PROGRAM

*as of Jan 20, 2024

Hyatt Regency San Francisco Airport • Burlingame, California

Computational Imaging

Monday January 22, 2024

Session: Generative Plug-and-Play

8:45 AM - 10:20 AM / Room: Grand Peninsula C Session Chair: *Charles Bouman, Purdue University (US)* 8:45 AM Welcome

8:50 AM **KEYNOTE: Image Restoration Through Inversion by Direct Iteration (InDI)** (COIMG-117)
Mauricio Delbracio and Peyman Milanfar, Google Research (US)

9:20 AM **Provable Probabilistic Imaging Using Score-Based Generative Priors** (COIMG-118)
Yu Sun[1], Zihui Wu[1], Yifan Chen[2], Berthy Feng[1], and Katherine Bouman[1]; [1]California Institute of Technology and [2]Courant Institute (US)

9:40 AM **Transformers for Microscopy Slide Image Segmentation of Invasive Melanoma** (COIMG-119)
Franklin Wang[1], Michael Wang[2], Avideh Zakhor,[1] and Timothy McCalmont[2]; [1]University of California Berkeley and [2]University of California San Francisco (US)

10:00 AM **Generative Plug-and-Play: Posterior Sampling for Inverse Problems** (COIMG-120)
Gregery Buzzard and Charles Bouman, Purdue University (US)

Coffee Break 10:10–10:40

Session: Generative Artificial Intelligence for Remote Sensing

10:40 AM - 12:30 PM / Room: Grand Peninsula C Session Chair: *Gregery Buzzard, Purdue University (US)*

10:40 AM **KEYNOTE: Efficient Neural Scene Representation, Rendering, and Generation** (COIMG-121)
Gordon Wetzstein, Stanford University (US)

11:10 AM **Dark Secrets of Computational Imaging** (COIMG-122)
Laura Waller, UC Berkeley (US)

11:30 AM **Super Resolution in Heterogeneous Array Cameras under Coherent and Partially Coherent Illumination: A Generative AI Approach** (COIMG-123)
Kevin Figueroa, Greg Nero, Gordon Hageman, and David Brady, University of Arizona (US)

11:50 AM **Diffractive Processing of Visual Information** (COIMG-124)
Aydogan Ozcan, and Jing Li, UCLA (US)

12:10 PM **Physics-informed Generative Models for Imaging and Photonic Design** (COIMG-125)
Muhammad Tayyab, Zheyuan Zhu, and Shuo Pang, University of Central Florida (CREOL) (US)

Lunch on Own

2:00 PM - 3:00 PM / Room: Grand Peninsula D

PLENARY: Seeing and Feeling in Robot-Assisted Surgery

Allison Okamura, Richard W. Weiland Professor of Engineering, Stanford University (US)

Coffee Break 3:00–3:30

3:30 PM - 5:00 PM / Room: Grand Peninsula D

Highlights 2024

Join us for a session that highlights the breadth of EI with short papers selected by their Chairs from EI conferences. The full papers are given at other times in the program. Note that COIMG and HVEI will run papers concurrent with this session.

Highlights papers are posted here.

Session: Intersection of Computational Imaging and Materials Science I

3:30 PM - 4:50 PM / Room: Grand Peninsula C

Session Chair: *Jeff Simmons, Air Force Research Laboratory (US)*

3:30 PM **Considerations for Materials Design from the Latent Space** (COIMG-126)

Jeff Simmons and Megna Shah, Air Force Research Laboratory, and Veera Sundararaghavan, University of Michigan (US)

3:50 PM **Methodology for Estimation of Intrinsic Dimensions and State Variables of Microstructures** (COIMG-127) *Megna Shah and Jeff Simmons, Air Force Research Laboratory, and Veera Sundararaghavan, University of Michigan (US)*

4:10 PM **Persistent Homology for Microstructure Manifold Construction** (COIMG-128)
Simon A. Mason[1], Jeff Simmons[2], Megna Shah[2], and Stephen Niezgoda[1]; [1]Ohio State University and [2]Air Force Research Laboratory (US)

4:30 PM **Dissipative Lagrangian Neural Networks for Materials Imaging and Simulation** (COIMG-129)
Veera Sundararaghavan, University of Michigan, and Megna Shah and Jeff Simmons, Air Force Research Laboratory (US)

5:00 PM - 6:30 PM / Room: The Grove **Symposium Reception**

6:00 PM - 8:30 PM / Room: Grand Peninsula D

FILM: *Interthinking Art + Science*

A feature-length documentary on painter, photographer, designer, educator, and art theorist György Kepes and his pioneering installations in light and motion. The film is directed by EI 2024 keynote speaker Márton Orocz, director of the Vasarely Museum in Budapest, Hungary.

Tuesday January 23, 2024

Session: Intersection of Computational Imaging and Materials Science II

8:45 AM - 10:10 AM / Room: Grand Peninsula C

Session Chair: *Jeff Simmons, Air Force Research Laboratory (US)*

8:45 AM Welcome

8:50 AM **Mathematical Nuances of Gaussian-Process-Driven Autonomous Experimentation** (COIMG-130)
Marcus Noack, Lawrence Berkeley National Laboratory (US)

9:10 AM **Reinforcement Learning for Metals Powder Bed Fusion** (COIMG-131)
Ojash Neopane, Carnegie Mellon University, and Michael Ballard, Andrew Gillman, and Sean Donegan, Air Force Research Laboratory (US)

9:30 AM **Evaluation of Information Content in 2D and 3D Microstructural Characterization of Brush Particle-Based Hybrid Materials** (COIMG-132)
Ayesha Abdullah[1], Lawrence Drummy[2], Levent Kara[1], Michael Bockstaller[1]; [1]Carnegie Mellon University and [2]Air Force Research Laboratory (US)

9:50 AM ***Semantic Segmentation and Anomaly Identification of Binder Jet Powder Bed Images*** (COIMG-133) *Alexander Gourley[1],; Jonathan Kaufman[2], Edwin Schwalbach[1], Lisa Rueschhoff[3], Jack Beuth[2], Reeja Jayan[1]; [1]Carnegie Mellon University, [2]Air Force Research Laboratory, and [3]UES (US)*

Coffee Break 10:10–10:40

Joint Session: Intersection of Computational Imaging and Materials Science III with *Machine Learning for Scientific Imaging*

10:40 AM - 12:30 PM / Room: Grand Peninsula C

Session Chair: *Jeff Simmons, Air Force Research Laboratory (US)*

10:40 AM **KEYNOTE: Quantitative Secondary Electron Yield Mapping in Ion-beam Microscopy** (COIMG-134)
Vivek Goyal[1], Akshay Agarwal[1], Leila Kasaei[2], Xinglin He[1], Leonard Feldman[2]; [1]Boston University and [2]Rutgers University (US)

11:10 AM **Local Entropy Key Points for Materials Science Image Collation** (MLSI-302)
Zachary Varley, Marc DeGraef, and Gregory Rohrer, Carnegie Mellon University (US)

11:30 AM **Combining Multimodal Fatigue Fracture Surface Image for Analysis with a CNN** (MLSI-303)
Katelyn Jones, Carnegie Mellon University; William Musinski, University of Wisconsin; Paul Shade and Reji John, Air Force Research Laboratory; and Elizabeth Holm, University of Michigan (US)

11:50 AM **A Lightweight Transformer for Faster and Robust EBSD Data Collection** (MLSI-304)
Harry Dong[1], Sean Donegan[2], Megna Shah[2], and Yuejie Chi[1]; [1]Carnegie Mellon University and [2]Air Force Research Laboratory (US)

12:10 PM **Biomedical Ultrasound Computed Tomography Using Neural Full Waveform Inversion** (COIMG-135)
Zhijun Zeng, Yihang Zheng, Youjia Zheng, and Zuoqiang Shi, Tsinghua University; Yubing Li, Institute Of Acoustics; and He Sun, Peking University (China)

Lunch on Own

2:00 PM - 3:00 PM / Room: Grand Peninsula D

PLENARY: Neural Radiance Fields

Jon Barron, senior staff research scientist, Google Research (US)

Coffee Break 3:00–3:30

Session: Additive Manufacturing: In- and Ex-Situ Imaging for Monitoring and Non-Destructive Characterization I

3:30 PM - 5:20 PM / Room: Grand Peninsula C

Session Chair: *Amir Ziabari, Oak Ridge National Laboratory (US)*

3:30 PM **Automated, High-Throughput X-ray CT Characterization of Additively Manufactured Parts Using Deep Learning Based Algorithms** (COIMG-136)
Amir Ziabari, Obaidullah Rahman, Zackary Snow, Singanallur V. Venkatakrishnan, Ryan Dehoff, and Vincent Paquit, Oak Ridge National Laboratory (US)

3:50 PM **KEYNOTE: Understanding Microstructural Evolution in Additively Manufactured Materials by 3D X-ray Imaging**
(COIMG-137)

Daniel Sinclair[1], Eshan Ganju[1], Hamid T. Sarraf[2], and Nikhilesh Chawla[1]; [1]Purdue University and [2]Lam Research (US)

4:20 PM **Engineering Temporally Integrated Images for In Situ Monitoring and Analysis of Laser-Based Powder Bed Fusion Additive Manufacturing** (COIMG-139)
Zackary Snow, Luke Scime, and Vincent Paquit, Oak Ridge National Lab, and Shuchi Khurana and Petros Apostolou, Addiguru (US)

4:40 PM **Benefit of X-ray Imaging to Improve Additive Manufacturing** (COIMG-140)
Anne-Françoise Obaton, Laboratoire National de Métrologie et d'Essais (LNE) (France), and Massimiliano Ferrucci, Brian Giera, Andrew Harris, and Jeff Haslam, Lawrence Livermore National Laboratory (LLNL) (US)

5:00 PM **Model-based Deep Learning with a CNN Prior for Sparse-view Cone-beam CT Reconstruction of Additively Manufactured Objects** (COIMG-141)
Aniket Pramanik, Obaidullah Rahman, Singanallur V. Venkatakrishnan, and Amir Ziabari, Oak Ridge National Laboratory (US)

5:30 PM - 7:30 PM / Room: Regency

Interactive Paper Poster Session, Demonstration Session, and Exhibit Happy Hour

Computational Imaging Posters

Detection of Multiple Fluorescent Dyes Using Liquid-crystal Variable Retarder and Sparse Modeling (COIMG-161) ***Kazuma Fujiwara, Takuya Funatomi, Kazuya Kitano, Yuki Fujimura, and Yasuhiro Mukaigawa, Nara Institute of Science and Technology; and Hiroshi Ochiai, Kyushu University (Japan)***

Open Set Domain Adaptation for Image Classification with Multiple Unknown Labels Using Unsupervised Clustering in a Target Domain (COIMG-162)
Daichi Nishihara[1], Yoshihiro Midoh[1], Youyang Ng[2], Osamu Yamane[2], Maasa Takahashi[2], Shuhei Iijima[2], Jun Shiomi[1], Goh Itoh[2], and Noriyuki Miura[1]; [1]Osaka University and [2]Kioxia Corporation (Japan)

Wednesday January 24, 2024

Session: Methods in Computational Imaging

9:10 AM – 10:10 AM / Room: Grand Peninsula C Session Chair: *Charles Bouman, Purdue University (US)*

9:10 AM **Leveraging Pixel Value Certainty in Pixel-Shift and Other Multi-Shot Super-Resolution Processing** (COIMG-142)
Henry G. Dietz, University of Kentucky (US)

9:30 AM **Multimodal Deep Learning Approach for Dynamic Sampling with Automatic Feature Selection in Matrix- Assisted Laser Desorption/Ionization Mass Spectrometry Imaging** (COIMG-143)
David Helminiak, Marquette University (US); Tobias Boskamp, Bruker Corporation (Germany); Dong Hye Ye, Georgia State University (US)

9:50 AM **Gradient-Based Image Visualization for Noisy LWIR Image** (COIMG-144)
Taichi Nakano, Masayuki Tanaka, and Masatoshi Okutomi, Tokyo Institute of Technology (Japan)

Coffee Break 10:10–10:40

Session: Additive Manufacturing: In- and Ex-Situ Imaging for Monitoring and Non-Destructive Characterization II

10:40 AM - 12:50 PM / Room: Grand Peninsula C

Session Chair: *Amir Ziabari, Oak Ridge National Laboratory (US)*

10:40 AM **CANCELED**

11:10 AM **Multimodal Registration and Fusion of In Situ and Ex Situ Process Monitoring Data: A Case Study in Laser Powder Bed Fusion** (COIMG-138)
Sean P. Donegan and Edwin J. Schwalbach, Air Force Research Lab, and Michael A. Groeber, Ohio State University (US)

11:30 AM **Generative Denoising Models for Material Science Applications** (COIMG-147)
Patxi Fernandez-Zelaia, Jiahao Cheng, Jason Mayeur, Amir K. Ziabari, Michael M. Kirka, Saket Thapliyal, Rangasayee Kanan, and Peeyush Nandwana, Oak Ridge National Laboratory (US)

11:50 AM **On the Development of Acoustic Melt Pool Monitoring Techniques Assisted by High-speed Synchrotron X-rays** (COIMG-148)
David Stobbe[1], Nathan Kizer[2], Lovejoy Mutswatiwa[2], Lauren Katch[2], Tao Sun[3], Jordan Lum[1], Samuel Clark[4], Kamel Fezzaa[4], and Chris Kube[2]; [1]Lawrence Livermore National Laboratory, [2]Penn State University, [3]University of Virginia, and [4]Argonne National Laboratory (US)

12:10 PM **Classification of Melt Pool Boundaries and Defects through Dual-energy X-ray CT of Crept Additively Manufactured Parts** (COIMG-149)
Obaidullah Rahman[1], Sumit Bahl[1], Curtis Frederick[2], Amit Shyam[1], Ryan Dehoff[1], Alex Plotkowski[1], and Amir Koushyar Ziabari[1]; [1]Oak Ridge National Laboratory and [2]Carl Zeiss Industrial Metrology (US)

12:30 PM **3D Printing Images Defect Detection and Classification Supported by Generative AI Models** (COIMG-368)
Amra Peles, Holden Hyer, Amir Ziabari, Ryan DeHoff, and Vincent Paquit, Oak Ridge National Laboratory (US)

Lunch on Own

2:00 PM - 3:00 PM / Room: Grand Peninsula D

PLENARY: Imaging the Universe: NASA Space Telescopes from James Webb to Nancy Grace Roman and Beyond

Joseph M. Howard, optical designer, NASA (US)

Coffee Break 3:00–3:30

Session: Imaging at the Edge

3:30 PM - 5:30 PM / Room: Grand Peninsula C

Session Chairs: *Mel White, Rice University (US), and Stanley H. Chan, Purdue University (US)*

3:30 PM **JIST-first: Computational Image Formation: Simulators in the Deep Learning Era** (COIMG-150)
Stanley H. Chan, Purdue University (US)
3:50 PM **Mobile Aware Computational Imaging** (COIMG-155)
Jing Li, Samsung (Republic of Korea)
4:10 PM **PSF Engineering for Edge Sensing** (COIMG-152)
Nicholas Antipa, University of California San Diego (US)
4:30 PM **Reconstruction of Phase and Temperature Maps from Energy-resolved Neutron Imaging** (COIMG-153)
Anton S. Tremsin, Space Sciences Laboratory (US); Adrian Losko, Forschungs-Neutronenquelle Heinz Maier-Leibnitz (Germany); Sven Vogel, Los Alamos National Laboratory (US); Winfried Kockelmann and Daniel Pooley, STFC (UK); and Takenao Shionhara and Kenichi Oikawa, Japan Atomic Energy Agency (Japan)
4:50 PM **Bio-Inspired Methods for Efficient Visual Sensing** (COIMG-154)
Emma Alexander, Northwestern University (US)
5:10 PM **Beyond RISC - Next-generation Compute Architecture for Computational Imaging** (COIMG-151)
Sergio Goma, Qualcomm (US)

Session: Panel Discussion: The Future of Computational Imaging

5:40 PM – 7:10 PM / Room: Grand Peninsula C Moderator: *Charles Bouman, Purdue University (US)*

PANELISTS:
Emma Alexander, Northwestern University Stanley Chan, Purdue University
Dilshan Godaliyadda, Samsung Sergio Goma, QualComm David Stork, Stanford University
Anton Tremsin, UC Berkeley Space Science Laboratory

Thursday January 25, 2024

Session: Implicit Neural Representations for Inverse Imaging

9:20 AM - 10:20 AM / Room: Grand Peninsula C
Session Chair: *K. Aditya Mohan, Lawrence Livermore National Laboratory (US)*
9:20 AM **Accurate Efficient Multispectral Spatiotemporal Image Reconstruction Using Neural Field Representations** (COIMG-156)
Luke Lozenski[1], Alia Khaled[2], Mark Anastasio[3], Mark Pagel[2], and Umberto Villa[4]; [1]Washington University in St Louis, [2]Anderson Cancer Center (US); [3]University of Illinois at Urbana-Champaign, and [4]The University of Texas at Austin (US)
9:40 AM **Neural Deconvolution and Rendering for Synthetic Aperture Sonar** (COIMG-157)
Suren Jayasuriya, Arizona State University (US)
10:00 AM **Implicit Neural Representation for Tomographic Imaging** (COIMG-158)
Yu Sun, California Institute of Technology (US)

Coffee Break 10:20-10:40

10:40 AM**Implicit Representation for Motion-Resolved Computed Tomography** (COIMG-159)
Kunal Gupta, Brendan Colvert, Zhennong Chen, Srirangan Madhavan, and Francisco Contijoch, University of California San Diego (US)
11:00 AM **Maximum Likelihood-based Phase-Retrieval Using Fresnel Propagation Forward Models with Optional Constraints** (COIMG-160)
K. Aditya Mohan, Jean-Baptiste Forien, Venkatesh Sridhar, and Jefferson Cuadra, Lawrence Livermore National Laboratory, and Dilworth Parkinson Lawrence Berkeley National Laboratory (US)