

IS&T International Symposium on  
**Electronic  
Imaging**  
SCIENCE AND TECHNOLOGY

**PROCEEDINGS**

26 January 2020 — 30 January 2020 • Burlingame, CA, USA

## Computational Imaging XVIII

Editors: **Charles A. Bouman**, Purdue Univ. (United States),  
**Gregory T. Buzzard**, Purdue Univ. (United States), and  
**Robert Stevenson**, Univ. of Notre Dame (United States)

These papers represent the program of Electronic Imaging 2020,  
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## Computational Imaging XVIII

### Conference overview

More than ever before, computers and computation are critical to the image formation process. Across diverse applications and fields, remarkably similar imaging problems appear, requiring sophisticated mathematical, statistical, and algorithmic tools. This conference focuses on imaging as a marriage of computation with physical devices. It emphasizes the interplay between mathematical theory, physical models, and computational algorithms that enable effective current and future imaging systems. Contributions to the conference are solicited on topics ranging from fundamental theoretical advances to detailed system-level implementations and case studies.

### Special Sessions

This year Computational Imaging hosts four special sessions on Algorithm/Hardware Co-Design for Computational Imaging, Computational Imaging Applications to Materials Characterization, Recent Progress in Computational Microscopy, and Optically-Coherent and Interferometric Imaging, presented by researchers from academia, national laboratories, and industry.

**Conference Chairs:** Charles A. Bouman, Purdue University (United States); Gregory T. Buzzard, Purdue University (United States); and Robert Stevenson, University of Notre Dame (United States)

**Program Committee:** Clem Karl, Boston University (United States); Eric Miller, Tufts University (United States); Joseph A. O'Sullivan, Washington University in St. Louis (United States); Hector J. Santos-Villalobos, Oak Ridge National Laboratory (United States); and Ken D. Sauer, University of Notre Dame (United States)

**Computational Microscopy Special Session Organizers:** Singanallur V. Venkatakrishnan, Oak Ridge National Laboratory (United States), and Ulugbek S. Kamilov, Washington University in St. Louis (United States)

**Optically-Coherent and Interferometric Imaging Special Session Organizer:** Casey Pellizzari, United States Air Force Academy (United States)

**Computational Imaging Applications to Materials Characterization Special Session Organizers:** Jeff Simmons, Air Force Research Laboratory (United States), and Stephen Niezgoda, The Ohio State University (United States)

**Algorithm/Hardware Co-Design for Computational Imaging Special Session Organizers:** Sergio Goma, Qualcomm Technologies Inc. (United States), and Hasib Saddiqui, Qualcomm Technologies Inc. (United States)

### Conference Sponsor



Paper authors listed as of 1 January 2020; refer to manuscript for final authors. Titles that are not listed with the proceedings files were presentation-only.

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# COMPUTATIONAL IMAGING XVIII

**Monday, January 27, 2020**

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## Plug and Play Approaches

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Session Chair: W. Clem Karl, Boston University (United States)

**8:45 – 10:10 am**

Grand Peninsula B/C

8:45

**Conference Welcome**

8:50

COIMG-005

**Plug-and-play amP for image recovery with Fourier-structured operators**, Subrata Sarkar, Rizwan Ahmad, and Philip Schniter, The Ohio State University (United States)

9:10

COIMG-006

**A splitting-based iterative algorithm for GPU-accelerated statistical dual-energy x-ray CT reconstruction**, Fangda Li, Ankit Manerikar, Tanmay Prakash, and Avinash Kak, Purdue University (United States)

9:30

COIMG-007

**Proximal Newton Methods for x-ray imaging with non-smooth regularization**, Tao Ge, Umberto Villa, Ulugbek Kamilov, and Joseph O'Sullivan, Washington University in St. Louis (United States)

9:50

COIMG-008

**Integrating learned data and image models through consensus equilibrium**, W. Clem Karl and Muhammad Usman Ghani, Boston University (United States)

10:10 – 10:50 am Coffee Break

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## Scientific Imaging I

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Session Chair: Eric Miller, Tufts University (United States)

**10:50 am – 12:30 pm**

Grand Peninsula B/C

10:50

COIMG-043

**Learned priors for the joint ptycho-tomography reconstruction**, Selin Aslan, Argonne National Laboratory (United States)

11:10

COIMG-044

**A joint reconstruction and lambda tomography regularization technique for energy-resolved x-ray imaging**, James Webber, Eric Quinto, and Eric Miller, Tufts University (United States)

11:30

COIMG-045

**Generalized tensor learning with applications to 4D-STEM image denoising**, Rungang Han<sup>1</sup>, Rebecca Willett<sup>2</sup>, and Anru Zhang<sup>1</sup>; <sup>1</sup>University of Wisconsin-Madison and <sup>2</sup>University of Chicago (United States)

11:50

COIMG-046

**Computational imaging in infrared sensing of the atmosphere**, Adam Milstein, Yaron Rachlin, Corrie Smeaton, Charles Wynn, Ryan Sullenberger, Philip Chapnik, Steven Leman, and William Blackwell, MIT Lincoln Laboratory (United States)

12:10

COIMG-047

**Learning optimal sampling for computational imaging**, He Sun<sup>1</sup>, Adrian Dalca<sup>2</sup>, and Katherine Bouman<sup>1</sup>; <sup>1</sup>California Institute of Technology and <sup>2</sup>Harvard Medical School (United States)

12:30 – 2:00 pm Lunch

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## PLENARY: Frontiers in Computational Imaging

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Session Chairs: Radka Tezaur, Intel Corporation (United States), and Jonathan Phillips, Google Inc. (United States)

**2:00 – 3:10 pm**

Grand Peninsula Ballroom D

**Imaging the Unseen: Taking the First Picture of a Black Hole**, Katie Bouman, assistant professor, Computing and Mathematical Sciences Department, California Institute of Technology (United States)

For abstract and speaker biography, see page 7

3:10 – 3:30 pm Coffee Break

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## Scientific Imaging II

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Session Chair: Brendt Wohlberg, Los Alamos National Laboratory (United States)

**3:30 – 4:10 pm**

Grand Peninsula B/C

3:30

COIMG-058

**Revealing subcellular structures with live-cell and 3D fluorescence nanoscopy**, Fang Huang, Purdue University (United States)

3:50

COIMG-059

**Single-shot coded diffraction system for 3D object shape estimation**, Samuel Pinilla<sup>1</sup>, Laura Galvis<sup>1</sup>, Karen Egiazarian<sup>2</sup>, and Henry Arguella<sup>1</sup>; <sup>1</sup>Universidad Industrial de Santander (Colombia) and <sup>2</sup>Tampere University (Finland)

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## PANEL: The Future of Computational Imaging

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Panel Moderator: Charles Bouman, Purdue University (United States)

**4:10 – 4:50 pm**

Grand Peninsula B/C

Panelists TBA.

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

## Tuesday, January 28, 2020

7:30 – 8:45 am Women in Electronic Imaging Breakfast;  
pre-registration required

### KEYNOTE: Computation and Photography

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

**8:50 – 9:30 am**

Grand Peninsula B/C

**Computation and photography: How the mobile phone became a camera**, Peyman Milanfar, principal scientist/director, Google Research (United States)

COIMG-089

Biographies and/or abstracts for all keynotes are found on pages 9–14

### Optically-Coherent and Interferometric Imaging I

Session Chair: Casey Pellizzari, United States Air Force Academy (United States)

**9:30 – 10:30 am**

Grand Peninsula B/C

*Optically-coherent and interferometric imaging sensors provide a means to measure both the amplitude and phase of incoming light. These sensors depend on computational-based methods to convert real-valued intensity measurements into amplitude and phase information for image reconstruction. Additionally, computational methods have helped overcome many of the practical issues associated with these sensors as well as enabled new imaging modalities. This session explores the coupling between optically-coherent and interferometric sensors and the computational methods that enable and extend their use. Example topic areas include both coherent and incoherent holography, coherent lidar, microscopy, metrology, and astronomy.*

9:30

COIMG-111

**Spectral shearing LADAR**, Jason Stafford<sup>1</sup>, David Rabb<sup>1</sup>, Kyle Watson<sup>2</sup>, Brett Spivey<sup>2</sup>, and Ryan Galloway<sup>3</sup>; <sup>1</sup>United States Air Force Research Laboratory, <sup>2</sup>JASR Systems, and <sup>3</sup>Montana State University (United States)

9:50

COIMG-112

**3D computational phase microscopy with multiple-scattering samples**, Laura Waller<sup>1</sup>, Shwetadwip Chowdhury<sup>1</sup>, Michael Chen<sup>1</sup>, Yonghuan David Ren<sup>1</sup>, Regina Eckert<sup>1</sup>, Michael Kellman<sup>1</sup>, and Eemrah Bostan<sup>2</sup>; <sup>1</sup>University of California, Berkeley (United States) and <sup>2</sup>University of Amsterdam (the Netherlands)

10:10

COIMG-113

**Imaging through deep turbulence and emerging solutions**, Mark Spencer<sup>1</sup>, Casey Pellizzari<sup>2</sup>, and Charles Bouman<sup>3</sup>; <sup>1</sup>Air Force Research Laboratory, <sup>2</sup>United States Air Force Academy, and <sup>3</sup>Purdue University (United States)

10:00 am – 7:30 pm Industry Exhibition - Tuesday

10:10 – 10:50 am Coffee Break

### Optically-Coherent and Interferometric Imaging II

Session Chair: Casey Pellizzari, United States Air Force Academy (United States)

**10:50 – 11:30 am**

Grand Peninsula B/C

*Optically-coherent and interferometric imaging sensors provide a means to measure both the amplitude and phase of incoming light. These sensors depend on computational-based methods to convert real-valued intensity measurements into amplitude and phase information for image reconstruction. Additionally, computational methods have helped overcome many of the practical issues associated with these sensors as well as enabled new imaging modalities. This session explores the coupling between optically-coherent and interferometric sensors and the computational methods that enable and extend their use. Example topic areas include both coherent and incoherent holography, coherent lidar, microscopy, metrology, and astronomy.*

10:50

COIMG-125

**Holographic imaging through highly attenuating fog conditions**, Abbie Watnik<sup>1</sup>, Samuel Park<sup>1</sup>, James Lindle<sup>2</sup>, and Paul Lebow<sup>3</sup>; <sup>1</sup>United States Naval Research Laboratory, <sup>2</sup>DCS Corporation, and <sup>3</sup>Alaire Technologies (United States)

11:10

COIMG-126

**Intensity interferometry-based 3D ranging**, Fabian Wagner<sup>1</sup>, Florian Schiffers<sup>1</sup>, Florian Willomitzer<sup>1</sup>, Oliver Cossairt<sup>1</sup>, and Andreas Velten<sup>2</sup>; <sup>1</sup>Northwestern University and <sup>2</sup>University of Wisconsin-Madison (United States)

### Phase Coherent Imaging

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

**11:30 am – 12:10 pm**

Grand Peninsula B/C

11:30

COIMG-146

**Constrained phase retrieval using a non-linear forward model for x-ray phase contrast tomography**, K. Aditya Mohan, Jean-Baptiste Forien, and Jefferson Cuadra, Lawrence Livermore National Laboratory (United States)

11:50

COIMG-147

**Multi-wavelength remote digital holography: Seeing the unseen by imaging off scattering surfaces and imaging through scattering media**, Florian Willomitzer<sup>1</sup>, Prasanna Rangarajan<sup>2</sup>, Fengqiang Li<sup>1</sup>, Muralidhar Madabhushi Balaji<sup>2</sup>, and Oliver Cossairt<sup>1</sup>; <sup>1</sup>Northwestern University and <sup>2</sup>Southern Methodist University (United States)

### Recent Progress in Computational Microscopy I

Session Chair: Singanallur Venkatakrisnan, Oak Ridge National Laboratory (United States)

**12:10 – 12:30 pm**

Grand Peninsula B/C

*Microscopy is currently experiencing an exciting era of new methodological developments with computation at its core. The recent progress in compressive imaging, numerical physical models, regularization techniques, large-scale optimization methods, and machine learning are leading to a faster, quantitative, and reliable microscopic imaging. Though many computational methods are being developed independently for different*

modalities, their combination may be seen as example of a new paradigm of rapid, comprehensive, and information-rich computational microscopy. This session will explore cross-cutting themes in several modalities such as optical, neutron, x-ray, and electron microscopy and will attempt to promote transfer of ideas between investigators in these different areas.

12:10 COIMG-152  
**3D DiffuserCam: Computational microscopy with a lensless imager**, Laura Waller, University of California, Berkeley (United States)

12:30 – 2:00 pm Lunch

**PLENARY: Automotive Imaging**

Session Chairs: Radka Tezaur, Intel Corporation (United States), and Jonathan Phillips, Google Inc. (United States)

**2:00 – 3:10 pm**

Grand Peninsula Ballroom D

**Imaging in the Autonomous Vehicle Revolution**, Gary Hicok, senior vice president, hardware development, NVIDIA Corporation (United States)

For abstract and speaker biography, see page 7

3:10 – 3:30 pm Coffee Break

**Recent Progress in Computational Microscopy II**

Session Chair: Singanallur Venkatakrishnan, Oak Ridge National Laboratory (United States)

**3:30 – 5:10 pm**

Grand Peninsula B/C

Microscopy is currently experiencing an exciting era of new methodological developments with computation at its core. The recent progress in compressive imaging, numerical physical models, regularization techniques, large-scale optimization methods, and machine learning are leading to a faster, quantitative, and reliable microscopic imaging. Though many computational methods are being developed independently for different modalities, their combination may be seen as example of a new paradigm of rapid, comprehensive, and information-rich computational microscopy. This session will explore cross-cutting themes in several modalities such as optical, neutron, x-ray, and electron microscopy and will attempt to promote transfer of ideas between investigators in these different areas.

3:30 COIMG-156  
**Computational nanoscale imaging with synchrotron radiation**, Doga Gursoy, Argonne National Laboratory (United States)

3:50 COIMG-157

**Recent advances in 3D structured illumination microscopy with reduced data-acquisition**, Chrysanthe Preza, The University of Memphis (United States)

4:10 COIMG-158

**Method of moments for single-particle cryo-electron microscopy**, Amit Singer, Princeton University (United States)

4:30 COIMG-159

**Computational imaging in transmission electron microscopy: Atomic electron tomography and phase contrast imaging**, Colin Ophus, Lawrence Berkeley National Laboratory (United States)

4:50 COIMG-160

**3D and 4D computational imaging of molecular orientation with multi-view polarized fluorescence microscopy**, Talon Chandler<sup>1</sup>, Min Guo<sup>2</sup>, Rudolf Oldenbourg<sup>3</sup>, Hari Shroff<sup>3</sup>, and Patrick La Riviere<sup>1</sup>; <sup>1</sup>The University of Chicago, <sup>2</sup>National Institutes of Health, and <sup>3</sup>Marine Biological Laboratory (United States)

**DISCUSSION: Tuesday Tech Mixer**

Hosts: Charles Bouman, Purdue University (United States); Gregory Buzzard, Purdue University (United States); and Robert Stevenson, University of Notre Dame (United States)

**5:10 – 5:40 pm**

Grand Peninsula B/C

Computational Imaging Conference Tuesday wrap-up discussion and refreshments.

5:30 – 7:30 pm Symposium Demonstration Session

**Wednesday, January 29, 2020**

**Medical Imaging**

Session Chair: Evan Morris, Yale University (United States)

**8:50 – 10:10 am**

Grand Peninsula B/C

8:50 COIMG-191

**Model comparison metrics require adaptive correction if parameters are discretized: Application to a transient neurotransmitter signal in PET data**, Heather Liu and Evan Morris, Yale University (United States)

9:10 COIMG-192

**Computational pipeline and optimization for automatic multimodal reconstruction of marmoset brain histology**, Brian Lee<sup>1</sup>, Meng Lin<sup>2</sup>, Junichi Hata<sup>2</sup>, Partha Mitra<sup>3</sup>, and Michael Miller<sup>1</sup>; <sup>1</sup>Johns Hopkins University (United States), <sup>2</sup>RIKEN Brain Science Institute (Japan), and <sup>3</sup>Cold Spring Harbor Laboratory (United States)

9:30 COIMG-193

**Model-based approach to more accurate stopping power ratio estimation for proton therapy**, Maria Medrano<sup>1</sup>, Jeffrey Williamson<sup>2</sup>, Bruce Whiting<sup>3</sup>, David Polite<sup>4</sup>, Shuanyue Zhang<sup>1</sup>, Tyler Webb<sup>1</sup>, Tianyu Zhao<sup>4</sup>, Ruirui Liu<sup>4</sup>, Mariela Porras-Chaverri<sup>2</sup>, Tao Ge<sup>1</sup>, Rui Liao<sup>1</sup>, and Joseph O'Sullivan<sup>1</sup>; <sup>1</sup>Washington University in St. Louis (United States), <sup>2</sup>University of Costa Rica (Costa Rica), <sup>3</sup>University of Pittsburg (United States), and <sup>4</sup>Washington University School of Medicine (United States)

9:50 COIMG-194

**Deep learning based regularized image reconstruction for respiratory gated PET**, Tiantian Li<sup>1</sup>, Mengxi Zhang<sup>1</sup>, Wenyuan Qi<sup>2</sup>, Evren Asma<sup>2</sup>, and Jinyi Qi<sup>1</sup>; <sup>1</sup>University of California, Davis and <sup>2</sup>Canon Medical Research (United States), Inc. (United States)

10:00 am – 3:30 pm Industry Exhibition - Wednesday

10:10 – 10:50 am Coffee Break

**Computational Imaging Applications to Materials Characterization**

Session Chair: Jeffrey Simmons, Air Force Research Laboratory (United States)

**10:50 am – 12:30 pm**

Grand Peninsula B/C

*Materials science, like physics, focuses on forward modeling almost exclusively for analysis. This creates opportunities for imaging scientists to make significant advances by introducing modern, inversion-based methods for analysis of microscope imagery. Materials Science emerged as a true “scientific” discipline, with the development of microscopy because it allowed the materials scientist to observe the “microstructure,” that is, the texture produced by the processes used for preparing the material. For this reason, materials science and microscopy have always been intimately linked, with the major connection being microstructure as a means of controlling properties. Until quite recently materials characterization was largely “photons-on-film.” With the digital transition of microscopy from film to data file, microscopy became a computational imaging problem. With the automation of data collection, it became imperative to develop algorithms requiring less human interaction. This session highlights recent advances in materials science as a direct consequence of cross-disciplinary approaches between computational imaging and materials science. This session covers, but is not limited to, forward modeling of material-probe-detector interactions, segmentation, anomaly detection, data fusion, denoising, learning approaches, detection and tracking, and super-resolution.*

10:50 WITHDRAWN COIMG-247

**Adversarial training incorporating physics-based regularization for digital microstructure synthesis**, Stephen Niezgodá, *The Ohio State University (United States)*

11:10 COIMG-248

**Crystallographic symmetry for data augmentation in detecting dendrite cores**, Lan Fu<sup>1</sup>, Hongkai Yu<sup>2</sup>, Megna Shah<sup>3</sup>, Jeffrey Simmons<sup>3</sup>, and Song Wang<sup>1</sup>; <sup>1</sup>University of South Carolina, <sup>2</sup>University of Texas, and <sup>3</sup>Air Force Research Laboratory (United States)

11:30 COIMG-249

**Multi-resolution data fusion for super resolution imaging of biological materials**, Emma Reid<sup>1</sup>, Cheri Hampton<sup>2</sup>, Asif Mehmood<sup>2</sup>, Gregory Buzzard<sup>1</sup>, Lawrence Drummy<sup>2</sup>, and Charles Bouman<sup>1</sup>; <sup>1</sup>Purdue University and <sup>2</sup>Air Force Research Laboratory (United States)

11:50 COIMG-250

**Void detection and fiber extraction for statistical characterization of fiber-reinforced polymers**, Camilo Aguilar Herrera and Mary Comer, *Purdue University (United States)*

12:10 COIMG-251

**Applications of denoising, structure optimization, and deep learning in high resolution electron microscopy**, Chenyu Zhang and Paul Voyles, *University of Wisconsin-Madison (United States)*

12:30 – 2:00 pm Lunch

**PLENARY: VR/AR Future Technology**

Session Chairs: Radka Tezaur, Intel Corporation (United States), and Jonathan Phillips, Google Inc. (United States)

**2:00 – 3:10 pm**

Grand Peninsula Ballroom D

**Quality Screen Time: Leveraging Computational Displays for Spatial Computing**, Douglas Lanman, *director, Display Systems Research, Facebook Reality Labs (United States)*

*For abstract and speaker biography, see page 7*

3:10 – 3:30 pm Coffee Break

**Materials Imaging**

Session Chair: David Castañón, Boston University (United States)

**3:30 – 4:10 pm**

Grand Peninsula B/C

3:30 COIMG-263

**Mueller matrix imaging for classifying similar diffuse materials**, Lisa Li, Meredith Kupinski, Madellyn Brown, and Russell Chipman, *The University of Arizona (United States)*

3:50 COIMG-264

**Modeling multivariate tail behavior in materials data**, Lucas Costa, Tomas Comer, Daniel Greiwe, Camilo Aguilar Herrera, and Mary Comer, *Purdue University (United States)*

**Security Imaging**

Session Chair: David Castañón, Boston University (United States)

**4:10 – 4:50 pm**

Grand Peninsula B/C

4:10 COIMG-293

**A spectrum-adaptive decomposition method for effective atomic number estimation using dual energy CT**, Ankit Manerikar, Fangda Li, Tanmay Prakash, and Avinash Kak, *Purdue University (United States)*

4:30 COIMG-294

**Metal artifact reduction in dual-energy CT with synthesized monochromatic basis for baggage screening**, Sandamali Devadithya and David Castañón, *Boston University (United States)*

**DISCUSSION: Wednesday Tech Mixer**

Hosts: Charles Bouman, Purdue University (United States); Gregory Buzzard, Purdue University (United States); and Robert Stevenson, University of Notre Dame (United States)

**4:50 – 5:30 pm**

Grand Peninsula B/C

*Computational Imaging Conference Wednesday wrap-up discussion and refreshments.*

**Computational Imaging XVIII Interactive Posters Session**

**5:30 – 7:00 pm**

Sequoia

The following works will be presented at the EI 2020 Symposium Interactive Posters Session.

COIMG-305

**Connected-tube MPP model for unsupervised 3D fiber detection**, Tianyu Li, Mary Comer, and Michael Sangid, Purdue University (United States)

COIMG-306

**Imaging through scattering media with a learning based prior**, Florian Schiffers, Lionel Fiske, Pablo Ruiz, Aggelos K. Katsaggelos, and Oliver Cossairt, Northwestern University (United States)

WITHDRAWN COIMG-307

**Reconstruction of 2D seismic wavefields from nonuniformly sampled sources**, Laura Galvis<sup>1</sup>, Juan Ramirez<sup>1</sup>, Edwin Vargas<sup>1</sup>, Ofelia Villarreal<sup>2</sup>, William Agudelo<sup>3</sup>, and Henry Arguello<sup>1</sup>; <sup>1</sup>Universidad Industrial de Santander, <sup>2</sup>Cooperativa de Tecnólogos e Ingenieros de la Industria del Petróleo y Afines, TIP, and <sup>3</sup>Instituto Colombiano del Petróleo, ICP, Ecopetrol S.A. (Colombia)

5:30 – 7:00 pm EI 2020 Symposium Interactive Posters Session

5:30 – 7:00 pm Meet the Future: A Showcase of Student and Young Professionals Research

**Thursday, January 30, 2020**

**Deep Learning in Computational Imaging**

Session Chair: Gregory Buzzard, Purdue University (United States)

**8:50 – 10:10 am**

Grand Peninsula B/C

COIMG-341

**2D label free microscopy imaging analysis using machine learning**, Han Hu<sup>1</sup>, Yang Lei<sup>2</sup>, Daisy Xin<sup>2</sup>, Viktor Shkolnikov<sup>2</sup>, Steven Barcelo<sup>2</sup>, Jan Allebach<sup>1</sup>, and Edward Delp<sup>1</sup>; <sup>1</sup>Purdue University and <sup>2</sup>HP Labs, HP Inc. (United States)

COIMG-342

**ProPaCoL-Net: A novel recursive stereo SR net with progressive parallax coherency learning**, Jeonghun Kim and Munchul Kim, Korea Advanced Institute of Science and Technology (Republic of Korea)

COIMG-343

**Deep learning method for height estimation of sorghum in the field using LiDAR**, Matthew Waliman and Avideh Zakhor, University of California, Berkeley (United States)

COIMG-344

**Background subtraction in diffraction x-ray images using deep CNN**, Gady Agam, Illinois Institute of Technology (United States)

10:10 – 10:50 am Coffee Break

**Algorithm/Hardware Co-Design for Computational Imaging**

Session Chair: Sergio Goma, Qualcomm Technologies, Inc. (United States)

**10:50 am – 12:30 pm**

Grand Peninsula B/C

The aim of this session is to take computational imaging concepts a step further and to set a stepping stone towards an optimal, technology dependent implementation of computational imaging: algorithm-hardware co-design. Complex algorithms thrive on clean data sets therefore sensors that are designed in conjunction with supporting algorithms can offer significantly improved results. This session is soliciting original contributions that relate to the joint design of sensors and/or technology in conjunction with algorithms.

COIMG-355

**Estimation of the background illumination in optical reflectance microscopy**, Charles Brookshire<sup>1</sup>, Michael Uchic<sup>2</sup>, Victoria Kramb<sup>1</sup>, Tyler Lesthaeghe<sup>3</sup>, and Keigo Hirakawa<sup>1</sup>; <sup>1</sup>University of Dayton, <sup>2</sup>Air Force Research Laboratory, and <sup>3</sup>University of Dayton Research Institute (United States)

COIMG-356

**Programming paradigm for streaming reconfigurable architectures**, Ioannis Nouisias and Mark Muir, Qualcomm Technologies, Inc. (United States)

COIMG-357

**Skin chromophore and melanin estimation from mobile selfie images using constrained independent component analysis**, Raja Bala<sup>1</sup>, Luisa Polania<sup>2</sup>, Ankur Purwar<sup>3</sup>, Paul Matts<sup>4</sup>, and Martin Maltz<sup>5</sup>; <sup>1</sup>Palo Alto Research Center (United States), <sup>2</sup>Target Corporation (United States), <sup>3</sup>Procter & Gamble (Singapore), <sup>4</sup>Procter & Gamble (United Kingdom), and <sup>5</sup>Xerox Corporation (United States)

COIMG-358

**Computational imaging: Algorithm/hardware co-design considerations**, Sergio Goma, Qualcomm Technologies, Inc. (United States)

COIMG-359

**Statistical inversion methods in mobile imaging**, Hasib Siddiqui, Qualcomm Technologies, Inc. (United States)

12:30 – 2:00 pm Lunch

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**Computer Vision I**

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Session Chair: Robert Stevenson, University of Notre Dame (United States)

**2:00 – 3:00 pm**

Grand Peninsula B/C

2:00 COIMG-377

**Efficient multilevel architecture for depth estimation from a single image**, Nilesch Pandey, Bruno Artacho, and Andreas Savakis, Rochester Institute of Technology (United States)

2:20 COIMG-378

**Sky segmentation for enhanced depth reconstruction and Bokeh rendering with efficient architectures**, Tyler Nuanes<sup>1,2</sup>, Matt Elsey<sup>2</sup>, Radek Grzeszczuk<sup>2</sup>, and John Shen<sup>1</sup>; <sup>1</sup>Carnegie Mellon University and <sup>2</sup>Light (United States)

2:40 COIMG-379

**A dataset for deep image deblurring aided by inertial sensor data**, Shuang Zhang, Ada Zhen, and Robert Stevenson, University of Notre Dame (United States)

**3:00 – 3:30 pm Coffee Break**

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**Computer Vision II**

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Session Chair: Robert Stevenson, University of Notre Dame (United States)

**3:30 – 4:30 pm**

Grand Peninsula B/C

3:30 COIMG-390

**On the distinction between phase images and two-view light field for PDAF of mobile imaging**, Chi-Jui (Jerry) Ho and Homer Chen, National Taiwan University (Taiwan)

3:50 COIMG-391

**Indoor layout estimation by 2D LiDAR and camera fusion**, Jieyu Li and Robert Stevenson, University of Notre Dame (United States)

4:10 COIMG-392

**Senscape: Modeling and presentation of uncertainty in fused sensor data live image streams**, Henry Dietz and Paul Eberhart, University of Kentucky (United States)



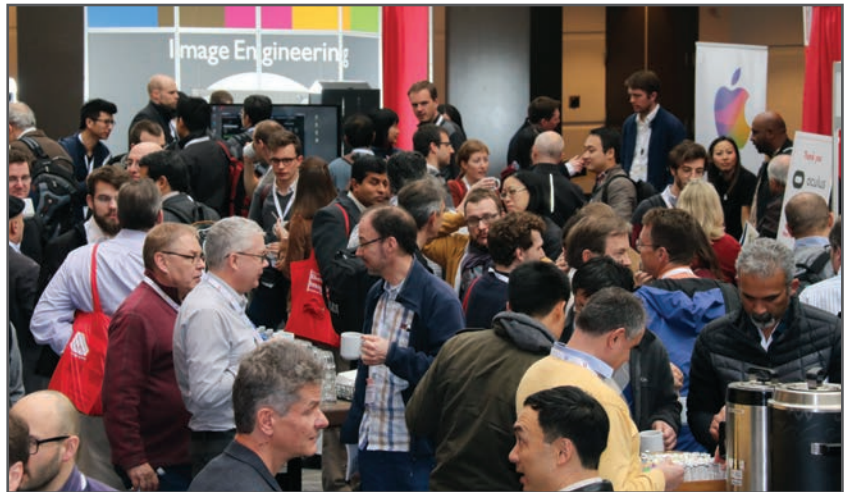
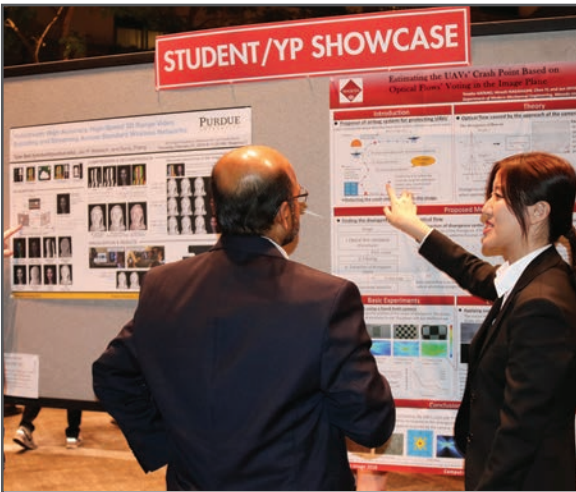
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