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PROCEEDINGS

Human Vision and Electronic Imaging 2021

Editors: **Damon Chandler**, Shizuoka University (Japan),
Mark McCourt, North Dakota State University (United States),
Jeffrey Mulligan, NASA Ames Research Center (United States)

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Society for Imaging Science and Technology
7003 Kilworth Lane • Springfield, VA 22151 USA
703/642-9090; 703/642-9094 fax
info@imaging.org; www.imaging.org

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Human Vision and Electronic Imaging 2021

Conference overview

The conference on Human Vision and Electronic Imaging explores the role of human perception and cognition in the design, analysis, and use of electronic media systems. It brings together researchers, technologists, and artists, from all over the world, for a rich and lively exchange of ideas. We believe that understanding the human observer is fundamental to the advancement of electronic media systems, and that advances in these systems and applications drive new research into the perception and cognition of the human observer. Every year, we introduce new topics through our Special Sessions, centered on areas driving innovation at the intersection of perception and emerging media technologies. The HVEI website (<https://jbmulligan.github.io/HVEI/>) includes additional information and updates.

Conference Chairs: Damon Chandler, Shizuoka University (Japan); Mark McCourt, North Dakota State University (United States); and Jeffrey Mulligan, NASA Ames Research Center (United States)

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Conference Sponsors



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Human Vision and Electronic Imaging 2021

TUESDAY 19 JANUARY 2021

PLENARY: DEEP INTERNAL LEARNING—DEEP LEARNING WITH ZERO EXAMPLES

Session Chair: Charles Bouman, Purdue University (United States)

10:00 – 11:10

Deep internal learning—Deep learning with zero examples

Michal Irani, professor, Department of Computer Science and Applied Mathematics, Weizmann Institute of Science (Israel)

Michal Irani is a professor at the Weizmann Institute of Science. Her research interests include computer vision, AI, and deep learning. Irani's prizes and honors include the Maria Petrou Prize (2016), the Helmholtz "Test of Time Award" (2017), the Landau Prize in AI (2019), and the Rothschild Prize in Mathematics and Computer Science (2020). She also received the ECCV Best Paper Awards (2000 and 2002), and the Marr Prize Honorable Mention (2001 and 2005).

WEDNESDAY 20 JANUARY 2021

APPLICATIONS OF NEURAL NETWORKS

Moderator: Vasilii Marshev, IMT Atlantique Bretagne-Pays de la Loire - Campus de Brest, IMT Atlantique Bretagne-Pays de la Loire - Campus de Brest, Brest, Bretagne, FR, academic/eng (France) / **Session Chair:** Jeffrey Mulligan, NASA Ames Research Center (United States)

10:15 – 11:15

10:15 HVEI-110
Deep quality evaluator guided by 3D saliency for stereoscopic images, Oussama Messai¹, Aladine Chetouani², Fella Hachoui¹, and Zianou Ahmed Seghii³; ¹University of Mentouri Brothers Constantine 1 (Algeria), ²University of Orléans (France), and ³University of Abbes Laghrour (Algeria)

10:35 HVEI-111
JPI-first: FP-nets for blind image quality assessment, Philipp Grüning and Erhardt Barth, University of Lübeck (Germany)

10:55 HVEI-112
Controllable medical image generation via generative adversarial networks, Zhihang Ren, Stella Yu, and David Whitney, UC Berkeley / ICSI (United States)

THURSDAY 21 JANUARY 2021

PLENARY: THE DEVELOPMENT OF INTEGRAL COLOR IMAGE SENSORS AND CAMERAS

Session Chair: Jonathan B. Phillips, Google Inc. (United States)

10:00 – 11:10

The development of integral color image sensors and cameras

Kenneth A. Parulski, *expert consultant: mobile imaging (United States)*

Kenneth Parulski is an expert consultant to mobile imaging companies and leads the development of ISO standards for digital photography. He joined Kodak in 1980 after graduating from MIT and retired in 2012 as research fellow and chief scientist in Kodak's digital photography division. His work has been recognized with a Technical Emmy and other major awards. Parulski is a SMPTE fellow and an inventor on more than 225 US patents.

HVEI POTPOURRI I

Moderator: Jeffrey Mulligan, NASA Ames Research Center (United States)

Session Chair: Lora Likova, Smith-Kettlewell Eye Research Institute (United States)

11:40 – 13:00

11:40

HVEI-157

Micro-expression recognition with noisy labels, *Tuomas Varanka, Wei Peng, and Guoying Zhao, University of Oulu (Finland)*

12:00

HVEI-158

Impact of virtual reality head mounted display on the attentional visual field, *Vasilii Marshev^{1,2}, Jean-Louis de Bougrenet de la Tocnaye¹, Beatrice Cochener³, and Vincent Nourri¹; ¹IMT Atlantique Bretagne-Pays de la Loire - Campus de Brest, ²Universite de Bretagne Occidentale, and ³CHRU Morvan (France)*

12:20

HVEI-159

JPI-first: Psychophysical study of human visual perception of flicker artifacts in automotive digital mirror replacement systems, *Nicolai Behmann, Sousa Weddige, and Holger Blume, Leibniz University Hannover (Germany)*

12:40

HVEI-160

Multipurpose spatiomotor capture system for haptic and visual training and testing in the blind and sighted, *Lora Likova, Kristyo Mineff, and Spero Nicholas, Smith-Kettlewell Eye Research Institute (United States)*

CONFERENCE INTERACTIVE POSTER

13:00 – 13:30

HVEI-156

HVEI POSTER: Cartography as spatial representation: A new assessment of the competing advantages and drawbacks across fields of science, *Christopher Tyler, Smith-Kettlewell Eye Research Institute (United States)*

COLOR AND LIGHTNESS

Moderator: Jeffrey Mulligan, NASA Ames Research Center (United States) / **Session Chair:** Sabine Süsstrunk, École Polytechnique Fédérale de Lausanne (Switzerland)

13:30 – 14:30

13:30 HVEI-151
Neurocomputational model explains spatial variations in perceived lightness induced by luminance edges in the image, *Michael Rudd, University of Nevada (United States)*

13:50 HVEI-152
The effect of display brightness and viewing distance: A dataset for visually lossless image compression, *Aliaksei Mikhailiuk, Nanyang Ye, and Rafal Mantiuk, University of Cambridge (United Kingdom)*

14:10 HVEI-153
Color threshold functions: Application of contrast sensitivity functions in standard and high dynamic range color spaces, *Minjung Kim, Maryam Azimi, and Rafal Mantiuk, University of Cambridge (United Kingdom)*

HVEI POTPOURRI II

Moderator: Jeffrey Mulligan, NASA Ames Research Center (United States) / **Session Chair:** Damon Chandler, Shizuoka University (Japan)

18:15 – 19:15

18:15 HVEI-161
Extension of ITU-T P.1203 model to tile-based omnidirectional video streaming, *Yuichiro Urata, Masanori Koike, Kazuhisa Yamagishi, Noritsugu Egi, and Jun Okamoto, Nippon Telegraph and Telephone Corporation (Japan)*

18:35 HVEI-162
JPI-first: The difference in impression between genuine and artificial leather: Quantifying the feeling of authenticity, *Shuhei Watanabe¹, Shoji Tominaga², and Takahiko Horiuchi²; ¹Ricoh Company, Ltd. and ²Chiba University (Japan)*

18:55 HVEI-163
Prediction of individual preference for movie poster designs based on graphic elements using machine learning classification, *Hyeon-jeong Suk, Juhee Kim, and Chulmin Kim, Korea Advanced Institute of Science and Technology (Republic of Korea)*

CONFERENCE INTERACTIVE POSTER

19:15 – 19:45

HVEI-155
HVEI POSTER: Scrambling parameter generation to improve perceptual information hiding, *Koki Madono^{1,2}, Masayuki Tanaka^{2,3}, Masaki Onishi², and Tetsuji Ogawa¹; ¹Waseda Daigaku, ²The National Institute of Advanced Industrial Science and Technology, and ³Tokyo Kogyo Daigaku (Japan)*

HVEI CONFERENCE WRAP-UP DISCUSSION

Session Chairs: Damon Chandler, Shizuoka University (Japan); Mark McCourt, North Dakota State University (United States); and Jeffrey Mulligan, NASA Ames Research Center (United States)

19:45 – 20:45

Meet for the traditional HVEI discussion and social hour

MONDAY 25 JANUARY 2021

PLENARY: MAKING INVISIBLE VISIBLE

Session Chair: Jonathan B. Phillips, Google Inc. (United States)

10:00 – 11:10

Making invisible visible

Ramesh Raskar, *associate professor, MIT Media Lab (United States)*

Ramesh Raskar is an associate professor at MIT Media Lab and directs the Camera Culture research group. His focus is on AI and imaging for health and sustainability. They span research in physical (e.g., sensors, health-tech), digital (e.g., automated and privacy-aware machine learning), and global (e.g., geomaps, autonomous mobility) domains. He received the Lemelson Award (2016), ACM SIGGRAPH Achievement Award (2017), DARPA Young Faculty Award (2009), Alfred P. Sloan Research Fellowship (2009), TR100 Award from MIT Technology Review (2004), and Global Indus Technovator Award (2003). He has worked on special research projects at Google [X] and Facebook and co-founded/advised several companies.

WEDNESDAY 27 JANUARY 2021

PLENARY: REVEALING THE INVISIBLE TO MACHINES WITH NEUROMORPHIC VISION SYSTEMS: TECHNOLOGY AND APPLICATIONS OVERVIEW

Session Chair: Radka Tezaur, Intel Corporation (United States)

10:00 – 11:10

Revealing the invisible to machines with neuromorphic vision systems: Technology and applications overview

Luca Verre, *CEO and co-founder, Prophesee (France)*

Luca Verre is co-founder and CEO of Prophesee, the inventor of the world's most advanced neuromorphic vision systems. Verre is a World Economic Forum technology pioneer. His experience includes project and product management, marketing, and business development roles at Schneider Electric. Prior to Schneider Electric, Verre worked as a research assistant in photonics at the Imperial College of London. Verre holds a MSc in physics, electronic and industrial engineering from Politecnico di Milano and Ecole Centrale and an MBA from Institut Européen d'Administration des Affaires, INSEAD.