

IS&T International Symposium on Electronic Imaging Science and Technology 2016

**Stereoscopic Displays and Applications
XXVII**

**San Francisco, California, USA
14 - 18 February 2016**

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Stereoscopic Displays and Applications XXVII

Conference Program

15-17 February 2016 – Hilton San Francisco Union Square

Monday, February 15, 2016

Light-Field and Super-Multiview Displays

Session Chair: Neil Dodgson, University of Cambridge (United Kingdom)

8:40 – 10:10 am

Continental Ballroom 5

8:40

SDA-426

New visual coding exploration in MPEG: Super-MultiView and Free Navigation in Free viewpoint TV, Gauthier Lafuit, Université Libre de Bruxelles (Belgium); Marek Domański, Krzysztof Wegner and Tomasz Grajek, Poznań University of Technology (Poland); Takanori Senoh, National Institute of Information and Communications Technology (Japan); Joël Jung, Orange Labs (France); Péter Tamás Kovács, Holografika (Hungary); Patrik Goorts and Lode Jorissen, Hasselt University; Adrian Munteanu and Beerend Ceulemans, Vrije Universiteit Brussel (Belgium); Pablo Carballeira and Sergio Garcia, Universidad Politécnica de Madrid (Spain); and Masayuki Tanimoto, Nagoya Industrial Science Research Institute (Japan) 1

9:00

SDA-424

Application of light field displays to vision correction and accommodation support, Fu-Chung Huang¹, Robert Konrad², and Gordon Wetzstein²; ¹NVIDIA Research and ²Stanford University (USA) [Presentation Only] N/A

9:20

SDA-425

Light field modulation using a double-lenticular liquid crystal panel, Hironobu Gotoda, National Institute of Informatics (Japan) 10

9:40

9:40

SDA-600

3DTV: past, present and future, Neil Dodgson, Victoria University of Wellington (New Zealand) [Standby Paper] [Presentation Only] N/A

10:00

SD&A Conference Opening Remarks

10:10 – 10:50 am Coffee Break

360° 3D

Session Chair: Gregg Favalora, VisionScope Technologies, LLC (USA)

10:50 am – 12:30 pm

Continental Ballroom 5

10:50

SDA-427

360-degree multi-viewer autostereoscopic tabletop display with omnidirectional dynamic parallax barrier and novel time-multiplexed directional backlight, Hagen Seifert and Quinn Smithwick, Disney Research (USA) 16

11:10

SDA-428

360-degree three-dimensional display with the virtual display surface, Hadaka Yamada¹, Kayo Yoshimoto¹, Hideya Takahashi¹, and Kenji Yamada²; ¹Osaka City University and ²Osaka University (Japan) 24

11:30

SDA-429

Stereoscopic space map – A semi-immersive configuration of 3D-stereoscopic tours in multi-display environments, Björn Sommer¹, Andreas Hamacher¹, Owen Kalitza¹, Tobias Czavardna¹, Matthias Klapperstück¹, Niklas Biere², Marco Civico², David G. Barnes³, and Falk Schreiber¹; ¹Monash University (Australia), ²Bielefeld University, and ³Gymnasium Schloss Halte-Stukenbrock (Germany) 30

11:50

SDA-430

Optical realization for the computer-generated cylindrical hologram, Munkh-Uchral Erdenebat, Erkhembaatar Dashdavaa, Ki-Chul Kwon, Chan Hoon Haan, and Nam Kim, Chungbuk National University (South Korea) 39

12:10

12:10

SDA-525

Capturing and Rendering Light-Field Video: Approaches and Challenges, Tim Milliron, Alex Song, Lytro, Inc. (USA) [Presentation Only] N/A

12:30 – 2:00 pm Lunch Break

El 2016 Opening Plenary and Symposium Awards

Session Chair: Choon-Woo Kim (Inha University) N/A

2:00 – 3:00 PM

Continental Ballroom 5

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

3:00 – 3:30 pm Coffee Break

3D Content I

Session Chair: Nicolas Holliman, University of Newcastle (United Kingdom)

3:30 – 3:50 pm

Continental Ballroom 5

SDA-431

Linear optimization approach for depth range adaption of stereoscopic videos, Werner Zellinger¹, Bernhard Maser¹, Ayadi Chouikhi¹, Florian Seitner², Matej Nezveda³, and Margrit Gelautz¹; ¹Software Competence Center Hagenberg GmbH, ²Emotion3D GmbH, and ³Technical Univ. Vienna (Austria) 44

SD&A Keynote I

Session Chair: Nicolas Holliman, University of Newcastle (United Kingdom) N/A

3:50 – 4:50 pm

Continental Ballroom 5

SDA-432

Two shipwrecks, 2500 metres underwater, six 3D cameras – let the survey begin, Andrew Woods¹, Andrew Hutchison¹, Joshua Hollick¹, and Tim Eastwood²; ¹Curtin University and ²Western Australian Museum (Australia) [Presentation Only] N/A

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

SD&A Conference 3D Theater

Hosts: John Stern, Intuitive Surgical, Inc. (USA); Chris Ward, Lightspeed Design, Inc. (USA); and Andrew Woods, Curtin University (Australia)

6:00 – 7:30 pm

Continental Ballroom 5

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

Stereoscopic Displays and Applications (SD&A) XXVII

SD&A Conference Annual Dinner
7:50 – 10:00 pm

M.Y. China restaurant

SD&A attendees are invited to join the annual informal SD&A dinner. This is an opportunity to meet with colleagues and discuss the latest advances. There is no host for this event. Information on venue and cost will be provided on the day at the conference.

Tuesday, February 16, 2016**Human Factors and 2D to 3D Conversion**

Session Chair: Takashi Kawai, Waseda University (Japan)

8:40 – 10:20 am

Continental Ballroom 5

8:40 SDA-433

Towards perceptually coherent depth maps in 2D-to-3D conversion, Nicole Brosch, Tanja Schausberger, and Margrit Gelautz, Vienna University of Technology (Austria) 50

9:00

SDA-434

Depth extraction from a single image based on block-matching and robust regression, Hyeonju Jeong, Changjae Oh, and Kwanghoon Sohn, Yonsei University (South Korea) 61

9:20

SDA-435

Emotional arousal with 3D images and effects on time perception, Takashi Kawai, Risako Hama, and Masashi Hariuchi, Waseda University (Japan) 67

9:40

SDA-436

A novel approach of generating stereoscopic images using defocus, Tianteng Bi, Yue Liu, Dongdong Wong, and Yongtian Wang, Beijing Institute of Technology (China) 72

10:00

SDA-437

Stereoscopic remote vision system aerial refueling visual performance, Marc Winterbottom¹, Charles Lloyd², James Gaska¹, Steven Wright¹, and Steven Hadley¹; ¹U.S. Air Force School of Aerospace Medicine and ²Visual Performance LLC (USA) 81

10:20 – 10:50 am Coffee Break

3D Image Quality and Visual Comfort

Session Chair: John Merritt, The Merritt Group (USA)

10:50 am – 12:30 pm

Continental Ballroom 5

10:50

SDA-438

An adaptive blur in peripheral vision to reduce visual fatigue in stereoscopic vision, David Aurat¹, Laure Leroy², Olivier Hugues¹, and Philippe Fuchs¹; ¹Mines Paristech – PSL Research University and ²Paris 8 University (France) 91

11:10

SDA-439

Trends in 3D movies quality as evaluated on 105 movies and 10 quality metrics, Dmitriy Vatolin, Alexander Bokov, Mikhail Erifeev, and Vyacheslav Napadovsky, Lomonosov Moscow State University (Russian Federation) 100

11:30

SDA-440

Evaluation of the perception of dynamic horizontal image translation and a gaze adaptive approach, Stefan Eickelberg, TU Dortmund University (Germany) 110

11:50

SDA-441

Study on the influence of 3D motion characteristics on the blinking rate, Yuan Gao, Yue Liu, Yiwang Qian, and Yongtian Wang, Beijing Institute of Technology (China) 122

12:10

SDA-442

Visual fatigue during continuous viewing the 3D Movie, Danli Wang, Xinpan Yang, Haichen Hu, and Helei Wang, Institut of Software, Chinese Academy of Sciences (China) 129

12:30 – 2:00 pm Lunch Break

EI 2016 Tuesday Plenary and Symposium Awards

Session Chair: Nitin Sampat (Rochester Institute of Technology) N/A

2:00 – 3:00 PM

Continental Ballroom 5

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

3:00 – 3:30 pm Coffee Break

SD&A Keynote II

Session Chair: Andrew Woods, Curtin University (Australia) N/A

3:30 – 4:30 pm

Continental Ballroom 5

SDA-443

3-D movie rarities, Robert Furmanek and Greg Kintz, 3-D Film Archive (USA) [Presentation Only] N/A

Autostereoscopic Displays

Session Chair: Hideki Kakeya, University of Tsukuba (Japan)

4:30 – 5:30 pm

Continental Ballroom 5

4:30

SDA-444

A high resolution aerial 3D display using a directional backlight (JIST-first), Hideki Kakeya and Shuta Ishizuka, University of Tsukuba (Japan) 135

4:50

SDA-445

Electronical correction of misalignments between optical grid and pixel panel on autostereoscopic displays, Silvio Jurk, Mathias Kuhlmeier, Bernd Duckstein, and René de la Barré, Fraunhofer Heinrich-Hertz-Institute (Germany) 143

EI 2016 Symposium Demonstration Session and Exhibit Hall**Happy Hour****5:30 – 7:00 PM**

Continental Ballroom Foyer

Wednesday, February 17, 2016**3D Content II**

Session Chair: John Stern, Intuitive Surgical, Inc. (USA)

8:40 – 9:20 am

Continental Ballroom 5

8:40

SDA-447

An efficient approach to playback of stereoscopic videos using a wide field-of-view, Chris Larkee and John LaDisa, Marquette University (USA) 148

9:00

SDA-448

Hybrid reality: Using 2D and 3D together in a mixed mode display, Kurt Hoffmeister, Mechdyne Corp. (USA) [Presentation Only] N/A

3D in VR and AR: Application Challenges**9:20 – 10:20 am**

Continental Ballroom 5

As key commercial devices are being released this year the successful application of 3D in VR and AR has become a critical issue for developers and researchers. This panel of leaders in the field will discuss in depth the stereography required for VR and AR and the additional factors that developers must consider to deliver a comfortable and compelling experience. Knowledge of stereography is essential for the market uptake of VR and AR applications and anyone working in the field will find this panel's advice indispensable. Moderator: Carolina Cruz-Neira, Emerging Analytics Center, University of Arkansas at Little Rock. Panellists: Devon Copley, Nokia; and Marty Banks, University of California Berkeley N/A

10:20 – 10:50 am Coffee Break

Stereoscopic Displays and Applications (SD&A) XXVII

3DIPM/SD&A: Stereoscopic Image Processing and Depth Mapping Joint Session

Session Chairs: William Puech, University of Montpellier (France) and Michael Weissman, TrueVision Systems (USA)

10:50 am – 12:30 pm

Continental Ballroom 5

This session is jointly sponsored by: Stereoscopic Displays and Applications XXVII and 3D Image Processing, Measurement (3DIPM), and Applications 2016.

10:50

SDA-034

Geometrically constrained sub-pixel disparity estimation from stereo images of the retinal fundus, Mohamad Kharboully¹, Carlos Vazquez¹, Stéphane Coulombe¹, and Jacques De Guise^{1,2}; ¹Ecole de technologie supérieure and ²University of Montreal Hospital Research Centre (Canada) 154

11:10

3DIPM-035

3D autostereoscopic display image generation using direct light field rendering, Young Ju Jeong and Hyunsung Chang, Samsung Advanced Institute of Technology (South Korea) N/A

11:30

SDA-036

A new hole filling method based on 3D geometric transformation for synthesized image, Hak Gu Kim and Yong Man Ro, Korea Advanced Institute of Science and Technology (South Korea) 162

11:50

3DIPM-037

Blue noise sampling of surfaces from stereoscopic images, Frederic Payan, Jean-Luc Peyrot, and Marc Antonini, Laboratory I3S, University Nice - Sophia Antipolis and CNRS (France) - UMR 7271 (France) N/A

12:10

SDA-601

Curtin HIVE – Hub for Immersive Visualisation and eResearch, Andrew Woods, Curtin University (Australia) [Standby Presentation] [Presentation Only] N/A

12:30 – 2:00 pm Lunch Break

EI 2016 Wednesday Plenary and Symposium Awards

Session Chair: Choon-Woo Kim (Inha University) N/A

2:00 – 3:00 PM

Continental Ballroom 5

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

3:00 – 3:30 pm Coffee Break

ERVR / SD&A: Virtual Reality and 3D Joint Session

Session Chairs: Margaret Dolinsky, Indiana University (USA) and Chris Ward, Lightspeed Design, Inc. (USA)

3:30 – 5:30 pm

Continental Ballroom 5

This session is jointly sponsored by: Stereoscopic Displays and Applications XXVII, and The Engineering Reality of Virtual Reality 2016.

3:30

SDA-039

LEIA 3D: Holographic reality, David Fattal, LEIA Inc. (USA) [Presentation Only] N/A

3:50

SDA-040

Effect of inter-lens distance on fusional limit in stereoscopic vision using a simple smartphone head-mounted display, Hiroyuki Morikawa^{1,2}, Yoshihiro Banchi², Shota Tsukada², Yusuke Hasegawa², Suguru Takahashi², Kaiji Ohta³, and Takashi Kawai²; ¹Aoyama Gakuin University, ²Waseda University, and ³International Christian University (Japan) 167

4:10

SDA-041

Investigating intermittent stereoscopy: Its effects on perception and visual fatigue, Ari Bouaniche and Laure Leroy, Université Paris 8 (France) 173

4:30

SDA-042

Stereoscopy-based procedural generation of virtual environments, Manlio Scalabrin, Laura Anna Ripamonti, Dario Maggiorini, and Davide Gadia, University of Milan (Italy) 182

4:50

ERVR-043

Beyond fun and games: VR as a tool of the trade, Carolina Cruz-Neira and Dirk Reiners, University of Arkansas (USA) N/A

5:10

SDA-525

3D will be back but not as we know it, Tim Macmillan, David Newman, GoPro Inc (USA) [Presentation Only] N/A

EI 2016 Symposium Interactive Papers Session

5:30 – 7:00 PM

Continental Ballroom 6

Stereoscopic Displays and Applications XXVII Interactive Papers Session

5:30 – 7:00 pm

Continental Ballroom 6

The following works will be presented at the EI 2016 Symposium Interactive Papers Session.

SDA-449

Occlusion and error detection for stereo matching and hole-filling using dynamic programming, Eu-Taeum Baek and Yo-Sung Ho, Gwangju Institute of Science and Technology (GIST) (South Korea) 189

SDA-450

Comparison of visual discomfort in viewing 3D video with various contrast changes on a stereoscopic 3D display, an autostereoscopic display and an HMD, Yoon-Suk Kang¹ and SungHo Cho²; ¹The Webb Schools (USA) and ²MasterImage 3D (South Korea) 195

SDA-451

An analysis of blue-light effect in reducing visual discomfort from watching stereoscopic 3D video, Yong-Woo Kim and Hang-Bong Kang, Catholic University of Korea (South Korea) 200

SDA-452

Retinal projection type 3D head-mounted display using an HOE lens array, Yasuhiro Takatsuka, Kayo Yoshimoto, and Hideya Takahashi, Osaka City University (Japan) 205

SDA-453

Disparity remapping considering the perception of depth structure, Ikuko Tsubaki¹, Kenichi Iwauchi¹, and Hiroaki Shigemasa²; ¹Sharp Corp. and ²Kochi University of Technology (Japan) 211

SDA-454

The effects of functional binocular disparity on route memory in stereoscopic images, Sanghyun Kim, Michika Takahashi, Katsumi Watanabe, and Takashi Kawai, Waseda University (Japan) 217

EI 2016 Symposium Interactive Papers Session

5:30 – 7:00 PM

Continental Ballroom 6