Computational Imaging XIV

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.

Conference Chairs and Program Committee:
Charles A. Bouman, Purdue Univ. (United States), and **Robert Stevenson,** Univ. of Notre Dame (United States)

Computational Imaging XIV

Monday, January 30, 2017

Scientific Imaging

Session Chair: Garth Simpson, Purdue University (United States)

8:50 – 10:30 am
Cypress C

8:50 COIMG-453
Deep neural networks for synchrotron X-ray imaging, *Francesco De Carlo, Charudatta Phatak, Vincent De Andrade, and Doğa Gürsoy, Argonne National Laboratory (United States)*

9:10 COIMG-415
Synchrotron x-ray diffraction dynamic sampling for protein crystal centering, *Garth Simpson, Purdue University (United States)*

9:30 COIMG-416
An iterative method to estimate and recover systematic and random errors in grating based x-ray phase contrast imaging, *Teck-Yian Lim[1], Minh Do[1], and Amber Dagel[2]; [1]University of Illinois at Urbana-Champaign and [2]Sandia National Laboratories (United States)*

9:50 COIMG-417
A model based neuron detection approach using sparse location priors, *Soumendu Majee[1], Dong Hye Ye[1], Gregery Buzzard[2], and Charles Bouman[1]; [1]School of Electrical and Computer Engineering, Purdue University and [2]Dept. of Mathematics, Purdue University (United States)*

10:10 COIMG-449
Multi-resolution Data Fusion (MDF) for computational electron microscopy, *Suhas Sreehari[1], Jeffrey Simmons[2], Lawrence Drummy[2], and Charles Bouman[1]; [1]Purdue University and [2]Air Force Research Laboratory (United States)*

10:30 – 10:50 am Coffee Break

Tomography

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

10:50 am – 12:30 PM
Cypress C

10:50 COIMG-418
High spatial resolution detection method for point light source in scintillator, *Kai Xu[1], Tetsuya Iizuka[2], Toru Nakura[2], and Kunihiro Asada[2]; [1]The University of Tokyo and [2]VLSI Design and Education Center, The University of Tokyo (Japan)*

11:10 COIMG-419
A randomized approach to reduce metal artifacts in x-ray computed tomography, *David Castañón and Parisa Babaheidarian, Boston University (United States)*

11:30 COIMG-420
Joint segmentation and material recognition in dual-energy CT images, *David Castañón and Parisa Babaheidarian, Boston University (United States)*

11:50 COIMG-421
MultiGPU acceleration of branchless distance driven projection and backprojection for Clinical Helical CT (JIST-first), *Ayan Mitra[1], David Politte[2], Bruce Whiting[3], Jeffrey Williamson[4], and Joseph O'Sullivan[1]; [1]Washington University, [2]Washington University School of Medicine, [3]University of Pittsburg, and [4]Virginia Commonwealth University (United States)*

12:10 COIMG-422
Fast and robust discrete computational imaging, *Ahmet Tuysuzoglu[1], Yuehaw Khoo[2], and W. Clem Karl[3]; [1]Siemens Healthcare, [2]Princeton University, and [3]Boston University (United States)*

12:30 – 2:00 pm Lunch Break

EI 2017 Opening Plenary and Symposium Awards
Session Chairs: Joyce E. Farrell, Stanford University, and Nitin Sampat, Rochester Institute of Technology (United States)
2:00 – 3:00 pm
Grand Peninsula Ballroom D

Giga-scale 3D computational microscopy, *Laura Waller, University of California, Berkeley (United States)*

Laura Waller is the Ted Van Duzer Endowed Assistant Professor of Electrical Engineering and Computer Sciences (EECS) at UC Berkeley. She is a Senior Fellow at the Berkeley Institute of Data Science, and received her BS (2004), MEng (2005), and PhD (2010) in EECS from the Massachusetts Institute of Technology (MIT). Waller's talk is on computational imaging methods for fast capture of gigapixel-scale 3D intensity and phase images in a commercial microscope that employs illumination-side and detection-side coding of angle (Fourier) space with simple hardware and fast acquisition. The result is high-resolution reconstructions across a large field-of-view, achieving high space-bandwith-time product.

3:00 – 3:30 pm Coffee Break

Computational Color

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

3:30 – 4:30 pm
Cypress C

3:30 COIMG-423
Linear mapping based inverse tone mapping, *Dae Eun Kim and Munchurl Kim, Korea Advanced Institute of Science and Technology (Republic of Korea)*

3:50 COIMG-424
Performance of the 14 skin-colored patches to accurately estimate the human skin, *Hayan Choi, Kyungah Choi, and Hyeon-Jeong Suk, Korea Advanced Institute of Science and Technology (Republic of Korea)*

4:10 COIMG-425
Skin-representative region in a face for finding true skin color, *Hyeon-Jeong Suk, Hayan Choi, and Kyungah Choi, Korea Advanced Institute of Science and Technology (Republic of Korea)*

Symposium Welcome Reception
5:00 – 6:00 pm
Atrium

Tuesday, January 31, 2017

Computational Optics

Session Chair: Stanley Chan, Purdue University (United States)

8:50 – 10:10 am
Cypress C

8:50 COIMG-454
Atomistic simulations of interface characteristics in materials systems, *Jeffrey Rickman, Lehigh University (United States)*

9:10 COIMG-426
A phase-coded aperture camera with programmable optics, *Jieen Chen[1], Michael Hirsch[2], Rainer Heintzmann[3], Bernhard Eberhardt[4], and Hendrik Lensch[1]; [1]University of Tuebingen, [2]Max Plank Institute for Intelligent Systems, [3]Leibniz Institute of Photonic Technology, and [4]Stuttgart Media University (Germany)*

9:30 COIMG-427
Wavefront correction using self-interference incoherent digital holography, *Kiseung Bang[1], Changwon Jang[1], Jonghyun Kim[1], Myung Kim[2], and Byoungho Lee[1]; [1]Seoul National University (Republic of Korea) and [2]University of South Florida (United States)*

9:50 COIMG-428
Non-iterative image reconstruction for single photon image sensors, *Stanley Chan, Purdue University (United States)*

10:00 am – 7:30 pm Industry Exhibition

10:10 – 10:50 am Coffee Break

Computational Photography

Session Chair: Henry Dietz, University of Kentucky (United States)

10:50 am – 12:30 pm
Cypress C

10:50 COIMG-429
Single image super-interpolation using adjusted self-exemplars, *Hyun-Ho Kim, Jae-Seok Choi, and Munchurl Kim, Korea Advanced Institute of Science and Technology (Republic of Korea)*

11:10 COIMG-430
Temporal super-resolution for time domain continuous imaging, *Henry Dietz, John Fike, Paul Eberhart, Katie Long, and Clark Demaree, University of Kentucky (United States)*

11:30 COIMG-431
Edge-aware light-field flow for depth estimation and occlusion detection, *Wenhui Zhou[1], Andrew Lumsdaine[2], Lili Lin[3], Wei Zhang[3], and Rong Wang[3]; [1]Hangzhou Dianzi University (China), [2]Indiana University (United States), and [3]Zhejiang Gongshang University (China)*

11:50 COIMG-432
Evaluating age estimation using deep convolutional neural nets, *Carlos Belver, Ignacio Arganda-Carreras, and Fadi Dornaika, University of the Basque Country (Spain)*

12:10 COIMG-452
3-D Shape recovery from real images using a symmetry prior, Vijai Jayadevan, Aaron Michaux, *Edward Delp, and Zygmunt Pizlo, Purdue University (United States)*

12:30 – 2:00 pm Lunch Break

EI 2017 Tuesday Plenary and Symposium Awards
Session Chairs: Joyce E. Farrell, Stanford University, and Nitin Sampat, Rochester Institute of Technology (United States)
2:00 – 3:00 pm
Grand Peninsula Ballroom D

VR 2.0: Making virtual reality better than reality, *Gordon Wetzstein, Stanford University (United States)*

Gordon Wetzstein is an Assistant Professor of Electrical Engineering and, by courtesy, of Computer Science, at Stanford University, and leads the Stanford Computational Imaging Group. He received a PhD in computer science from the University of British Columbia (2011) where his doctoral dissertation focused on computational light modulation for image acquisition and display. In his talk, Wetzstein explores the frontiers of VR systems engineering. Eventually, VR/AR systems will redefine communication, entertainment, education, collaborative work, simulation, training, telesurgery, and basic vision research, as next-generation computational near-eye displays evolve to deliver visual experiences that are better than the real world.

3:00 – 3:30 pm Coffee Break

Image Analysis

Session Chair: Avideh Zakhor, University of California, Berkeley (United States)

3:30 – 5:30 pm
Cypress C

3:30 COIMG-433
Augmenting salient foreground detection using Fiedler vector for multi-object segmentation, *Michal Kucer[1], Nathan Cahill[1], Alexander Loui[2], and David Messinger[1]; [1]Rochester Institute of Technology and [2]Kodak Alaris Inc. (United States)*

3:50 COIMG-434
Non-destructive localization of overpaintings in Byzantine miniature illuminations, *Alexandra Psarrou[1], Vassiliki Kokla[1], Sophie Triantaphillidou[1], and Lindsay MacDonald[2]; [1]University of Westminster and [2]University College London (United Kingdom)*

4:10 COIMG-435
Computing height and width of in situ sorghum plants using 2.5d infrared images, *Tavor Baharav, Mohini Bariya, and Avideh Zakhor, University of California, Berkeley (United States)*

4:30 COIMG-436
Non-parametric texture synthesis using texture classification, *Kyle Ziga[1], Judy Bagchi[2], Jan Allebach[1], and Fengqing Zhu[1]; [1]Purdue University and [2]DZine Steps (United States)*

4:50 COIMG-437
On-the-fly performance evaluation of large-scale fiber tracking, *Hongkai Yu[1], Jeffrey Simmons[2], Craig Przybyla[2], and Song Wang[1]; [1]University of South Carolina and [2]Air Force Research Laboratory (United States)*

5:10 COIMG-438
Point cloud based approach to biomass feature extraction, *Jihui Jin and Avideh Zakhor, University of California, Berkeley (United States)*

Symposium Demonstration Session
5:30 – 7:30 pm
Grand Peninsula Ballroom E

Wednesday, February 1, 2017

EI 2017 Wednesday Plenary and Symposium Awards
Session Chairs: Joyce E. Farrell, Stanford University, and Nitin Sampat, Rochester Institute of Technology (United States)
2:00 – 3:00 pm
Grand Peninsula Ballroom D

Designing VR video camera systems, *Brian Cabral, Facebook, Inc. (United States)*

Brian Cabral is Director of Engineering at Facebook, leading the Surround 360 VR camera team, specializing in computational photography, computer vision, and computer graphics. He has published a number of papers in the area of computer graphics and imaging including the pioneering Line Integral Convolution algorithm. Cabral discusses developing Facebook Surround 360, an open, high-quality 3D-360 video capture system. VR video capture systems are composed of multiple optical and digital components - all of which must operate as if they are one seamless optical system. The design of VR video cameras, optical choices, SNR, etc., require a new set of technologies and engineering approaches, with tight coupling to the computational system components.

3:00 – 3:30 pm Coffee Break

Computational Imaging XV Interactive Papers Session

5:30 – 7:00 pm
Atrium

The following works will be presented at the EI 2017 Symposium Interactive Papers Session.

COIMG-439
Non-iterative joint demosaicing and super resolution framework, *Xenya Petrova, Ivan Glazistov, Sergey Zavalishin, Vladimir Kurmanov, Kirill Lebedev, Alexander Molchanov, Andrey Shcherbinin, Gleb Milyukov, and Ilya Kurilin, Samsung R&D Institute Rus (Russian Federation)*

COIMG-440
Localized high dynamic range plenoptic image compression, *Chuan-Chung Chang[1], Hsin-Hsiang Lo[1], Han-Hsuan Lin[1], Zhi-Rong Fan[2], Shao-Hsuan Cheng[1], Chih-Hung Lu[1], Fu-Ming Chuang[1], and Jiun-In Guo[2]; [1]Coretronic Corp. and [2]National Chiao Tung University (Taiwan)*

COIMG-441
Image-based age estimation: Comparing hand crafted and deep features, *Fadi Dornaika[1], Nada Moukaddem[2], and Ammar Assoum[2]; [1]University of the Basque Country (Spain) and [2]Lebanese University (Lebanon)*

COIMG-442
Compressive light field display using scattering polarizer, *Dukho Lee[1,2], Byoungho Lee[1,2], Seokil Moon[1,2], Chang-Kun Lee[1,2], and Gang Li[1,2]; [1]Electrical and Computer Engineering, Seoul National University and [2]Optical Engineering and Quantum Electronics Laboratory, Seoul National University (Republic of Korea)*

COIMG-443
High-resolution image reconstruction for PET using local and non-local regularizations, *Xue Ren and Soo-Jin Lee, Pai Chai University (Republic of Korea)*

COIMG-444
3D reconstruction based multiple view depth generation using heterogeneous cameras, *Dong-won Shin, Gwangju Institute of Science and Technology (Republic of Korea)*

COIMG-445
Deep convolutional neural networks for the classification of snapshot mosaic hyperspectral imagery, *Konstantina Fotiadou[1,2], Grigorios Tsagkatakis[1], and Panagiotis Tsakalides[1,2]; [1]FORTH and [2]University of Crete (Greece)*

COIMG-446
Space-variant smoothing in median-regularized reconstruction for transmission tomography, *Ji Eun Jung and Soo-Jin Lee, Pai Chai University (Republic of Korea)*

COIMG-447
A viewing direction control camera without mechanical motion based on computational imaging, *Daiki Teraya and Tomohiro Yendo, Nagaoka University of Technology (Japan)*

COIMG-448
The human sclera and pupil as the calibration targets, *Hayan Choi, Kyungah Choi, and Hyeon-Jeong Suk, Korea Advanced Institute of Science and Technology (Republic of Korea)*