https://doi.org/10.2352/ISSN.2470-1173.2019.11.IPAS-A11

PROCEEDINGS

IS&T International Symposium on

Electronic Imaging

SCIENCE AND TECHNOLOGY

13 January 2019 – 17 January 2019 • Burlingame, CA, USA

Image Processing: Algorithms and Systems XVII

Editors: **Sos S. Agaian,** College of Staten Island, CUNY (United States),
Karen 0. Egiazarian, Tampere Univ. of Technology (Finland),
Atanas P. Gotchev, Tampere Univ. of Technology (Finland)

These papers represent the program of Electronic Imaging 2019,
held 13 January – 17 January 2019, at the Hyatt Regency San Francisco Airport in Burlingame, CA.

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ISSN 2470-1173
https://doi.org/10.2352/ISSN.2470-1173.2019.11.IPAS-A11
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Image Processing: Algorithms and Systems XVII

Conference overview

Image Processing: Algorithms and Systems continues the tradition of the past conference Nonlinear Image Processing and Pattern Analysis in exploring new image processing algorithms. It also reverberates the growing call for integration of the theoretical research on image processing algorithms with the more applied research on image processing systems.

Specifically, the conference aims at highlighting the importance of the interaction between linear, nonlinear, and transform-based approaches for creating sophisticated algorithms and building modern imaging systems for new and emerging applications.

Award

Best Paper

Conference Chairs: **Sos S. Agaian**, The University of Texas at San Antonio (United States); **Karen 0. Egiazarian,** Tampere University of Technology (Finland); and **Atanas P. Gotchev,** Tampere University of Technology (Finland)

Program Committee: **Gözde Bozdagi Akar**, Middle East Technical University (Turkey); **Junior Barrera,** Universidad de São Paulo (Brazil); **Jenny Benois-Pineau,** Bordeaux University (France); **Giacomo Boracchi,** Politecnico di Milano (Italy); **Reiner Creutzburg,** Technische Hochschule Brandenburg (Germany); **Alessandro Foi,** Tampere University of Technology (Finland); **Paul D. Gader,** University of Florida (United States); **John C. Handley,** University of Rochester (United States); **Vladimir V. Lukin,** National Aerospace University (Ukraine); **Vladimir Marchuk,** Don State Technical University (Russian Federation); **Alessandro Neri,** Radiolabs (Italy); **Marek R. Ogiela,** AGH University of Science and Technology (Poland); **Ljiljana Platisa,** Universiteit Gent (Belgium); **Françoise Prêteux,** Ecole des Ponts ParisTech (France); **Giovanni Ramponi,** University degli Studi di Trieste (Italy); **Ivan W. Selesnick,** Polytechnic Institute of New York University (United States); and **Damir Sersic,** University of Zagreb (Croatia)

IMAGE PROCESSING: ALGORITHMS AND SYSTEMS XVII

Monday, January 14, 2019

Image Restoration I

Session Chairs: Karen Egiazarian, Tampere University of Technology (Finland) and Atanas Gotchev, Tampere University of Technology (Finland)

8:50 – 10:20 am
Regency C

8:50 IPAS-250
Additive spatially correlated noise suppression by robust block matching and adaptive 3D filtering (JIST-first), *Oleksii Rubel[1], Vladimir Lukin[1], and Karen Egiazarian[2]; [1]National Aerospace University (Ukraine) and [2]Tampere University of Technology (Finland)*

9:10 IPAS-251
A snowfall noise elimination using moving object compositing method adaptable to natural boundary, *Yoshihiro Sato, Koya Kokubo, and Yue Bao, Tokyo City University (Japan)*

9:30 IPAS-252
Patch-based image despeckling using low-rank Hankel matrix approach with speckle level estimation, *Hansol Kim, Paul Oh, Sangyoon Lee, and Moon Gi Kang, Yonsei University (Republic of Korea)*

9:50 IPAS-253
Leveraging training data in computational image reconstruction (Invited), *Davis Gilton[1], Greg Ongie[2], and Rebecca Willett[2]; [1]University of Wisconsin, Madison and [2]University of Chicago (United States)*

10:20 – 10:40 am Coffee Break

Image Restoration II

Session Chairs: Sos Agaian, CUNY/ The College of Staten Island (United States) and Atanas Gotchev, Tampere University of Technology (Finland)

10:40 am – 12:10 pm
Regency C

10:40 IPAS-254
General Adaptive Neighborhood Image Processing (GANIP) (Invited), *Johan Debayle, Ecole Nationale Supérieure des Mines (France)*

11:10 IPAS-255
Gradient management and algebraic reconstruction for single image super resolution, *Leandro Delfin[1], Raul Pinto Elias[1], and Humberto de Jesus Ochoa Dominguez[2]; [1]CENIDET and [2]Universidad Autónoma de Ciudad Juarez (Mexico)*

11:30 IPAS-256
Image stitching by creating a virtual depth, *Ahmed Eid, Brian Cooper, and Tomasz Cholewo, Lexmark (United States)*

11:50 IPAS-257
Enhanced guided image filter using trilateral kernel for disparity error correction, *Yong-Jun Chang and Yo-Sung Ho, Gwangju Institute of Science and Technology (Republic of Korea)*

Phase Imaging

Session Chairs: Sos Agaian, CUNY/ The College of Staten Island (United States) and Karen Egiazarian, Tampere University of Technology (Finland)

12:10 – 12:50 pm
Regency C

12:10 IPAS-258
Phase masks optimization for broadband diffractive imaging, *Nikolay Ponomarenko, Vladimir Katkovnik, and Karen Egiazarian, Tampere University of Technology (Finland)*

12:30 IPAS-259
Phase extraction from interferogram using machine learning, *Daichi Kando and Satoshi Tomioka, Hokkaido University (Japan)*

12:50 – 2:00 pm Lunch

Monday Plenary

2:00 – 3:00 pm
Grand Peninsula Ballroom D

Autonomous Driving Technology and the OrCam MyEye, *Amnon Shashua, President and CEO, Mobileye, an Intel Company, and senior vice president, Intel Corporation (United States)*

The field of transportation is undergoing a seismic change with the coming introduction of autonomous driving. The technologies required to enable computer driven cars involves the latest cutting edge artificial intelligence algorithms along three major thrusts: Sensing, Planning and Mapping. Shashua will describe the challenges and the kind of computer vision and machine learning algorithms involved, but will do that through the perspective of Mobileye's activity in this domain. He will then describe how OrCam leverages computer vision, situation awareness and language processing to enable blind and visually impaired to interact with the world through a miniature wearable device.

Prof. Amnon Shashua holds the Sachs chair in computer science at the Hebrew University of Jerusalem. His field of expertise is computer vision and machine learning. Shashua has founded three startups in the computer vision and machine learning fields. In 1995 he founded CogniTens that specializes in the area of industrial metrology and is today a division of the Swedish Corporation Hexagon. In 1999 he cofounded Mobileye with his partner Ziv Aviram. Mobileye develops system-on-chips and computer vision algorithms for driving assistance systems and is developing a platform for autonomous driving to be launched in 2021. Today, approximately 32 million cars rely on Mobileye technology to make their vehicles safer to drive. In August 2014, Mobileye claimed the title for largest Israeli IPO ever, by raising $1B at a market cap of $5.3B. In August 2017, Mobileye became an Intel company in the largest Israeli acquisition deal ever of $15.3B. Today, Shashua is the president and CEO of Mobileye and a senior vice president of Intel Corporation. In 2010 Shashua co-founded OrCam which harnesses computer vision and artificial intelligence to assist people who are visually impaired or blind.

3:00 – 3:30 pm Coffee Break

Panel: Sensing and Perceiving for Autonomous Driving — Joint Session

3:30 – 5:30 pm
Grand Peninsula Ballroom D

This session is jointly sponsored by the EI Steering Committee

Moderator: Dr. Wende Zhang, technical fellow, General Motors
Panelists:
Dr. Amnon Shashua, professor of computer science, Hebrew University; president and CEO, Mobileye, an Intel Company, and senior vice president, Intel Corporation
Dr. Boyd Fowler, CTO, OmniVision Technologies
Dr. Christoph Schroeder, head of autonomous driving N.A., Mercedes-Benz R&D Development North America, Inc.
Dr. Jun Pei, CEO and co-founder, Cepton Technologies Inc.

Driver assistance and autonomous driving rely on perceptual systems that combine data from many different sensors, including camera, ultrasound, radar and lidar. The panelists will discuss the strengths and limitations of different types of sensors and how the data from these sensors can be effectively combined to enable autonomous driving.

5:00 – 6:00 pm All-Conference Welcome Reception

Tuesday January 15, 2019

7:15 – 8:45 am Women in Electronic Imaging Breakfast

Image Quality

Session Chairs: Marco Carli, Università degli Studi Roma TRE (Italy) and Karen Egiazarian, Tampere University of Technology (Finland)

8:50 – 10:10 am
Regency C

8:50 IPAS-260
Combined no-reference IQA metric and its performance analysis (Invited), *Oleg Ieremeiev[1], Vladimir Lukin[1], Nikolay Ponomarenko[1,2], and Karen Egiazarian[2]; [1]National Aerospace University (Ukraine) and [2]Tampere University of Technology (Finland)*

9:10 IPAS-261
Evaluating the effectiveness of image quality metrics in a light field scenario, *Giuliano Arru, Marco Carli, and Federica Battisti, Università degli Studi Roma TRE (Italy)*

9:30 IPAS-262
Parameter optimization in H.265 rate-distortion by single frame semantic scene analysis, *Ahmed Hamza[1], Abdelrahman Abdelazim[2], and Djamel Ait-Boudaoud[1]; [1]University of Portsmouth and [2]Blackpool and the Fylde College (United Kingdom)*

9:50 IPAS-263
Additional lossless compression of JPEG images based on BPG, *Nikolay Ponomarenko[1], Oleksandr Miroshnichenko[2], Vladimir Lukin[2], and Karen Egiazarian[1]; [1]Tampere University of Technology (Finland) and [2]National Aerospace University (Ukraine)*

10:00 am – 7:00 pm Industry Exhibition

10:10 – 10:50 am Coffee Break

Object Recognition

Session Chairs: Sos Agaian, CUNY/ The College of Staten Island (United States) and Atanas Gotchev, Tampere University of Technology (Finland)

10:50 am – 12:30 pm
Regency C

10:50 IPAS-264
Uncertainty quantification for semi-supervised multilabel classification in image processing and ego motion analysis from body worn cameras, *Yiling Qiao[1], Chang Shi[1], Chenjian Wang[1], Hao Li[1], Matthew Haberland[1,2], Andrew Stuart[3], and Andrea Bertozzi[1]; [1]UCLA, [2]Cal Poly San Luis Obispo, and [3]California Institute of Technology (United States)*

11:10 IPAS-265
On-street parked vehicle detection via view-normalized classifier, *Wencheng Wu, University of Rochester (United States)*

11:30 IPAS-266
Multi-class detection and orientation recognition of vessels in maritime surveillance, *Amir Ghahremani, Yitian Kong, Egor Bondarev, and Peter de With, Eindhoven University of Technology (the Netherlands)*

11:50 IPAS-267
Construction of facial emotion database through subjective experiments and its application to deep learning-based facial image processing, *Tomoyuki Takanashi, Keita Hirai, and Takahiko Horiuchi, Chiba University (Japan)*

12:10 IPAS-268
Improving person re-identification performance by customized dataset and better person detection, *Herman Groot, Egor Bondarev, and Peter de With, Eindhoven University of Technology (the Netherlands)*

12:30 – 2:00 pm Lunch

Tuesday Plenary

2:00 – 3:00 pm
Grand Peninsula Ballroom D

The Quest for Vision Comfort: Head-Mounted Light Field Displays for Virtual and Augmented Reality, *Hong Hua, professor of optical sciences, University of Arizona (United States)*

Hong Hua will discuss the high promises and the tremendous progress made recently toward the development of head-mounted displays (HMD) for both virtual and augmented reality displays, developing HMDs that offer uncompromised optical pathways to both digital and physical worlds without encumbrance and discomfort confronts many grand challenges, both from technological perspectives and human factors. She will particularly focus on the recent progress, challenges and opportunities for developing head-mounted light field displays (LF-HMD), which are capable of rendering true 3D synthetic scenes with proper focus cues to stimulate natural eye accommodation responses and address the well-known vergence-accommodation conflict in conventional stereoscopic displays.

Dr. Hong Hua is a professor of optical sciences at the University of Arizona. With more than 25 years of experience, Hua is widely recognized through academia and industry as an expert in wearable display technologies and optical imaging and engineering in general. Hua's current research focuses on optical technologies enabling advanced 3D displays, especially head-mounted display technologies for virtual reality and augmented reality applications, and microscopic and endoscopic imaging systems for medicine. Hua has published more than 200 technical papers and filed a total of 23 patent applications in her specialty fields, and delivered numerous keynote addresses and invited talks at major conferences and events worldwide. She is an SPIE Fellow and OSA senior member. She was a recipient of NSF Career Award in 2006 and honored as UA Researchers @ Lead Edge in 2010. Hua and her students shared a total of 8 "Best Paper" awards in various IEEE, SPIE and SID conferences. Hua received her PhD in optical engineering from the Beijing Institute of Technology in China (1999). Prior to joining the UA faculty in 2003, Hua was an assistant professor with the University of Hawaii at Manoa in 2003, was a Beckman Research Fellow at the Beckman Institute of University of Illinois at Urbana-Champaign between 1999 and 2002, and was a post-doc at the University of Central Florida in 1999.

3:00 – 3:30 pm Coffee Break

Computational Models for Human Optics

JOINT SESSION

Session Chair: Jennifer Gille, Oculus VR (United States)

3:30 – 5:30 pm
Grand Peninsula Ballroom D

This session is jointly sponsored by the EI Steering Committee.

3:30 EISS-704
Eye model implementation (Invited), *Andrew Watson, Apple Inc. (United States)*

Dr. Andrew Watson is the chief vision scientist at Apple Inc., where he specializes in vision science, psychophysics display human factors, visual human factors, computation modeling of vision, and image and video compression. For thirty-four years prior to joining Apple, Dr. Watson was the senior scientist for vision research at NASA. Watson received his PhD in psychology from the University of Pennsylvania (1977) and followed that with post doc work in vision at the University of Cambridge.

3:50 EISS-700
Wide field-of-view optical model of the human eye (Invited), *James Polans, Verily Life Sciences (United States)*

Dr. James Polans is an engineer who works on surgical robotics at Verily Life Sciences in South San Francisco. Polans received his PhD in biomedical engineering from Duke University under the mentorship of Joseph Izatt. His doctoral work explored the design and development of wide field-of-view optical coherence tomography systems for retinal imaging. He also has a MS in electrical engineering from the University of Illinois at Urbana-Champaign.

4:10 EISS-702
Evolution of the Arizona Eye Model (Invited), *Jim Schwiegerling, University of Arizona (United States)*

Prof. Jim Schwiegerling is a professor in the College of Optical Sciences at the University of Arizona. His research interests include the design of ophthalmic systems such as corneal topographers, ocular wavefront sensors and retinal imaging systems. In addition to these systems, Schwiegerling has designed a variety of multifocal intraocular and contact lenses and has expertise in diffractive and extended depth of focus systems.

4:30 EISS-705
Berkeley Eye Model (Invited), *Brian Barsky, University of California, Berkeley (United States)*

Prof. Brian Barsky is professor of computer science and affiliate professor of optometry and vision science at UC Berkeley. He attended McGill University, Montréal, received a DCS in engineering and a BSc in mathematics and computer science. He studied computer graphics and computer science at Cornell University, Ithaca, where he earned an MS. His PhD is in computer science from the University of Utah, Salt Lake City. He is a fellow of the American Academy of Optometry. His research interests include computer aided geometric design and modeling, interactive three-dimensional computer graphics, visualization in scientific computing, computer aided cornea modeling and visualization, medical imaging, and virtual environments for surgical simulation.

4:50 EISS-701
Modeling retinal image formation for light field displays (Invited), *Hekun Huang, Mohan Xu, and Hong Hua, University of Arizona (United States)*

Prof. Hong Hua is a professor of optical sciences at the University of Arizona. With more than 25 years of experience, Hua is widely recognized through academia and industry as an expert in wearable display technologies and optical imaging and engineering in general. Hua's current research focuses on optical technologies enabling advanced 3D displays, especially head-mounted display technologies for virtual reality and augmented reality applications, and microscopic and endoscopic imaging systems for medicine. Hua has published more than 200 technical papers and filed a total of 23 patent applications in her specialty fields, and delivered numerous keynote addresses and invited talks at major conferences and events worldwide. She is an SPIE Fellow and OSA senior member. She was a recipient of NSF Career Award in 2006 and honored as UA Researchers @ Lead Edge in 2010. Hua and her students shared a total of 8 "Best Paper" awards in various IEEE, SPIE and SID conferences. Hua received her PhD in optical engineering from the Beijing Institute of Technology in China (1999). Prior to joining the UA faculty in 2003, Hua was an assistant professor with the University of Hawaii at Manoa in 2003, was a Beckman research fellow at the Beckman Institute of University of Illinois at Urbana-Champaign between 1999 and 2002, and was a post-doc at the University of Central Florida in 1999.

5:10 EISS-703
Ray-tracing 3D spectral scenes through human optics (Invited), *Trisha Lian, Kevin MacKenzie, and Brian Wandell, Stanford University (United States)*

Trisha Lian is an electrical engineering PhD student at Stanford University. Before Stanford, she received her bachelor's in biomedical engineering from Duke University. She is currently advised by Professor Brian Wandell and works on interdisciplinary topics that involve image systems simulations. These range from novel camera designs to simulations of the human visual system.

5:30 – 7:00 pm Symposium Demonstration Session

Wednesday January 16, 2019

10:00 am – 3:30 pm Industry Exhibition

10:10 – 11:00 am Coffee Break

12:30 – 2:00 pm Lunch

Wednesday Plenary

2:00 – 3:00 pm
Grand Peninsula Ballroom D

Light Fields and Light Stages for Photoreal Movies, Games, and Virtual Reality, *Paul Debevec, senior scientist, Google (United States)*

Paul Debevec will discuss the technology and production processes behind "Welcome to Light Fields", the first downloadable virtual reality experience based on light field capture techniques which allow the visual appearance of an explorable volume of space to be recorded and reprojected photorealistically in VR enabling full 6DOF head movement. The lightfields technique differs from conventional approaches such as 3D modelling and photogrammetry. Debevec will discuss the theory and application of the technique. Debevec will also discuss the Light Stage computational illumination and facial scanning systems which use geodesic spheres of inward-pointing LED lights as have been used to create digital actor effects in movies such as Avatar, Benjamin Button, and Gravity, and have recently been used to create photoreal digital actors based on real people in movies such as Furious 7, Blade Runner: 2049, and Ready Player One. The lighting reproduction process of light stages allows omnidirectional lighting environments captured from the real world to be accurately reproduced in a studio, and has recently be extended with multispectral capabilities to enable LED lighting to accurately mimic the color rendition properties of daylight, incandescent, and mixed lighting environments. They have also recently used their full-body light stage in conjunction with natural language processing and automultiscopic video projection to record and project interactive conversations with survivors of the World War II Holocaust.

Paul Debevec is a senior scientist at Google VR, a member of Google VR's Daydream team, and adjunct research professor of computer science in the Viterbi School of Engineering at the University of Southern California, working within the Vision and Graphics Laboratory at the USC Institute for Creative Technologies. Debevec's computer graphics research has been recognized with ACM SIGGRAPH's first Significant New Researcher Award (2001) for "Creative and Innovative Work in the Field of Image-Based Modeling and Rendering", a Scientific and Engineering Academy Award (2010) for "the design and engineering of the Light Stage capture devices and the image-based facial rendering system developed for character relighting in motion pictures" with Tim Hawkins, John Monos, and Mark Sagar, and the SMPTE Progress Medal (2017) in recognition of his achievements and ongoing work in pioneering techniques for illuminating computer-generated objects based on measurement of real-world illumination and their effective commercial application in numerous Hollywood films. In 2014, he was profiled in The New Yorker *magazine's "Pixel Perfect: The Scientist Behind the Digital Cloning of Actors" article by Margaret Talbot.*

3:00 – 3:30 pm Coffee Break

Light Field Imaging and Display — Joint Session

Session Chair: Gordon Wetzstein, Stanford University (United States)

3:30 – 5:30 pm
Grand Peninsula Ballroom D

This session is jointly sponsored by the EI Steering Committee.

3:30 EISS-706
Light fields - From shape recovery to sparse reconstruction (Invited), *Ravi Ramamoorthi, University of California, San Diego (United States)*

Prof. Ravi Ramamoorthi is the Ronald L. Graham Professor of Computer Science, and Director of the Center for Visual Computing, at the University of California, San Diego. Ramamoorthi received his PhD in computer science (2002) from Stanford University. Prior to joining UC San Diego, Ramamoorthi was associate professor of EECS at the University of California, Berkeley, where he developed the complete graphics curricula. His research centers on the theoretical foundations, mathematical representations, and computational algorithms for understanding and rendering the visual appearance of objects, exploring topics in frequency analysis and sparse sampling and reconstruction of visual appearance datasets a digital data-driven visual appearance pipeline; light-field cameras and 3D photography; and physics-based computer vision. Ramamoorthi is an ACM Fellow for contributions to computer graphics rendering and physics-based computer vision, awarded Dec. 2017, and an IEEE Fellow for contributions to foundations of computer graphics and computer vision, awarded Jan. 2017.

4:10 EISS-707
The beauty of light fields (Invited), *David Fattal, LEIA Inc. (United States)*

Dr. David Fattal is co-founder and CEO at LEIA Inc., where he is in charge of bringing their mobile holographic display technology to market. Fattal received his PhD in physics from Stanford University (2005). Prior to founding LEIA Inc., Fattal was a research scientist with HP Labs, HP Inc. At LEIA Inc., the focus is on immersive mobile, with screens that come alive in richer, deeper, more beautiful ways. Flipping seamlessly between 2D and lightfields, mobile experiences become truly immersive: no glasses, no tracking, no fuss. Alongside new display technology LEIA Inc. is developing Leia Lofi™ — a whole new canvas.

4:30 EISS-708
Light field insights from my time at Lytro (Invited), *Kurt Akeley, Google Inc. (United States)*

Dr. Kurt Akeley is a distinguished engineer at Google Inc. Akeley received his PhD in stereoscopic display technology from Stanford University (2004), where he implemented and evaluated a stereoscopic display that passively (e.g., without eye tracking) produces nearly correct focus cues. After Stanford, Akeley worked with OpenGL at NVIDIA Incorporated, was a principal researcher at Microsoft Corporation, and a consulting professor at Stanford University. In 2010, he joined Lytro Inc. as CTO. During his seven-year tenure as Lytro's CTO, he guided and directly contributed to the development of two consumer light-field cameras and their related display systems, and also to a cinematic capture and processing service that supported immersive, six-degree-of-freedom virtual reality playback.

4:50 EISS-709
Quest for immersion (Invited), *Kari Pulli, Stealth Startup (United States)*

Dr. Kari Pulli has spent two decades in computer imaging and AR at companies such as Intel, NVIDIA and Nokia. Before joining a stealth startup, he was the CTO of Meta, an augmented reality company in San Mateo, heading up computer vision, software, displays, and hardware, as well as the overall architecture of the system. Before joining Meta, he worked as the CTO of the Imaging and Camera Technologies Group at Intel, influencing the architecture of future IPU's in hardware and software. Prior, he was vice president of computational imaging at Light, where he developed algorithms for combining images from a heterogeneous camera array into a single high-quality image. He previously led research teams as a senior director at NVIDIA Research and as a Nokia fellow at Nokia Research, where he focused on computational photography, computer vision, and AR. Pulli holds computer science degrees from the University of Minnesota (BSc), University of Oulu (MSc, Lic. Tech), and University of Washington (PhD), as well as an MBA from the University of Oulu. He has taught and worked as a researcher at Stanford, University of Oulu, and MIT.

5:10 EISS-710
Industrial scale light field printing (Invited), *Matthew Hirsch, Lumii Inc. (United States)*

Dr. Matthew Hirsch is a co-founder and chief technical officer of Lumii. He worked with Henry Holtzman's Information Ecology Group and Ramesh Raskar's Camera Culture Group at the MIT Media Lab, making the next generation of interactive and glasses-free 3D displays. Hirsch received his bachelors from Tufts University in computer engineering, and his Masters and Doctorate from the MIT Media Lab. Between degrees, he worked at Analogic Corp. as an imaging engineer, where he advanced algorithms for image reconstruction and understanding in volumetric x-ray scanners. His work has been funded by the NSF and the Media Lab consortia, and has appeared in SIGGRAPH, CHI, and ICCP. Hirsch has also taught courses at SIGGRAPH on a range of subjects in computational imaging and display, with a focus on DIY.

Image Processing: Algorithms and Systems XVII Interactive Posters Session

Session Chairs: Federica Battisti, Università degli Studi di Roma Tre (Italy) and Viacheslav Voronin, Don State Technical University (Russian Federation)

5:30 – 7:00 pm
The Grove

The following works will be presented at the EI 2019 Symposium Interactive Papers Session.

IPAS-269
Background subtraction using Multi-Channel Fused Lasso, *Xin Liu and Guoying Zhao, University of Oulu (Finland)*

IPAS-270
Depth from stacked light field images using generative adversarial network, *Ji-Hun Mun and Yo-Sung Ho, Gwangju Institute of Science and Technology (GIST) (Republic of Korea)*

IPAS-271
Depth-based saliency estimation for omnidirectional images, *Federica Battisti and Marco Carli, Università degli Studi Roma TRE (Italy)*

IPAS-272
Driver drowsiness detection in facial images, *Fadi Dornaika, Jorge Reta, Ignacio Arganda-Carreras, and Abdelmalik Moujahid, University of the Basque Country (Spain)*

IPAS-273
Illumination invariant NIR face recognition using directional visibility, *Srijith Rajeev[1], Shreyas Kamath[1], Qianwen Wan[1], Karen Panetta[1], and Sos Agaian[2]; [1]Tufts University and [2]CUNY/ The College of Staten Island (United States)*

IPAS-274
Microscope image matching in scope of multi-resolution observation system, *Evan Eka Putranto[1], Usuki Shin[2], and Kenjiro Miura[1]; [1]Shizuoka University and [2]Research Institute of Electronics (Japan)*

IPAS-275
Multi-frame super-resolution utilizing spatially adaptive regularization for ToF camera, *Haegeun Lee, Jonghyun Kim, Jaeduk Han, and Moon Gi Kang, Yonsei University (Republic of Korea)*

IPAS-276
Pixelwise JPEG compression detection and quality factor estimation based on convolutional neural network, *Kazutaka Uchida[1], Masayuki Tanaka[2,1], and Masatoshi Okutomi[1]; [1]Tokyo Institute of Technology and [2]National Institute of Advanced Industrial Science and Technology (Japan)*

IPAS-277
The quaternion-based anisotropic gradient for the color images, *Viacheslav Voronin[1], Vladimir Frants[2], and Sos Agaian[3]; [1]Don State Technical University (Russian Federation), [2]Moscow State University of Technology "STANKIN" (Russian Federation), and [3]CUNY/ The College of Staten Island (United States)*

Thursday January 17, 2019

Imaging Systems — Joint Session

Session Chairs: Atanas Gotchev, Tampere University of Technology (Finland) and Michael Kriss, MAK Consultants (United States)

8:50 – 10:10 am
Regency B

This session is jointly sponsored by: Image Processing: Algorithms and Systems XVII, and Photography, Mobile, and Immersive Imaging 2019.

8:50 PMII-278
EDICT: Embedded and distributed intelligent capture technology (Invited), *Scott Campbell, Timothy Macmillan, and Katsuri Rangam, Area4 Professional Design Services (United States)*

9:10 IPAS-279
Modeling lens optics and rendering virtual views from fisheye imagery, *Filipe Gama, Mihail Georgiev, and Atanas Gotchev, Tampere University of Technology (Finland)*

9:30 PMII-280
Digital distortion correction to measure spatial resolution from cameras with wide-angle lenses, *Brian Rodricks[1] and Yi Zhang[2]; [1]SensorSpace, LLC and [2]Facebook Inc. (United States)*

9:50 IPAS-281
LiDAR assisted large-scale privacy protection in street view cycloramas, *Clint Sebastian[1], Bas Boom[2], Egor Bondarev[1], and Peter de With[1]; [1]Eindhoven University of Technology and [2]CycloMedia Technology B.V. (the Netherlands)*

10:10 – 10:50 am Coffee Break

Medical Imaging - Perception II

JOINT SESSION

Session Chair: Sos Agaian, CUNY/ The College of Staten Island (United States)

10:50 am – 12:10 pm
Grand Peninsula Ballroom A

This medical imaging session is jointly sponsored by: Human Vision and Electronic Imaging 2019, and Image Processing: Algorithms and Systems XVII.

10:50 IPAS-222
Specular reflection detection algorithm for endoscopic images, *Viacheslav Voronin[1], Evgeny Semenishchev[1], and Sos Agaian[2]; [1]Don State Technical University (Russian Federation) and [2]CUNY/ The College of Staten Island (United States)*

11:10 IPAS-223
Feedback alfa-rooting algorithm for medical image enhancement, *Viacheslav Voronin[1], Evgeny Semenishchev[1], and Sos Agaian[2]; [1]Don State Technical University (Russian Federation) and [2]CUNY/ The College of Staten Island (United States)*

11:30 HVEI-224
Observer classification images and efficiency in 2D and 3D search tasks (Invited), *Craig Abbey, Miguel Lago, and Miguel Eckstein, University of California, Santa Barbara (United States)*

11:50 HVEI-226
Image recognition depends largely on variety (Invited), *Tamara Haygood[1], Christina Thomas[2], Tara Sagebiel[2], Diana Palacio[2], Myrna Godoy[2], and Karla Evans[1]; [1]University of York (United Kingdom) and [2]UT M.D. Anderson Cancer Center (United States)*

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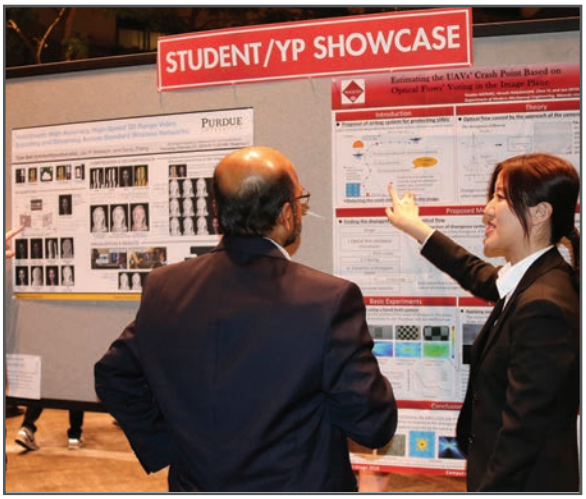

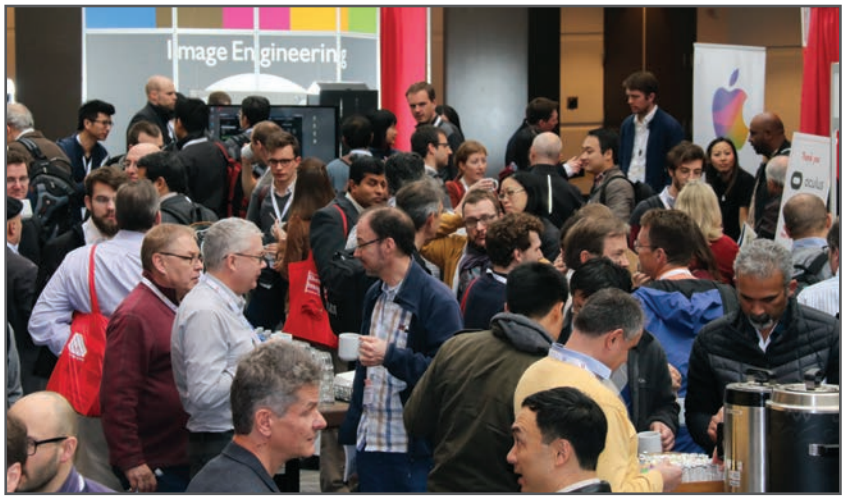

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