . . .	\$53

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IS&T, the Society for Imaging Science and Technology, is an international non-profit dedicated to keeping members and others apprised of the latest developments in fields related to imaging science through conferences, educational programs, publications, and its website. IS&T encompasses all aspects of imaging, with particular emphasis on digital printing, electronic imaging, color science, photofinishing, image preservation, silver halide, pre-press technology, and hybrid imaging systems.

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