MEDICAL IMAGING

THE LEADING CONFERENCE THAT EXPLORES THE SCIENCE OF MEDICAL IMAGING

16-21 February 2019
Town and Country Resort & Convention Center
San Diego, California, USA

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THE PREMIER EVENT FOR THE SCIENCE BEHIND MEDICAL IMAGING
16–21 February 2019
Town and Country Resort & Convention Center
San Diego, California, USA

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- Up-to-date paper listings and session times
- Hotel, travel, and complete registration information
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  - Information about local travel options

Reserve hotel rooms by: **16 January 2019**
Registration rates increase after: **1 February 2019**

**PROGRAM CURRENT AS OF: 15 October 2018**

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Plan to attend SPIE Medical Imaging—where the latest information is presented.

**Conferences:** Hear 1,000 presentations on the latest advances in digital pathology; tomography; image processing; observer performance; image-registration, -informatics, and -segmentation; computer-aided diagnosis; and ultrasound.

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**Courses:** Get focused, efficient training on current approaches in biomedical imaging and physics, imaging and CT, observer studies, photon counting, and many more, that you can apply directly to your daily work. Register soon to ensure a spot.

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Participate in the following opportunities: RFW All-Conference Best Student Paper, Young Scientist Award, Student Paper Award, as well as information about Poster Awards.
Learn from over 1,000 presentations on the latest advances in medical imaging research

SPIE Medical Imaging is the internationally recognized forum for reporting state-of-the-art research and development in medical imaging. The event focuses on the latest innovations found in underlying fundamental scientific principles, technology developments, scientific evaluation, and clinical application. The symposium covers the full range of medical imaging modalities including image processing, physics, computer-aided diagnosis, perception, image-guided procedures, biomedical applications, ultrasound, informatics, radiology and digital pathology, with an increased focus on fast emerging areas like deep learning, AI, and machine learning. The event offers the latest advances covered in nine conference topics.

Join your peers where collaboration brings ideas to life and technology to market. Hear the work, network with leaders in the field, and see the applications of the future. We look forward to seeing you in San Diego!
Awards and Plenary Session

Don’t miss these world-class speakers discussing the latest directions and most promising breakthroughs.

Monday 18 February 2019 • 4:10 PM - 5:30 PM

4:10 PM
WELCOME AND NEW SPIE FELLOWS
ACKNOWLEDGEMENTS

4:15 PM
BEST STUDENT PAPER AWARDS
ANNOUNCEMENT
The first place winner and runner up of the Robert F. Wagner All-Conference Student Paper Award will be announced.

4:20 PM
SPIE HARRISON H. BARRETT AWARD IN
MEDICAL IMAGING
Inaugural Presentation
This award will be presented in recognition of outstanding accomplishments in medical imaging.

4:30 PM

Plenary Presentation

Dr. Thomas J. Fuchs
Director of Computational Pathology, Dept. of Pathology
Memorial Sloan Kettering Cancer Ctr. (USA)
Weill Cornell Medicine (USA)

Biography: Dr. Thomas Fuchs heads the Computational Pathology and Medical Machine Learning Lab at Memorial Sloan Kettering Cancer Center and teaches biomedical machine learning as associate professor at Weill-Cornell in New York City. He is director of The Warren Alpert Center for Digital and Computational Pathology.

His passion for the tremendous potential of artificial intelligence in medicine resulted in more than 90 publications spanning a range of topics from novel deep learning and Bayesian approaches for quantification to real-world applications in the clinic.

THIS PDF PROGRAM IS CURRENT AS OF 15 OCTOBER 2018. Find complete, up-to-date information and create your personalized schedule at spie.org/mi19program
Special Events • Keynote Presentations

**Imaging Informatics for Healthcare, Research, and Applications**
Conference 10954 • Paper Number 10954-12

**AI research and applications in radiology: experience in China**
Sunday 17 February 2019 • 1:20 PM - 2:00 PM

**Shiyuan Liu**
Changzheng Hospital (China)

Abstract: Artificial Intelligence (AI) is growing rapidly almost everywhere and entering the fields of healthcare and medicine. Compared to in developed countries, AI may play a distinct role, face different challenges, yet represents a greater opportunity in less-developed countries, where quality medical services and resources are in general limited. The speaker, Dr. Shiyuan Liu, President-Elect of the Chinese Society of Radiology, will talk about the status, experience, and challenges regarding AI research, applications, and regulatory in the clinical/radiology workflow specifically in hospitals in China. He will also share his thoughts and insights in leading the national efforts of AI innovation by synergizing the academic, industry, and clinical strengths.

Biography: **Dr. Shiyuan Liu**, Professor and Chairman of the Department of Radiology in the ChangZheng Hospital in Shanghai, China. He is the President-Elect of the Chinese Society of Radiology and of the Asian Society of Chest Radiology. Dr. Liu serves as the President of the Chinese Medical Imaging AI Innovation Alliance and leads the national efforts of AI research and applications in radiology. Dr. Liu received approximately $6 million research grants from Chinese National Science Foundation, Ministry of Science and Technology, and Shanghai Local Research Foundation. Dr. Liu is the Editor-in-Chief of the Oncoradiology journal. He has published more than 321 journal papers and authored 9 books. Dr. Liu is specialized in chest radiology especially in lung cancer screening and clinical imaging diagnosis with more than 30 years of experience.

**World’s deepest-penetration and fastest optical cameras: photoacoustic tomography and compressed ultrafast photography**
Monday 18 February 2019 • 10:10 AM - 10:50 AM

**Lihong Wang**
Caltech (USA)

Abstract: We developed photoacoustic tomography to peer deep into biological tissue. Photoacoustic tomography (PAT) provides in vivo omniscale functional, metabolic, molecular, and histologic imaging across the scales of organs and through organisms. We also developed compressed ultrafast photography (CUP) to record 10 trillion frames per second, 10 orders of magnitude faster than commercially available camera technologies. CUP can tape the fastest phenomenon in the universe, namely, light propagation, and can be slowed down for slower phenomena such as combustion. PAT physically combines optical and ultrasonic waves. Conventional high-resolution optical imaging of scattering tissue is restricted to depths within the optical diffusion limit (~1 mm in the skin). Taking advantage of the fact that ultrasonic scattering is orders of magnitude weaker than optical scattering per unit path length, PAT beats this limit and provides deep penetration at high ultrasonic resolution and high optical contrast by sensing molecules. Broad applications include early-cancer detection and brain imaging. The annual conference on PAT has become the largest in SPIE’s 20,000-attendee Photonics West since 2010. CUP can image in 2D non-repeatable time-evolving events. CUP has a prominent advantage of measuring an x, y, t (x, y, spatial coordinates; t, time) scene with a single exposure, thereby allowing observation of transient events occurring on a time scale down to 100 femtoseconds, such as propagation of a light pulse. Further, akin to traditional photography, CUP is receive-only—avoiding specialized active illumination required by other single-shot ultrafast imagers. CUP can be coupled with front optics ranging from microscopes to telescopes for widespread applications in both fundamental and applied sciences.

Biography: **Lihong Wang** is Bren Professor of Medical and Electrical Engineering at Caltech. Published 495 journal articles (h-index = 122, citations = 61,000). Delivered 500 keynote/plenary/invited talks. Published the first functional photoacoustic CT, 3D photoacoustic microscopy, and compressed ultrafast photography (world’s fastest camera). Served as Editor-in-Chief of the Journal of Biomedical Optics. Received the Goodman Book Award, NIH Director’s Pioneer Award, OSA Mees Medal, IEEE Technical Achievement and Biomedical Engineering Awards, SPIE Chance Biomedical Optics Award, IPPA Senior Prize, OSA Feld Biophotonics Award, and an honorary doctorate from Lund University, Sweden. Inducted into the National Academy of Engineering.

**Seismo-medical tomography**
Monday 18 February 2019 • 1:20 PM - 2:20 PM

**Andreas Fichtner**
ETH Zurich (Switzerland)

Abstract: Rendering cancer diagnoses from biopsy slides involves challenging tasks for pathologists, such as detecting micro metastases in tissue biopsies, or distinguishing tumors from benign tissue that can look deceivingly similar. These tasks are typically very difficult for humans, and, consequently, over- and under-diagnoses are not uncommon, resulting in non-optimal treatment. Algorithmic approaches for pathology, on the other hand, face their own set of challenges in the form of gigapixel images, proprietary data formats, and low availability of digitized images let alone high quality labels. However, advances in deep learning, access to cloud based storage, and the recent FDA approval of the first whole slide image scanner for primary diagnosis now set the stage for a new era of digital pathology. This talk will discuss the potential of deep learning to improve the accuracy and availability of cancer diagnostics, and highlight some recent advances towards that goal.

Biography: **Andreas Fichtner** is Professor of Seismology and Wave Physics in the Department of Earth Sciences at ETH Zurich. His research is focused on the development of waveform inversion techniques, including a diverse range of aspects, such as numerical wave propagation through complex media, high-performance computing, large-scale data analysis, Bayesian inference and Monte Carlo methods, as well as effective medium theory. Though most applications are in seismic imaging for deep Earth structure, his group actively engages in technology transfer to medical imaging and material testing. Andreas Fichtner is the author of 3 books on applied mathematics and geophysics, and of around 70 research papers in various international journals. He received early career awards from the American Geophysical Union and from the International Union of Geodesy and Geophysics. In addition to ETH Zurich, he has been affiliated with LMU Munich, Utrecht University, Stanford University and the Australian National University.
Bringing transcranial MR-guided focused ultrasound into focus

Kim Butts-Pauly
Stanford Univ. (USA)

Abstract: Focused ultrasound can target tissue within the skull with grain-of-rice accuracy. It is being studied for movement disorders, blood-brain barrier opening for cancer therapy, and for non-invasive deep brain neuromodulation. Although at various points in the translation process, each of these exciting applications require image-guided transcranial focusing, focal spot imaging, and treatment evaluation.

Biography: Kim Butts Pauly is Professor at Stanford in the Departments of Radiology, Bioengineering, and Electrical Engineering. She is Division Chief of the Radiological Sciences Laboratory in the Department of Radiology. She is Secretary General of the International Society for Therapeutic Ultrasound. She is a fellow of the ISMRM, Distinguished Investigator of the Academy of Radiology Research, Society for Therapeutic Ultrasound. She is a fellow of the ISMRM, and a member of the American Institute for Medical and Biological Engineering (AIMBE)’s College of Fellows.

Christopher Filippi
North Shore-Long Island Jewish Health System (USA), Columbia Univ. (USA)

Biography: Dr. Christopher G. Filippi, “Risto”, is a Professor of Radiology and Vice Chairman of Biomedical Imaging and Translational Science at the Donald and Barbara Zucker School of Medicine of Hofstra/Northwell and an attending physician at Lenox Hill Hospital and Greenwich Village Healthplex. He is a graduate of Cornell University Medical College and completed training in diagnostic radiology at New York Hospital-Cornell and a 2-year neuroradiology fellowship at Yale University School of Medicine. Past President of the American Society of Functional Neuroradiology (ASFNR) and Eastern Neuroradiology Society (ENRS) and formerly the Director of MRI Research at the University of Vermont and Division Chief of Neuroradiology at Columbia University, his research interests include Artificial Intelligence (AI), DTI applications in pediatric neuroradiology, novel MR techniques (T1rho), and translational MR in pediatric and adult demyelinating disease and glioma. He has had extramural funding annually for the past 17 years, and he has more than 85 peer-reviewed publications and 125 presented/published abstracts at national and international meetings. Currently, he is the Deputy Editor of Artificial Intelligence for the American Journal of Neuroradiology (AJNR), Chairman of the ASNR Task Force on Artificial Intelligence, and member of the AI Working Group of the ASFNR.

Bernardino Romera-Paredes
Google DeepMind (UK)

Abstract: The U-net has become the predominant choice when facing any medical image segmentation task. This is due to its high performance in many different medical domains. In this talk, I will introduce the U-net, and I will present three projects from DeepMind Health Research that use the U-net to address different challenges. The first project, a collaboration with University College London Hospital, deals with the challenging task of the precise segmentation of radiosensitive head and neck anatomy in CT scans, an essential input for radiotherapy planning. The second project, together with Moorfields Eye Hospital, developed a system that analyses 3D OCT (optical coherence tomography) eye scans to provide referral decisions for patients. The performance was on par with world experts with over 20 years experience. Finally, I will focus on the third project, which deals with the segmentation of ambiguous images. This is of particular relevance in medical imaging where ambiguities can often not be resolved from the image context alone. We propose a combination of a U-net with a conditional variational autoencoder that is capable of efficiently producing an unlimited number of plausible segmentation map hypotheses for a given ambiguous image. We show that each hypothesis provides a globally consistent segmentation, and that the probabilities of these hypotheses are well calibrated.

Biography: Bernardino Romera-Paredes is a research scientist at DeepMind. He was a postdoctoral research fellow in the Torr Vision Group at the University of Oxford. Previously, he received his Ph.D. degree from University College London in 2014, supervised by Prof. Massimiliano Pontil and Prof. Nadia Berthouze, and also did an internship at Microsoft Research. He has published in top-tier machine-learning conferences such as in Conference on Neural Information Processing Systems (NIPS), International Conference on Machine Learning (ICML), and International Conference on Computer Vision (ICCV), as well as in journals, such as the Journal of Machine Learning Research (JMLR). His research focuses on structure prediction in computer vision, such as semantic and instance segmentation, and its application to the medical domain.
Visual adaptation and the perception of radiological images

Wednesday 20 February 2019 • 8:00 AM - 9:00 AM

Michael A. Webster
Univ. of Nevada, Reno (USA)

Abstract: The interpretation of medical images relies heavily on visual inspection by human observers. Many studies have explored how sensory and cognitive factors in visual processing influence how medical images are perceived and evaluated. But how do these images influence visual processing itself? The visual system is highly adaptable and constantly adjusting to changes in the visual environment. These adjustments recalibrate and optimize visual coding not only for simple properties of the world like the average light level, but also for complex features like the average blur or texture in a scene. Adaptation thus affects everything we see. The unique visual characteristics of radiological images suggest that they may hold the radiologist in unique states of adaptation. I will illustrate how this adaptation influences contrast sensitivity and the appearance of medical images. One proposed function of adaptation is to highlight novel information by “filtering out” the expected characteristics of scenes, and I will illustrate the implications of this by considering how adaptation may affect visual search for novel or suspicious features in medical images.

Biography: Michael Webster is Foundation Professor of Psychology at the University of Nevada, Reno. He received his PhD in 1988 from UC Berkeley and was a postdoctoral fellow at Cambridge University before joining the UNR faculty in 1994. His research is focused on color and form perception in human vision and how visual processing adapts to changes in the environment or the observer. He is the Director of UNR’s Center for Integrative Neuroscience (an NIH COBRE grant), and co-directs both the BS and PhD degree programs in Neuroscience.

Deep learning for inverse imaging problems: some recent approaches

Wednesday 20 February 2019 • 10:10 AM - 11:10 AM

Carola-Bibiane Schönlieb
Univ. of Cambridge (UK)

Abstract: In this talk we discuss the idea of data-driven regularisers for inverse imaging problems. We are in particular interested in the combination of model-based and purely data-driven image processing approaches. In this context we will make a journey from “shallow” learning for computing optimal parameters for variational regularisation models by bilevel optimization to the investigation of different approaches that use deep neural networks for solving inverse imaging problems. Alongside all approaches that are being discussed, their numerical solution and available solution guarantees will be stated.

Biography: Carola-Bibiane Schönlieb is Professor in Applied Mathematics at the Department of Applied Mathematics and Theoretical Physics (DAMTP), University of Cambridge. There, she is head of the Cambridge Image Analysis group, Director of the Cantab Capital Institute for Mathematics of Information, Co-Director of the EPSRC Centre for Mathematical and Statistical Analysis of Multimodal Clinical Imaging, and since 2011 a fellow of Jesus College Cambridge. Her current research interests focus on variational methods and partial differential equations for image analysis, image processing and inverse imaging problems. Her research has been acknowledged by scientific prizes, among them the LMS Whitehead Prize 2016, and by invitations to give plenary lectures at several renowned applied mathematics conferences, among them the SIAM conference on Imaging Science in 2014, the SIAM conference on Partial Differential Equations in 2015, the IMA Conference on Challenges of Big Data in 2016, the SIAM annual meeting in 2017 and the Applied Inverse Problems Conference in 2019.

In her research Carola is interested in the interaction of mathematical sciences and imaging. She studies non-smooth and possibly non-convex variational methods and nonlinear partial differential equations for image analysis and inverse imaging problems, among them image reconstruction and restoration, object segmentation, and dynamic image reconstruction and analysis such as fast flow imaging, object tracking and motion analysis in videos. Moreover, she works on computational methods for large-scale and high-dimensional problems appearing in, e.g. image classification and 3D and 4D imaging.

Pixels to diagnosis: image analysis for digital pathology

Wednesday 20 February 2019 • 1:20 PM - 2:20 PM

Metin Gurcan
Wake Forest Baptist Medical Ctr. (USA)

Abstract: Increased interest in medical imaging has resulted in development of a variety of image analysis systems. Many of these systems follow the ‘computer-aided diagnosis’ paradigm. In this paradigm, the main function of the image analysis system is to help medical professionals (e.g. radiologists, pathologists, dermatologists) in their decision-making, instead of making decisions on their behalf. If a system is designed to help medical professionals, its logic, development methodology and evaluation should be transparent to its users. In this talk, we will describe how to develop an image analysis system: how to translate medical knowledge into algorithms, how to supplement this knowledge with pattern recognition methods, and how to evaluate such systems with carefully designed reader studies with the participation of medical professionals of varying levels of experience.

Biography: Dr. Metin Gurcan is Director of Center for Biomedical Informatics and Professor of Internal Medicine, Pathology and Biomedical Engineering and Director of the Clinical Image Analysis Lab (http://tsi.wakehealth.edu/CIALab/) at Wake Forest School of Medicine. Previously, he was Professor of Biomedical Informatics and Pathology, Director of Division of Clinical and Translational Informatics at the Ohio State University. Dr. Gurcan received his BSc. and Ph.D. degrees in Electrical and Electronics Engineering from Bilkent University, Turkey and his MSc. Degree in Digital Systems Engineering from the University of Manchester Institute of Science and Technology, England. From 1999 to 2001, he was a postdoctoral research fellow in the Department of Radiology at the University of Michigan, Ann Arbor. Following his postdoctoral work, he worked as a senior researcher and a product director at a high-tech company, specializing in computer-aided detection and diagnosis of cancer from radiological images.

Dr. Gurcan is the author of over 200 peer-reviewed publications, book chapters and was awarded three patents for his inventions in medical image analysis. He is the recipient of several awards including the British Foreign and Commonwealth Organization Award, NCI caBIG Embodiment the Vision Award, NIH Exceptional, Unconventional Research Enabling Knowledge Acceleration (EUREKA) Award, Children’s Neuroblastoma Cancer Foundation Young Investigator Award, The OSU Cancer Center REAP Award, and Pelotonia Idea Award. As an internationally recognized researcher and educator, he is a senior member of IEEE, SPIE, and AMIA. He currently serves on the editorial boards of Journal of Pathology Informatics and Journal of Medical Imaging; and organizes the Pathology Informatics Histopathological Image Analysis (HIMA) workshop.
Special Events • Technical Events

Join your peers and colleagues in group discussions around focused technical topics, various workshops, live demos, and at the interactive poster sessions.

Sunday/Monday Poster Session
Monday 18 February 2019 • 5:30 PM - 7:00 PM

Poster authors are required to:
- Display the poster early on the first day of your session.
- Attend the Poster Session to answer questions.

See Poster Presentation Guidelines for additional information.

Poster presentations from the Physics of Medical Imaging; Image-Guided Procedures, Robotic Interventions, and Modeling; Imaging Informatics for Healthcare, Research, and Applications; and Ultrasonic Imaging and Tomography conferences will be included.

Author Set-Up Time: Sunday after 12:00 PM (noon)
In order to be fully considered for a Poster Award, it is recommended to have your poster up as soon as possible.

Posters should remain on display until the end of the Poster Session on Monday.

Poster Session and Reception: Monday from 5:30 to 7:00 PM
NOTE: Extended poster viewing until 9:00 PM on Sunday.
Poster award winners will be recognized and certificates distributed in the conference meeting rooms. Check conference schedules for times and locations. Ribbons will identify winning posters during the Poster Sessions.

TECHNICAL WORKSHOP
USCT Data Challenge 2019 and Panel Discussion
Sunday 17 February 2019 • 5:45 PM - 7:45 PM

WK 6 ULTRASONIC IMAGING AND TOMOGRAPHY
(CONFERENCE 10955)
MODERATOR:
Christian Boehm
ETH Zurich (Switzerland)

Ultrasound Computer Tomography (USCT) is an emerging technology mostly aimed at breast cancer imaging. To foster the exchange of knowledge and reproducible science, several research groups have joined forces to create a blind test with freely available synthetic USCT data. Using this database, we invite all participants to benchmark different imaging algorithms in terms of the quality of the reconstruction and computational efficiency. This will enable the USCT community to collect best practices and relevant background information on various imaging techniques. In this panel, we discuss the acquisition systems included in the data challenge, data formats and how to access them, and the evaluation criteria that will be applied to compare the results of the blind test.
Detector Innovations: From Concept to Product to Clinical Outcome
Sunday 17 February 2019 • 5:45 PM - 7:45 PM

WK 1 TECHNICAL WORKSHOP: PHYSICS OF MEDICAL IMAGING (CONFERENCE 10948)

Detector technology is advancing at a rapid pace, impacting the development of imaging systems and algorithms, and enabling new clinical applications. Leading experts will discuss the driving forces for innovative detector technology, the challenges of adopting new technology, and how to bridge the gap between research and the clinic. A series of Blue Sky talks will introduce exciting and novel detector technologies. A range of applications will be presented including interventional imaging, CT imaging, orthopedic imaging, photon counting detectors and imaging for radiation therapy. The workshop will also include a town hall discussion between the audience and expert speakers.

SPEAKERS:
Rebecca Fahrig, Siemens Healthineers (Germany) - “Driving forces for detector technology”
Andrew T. Kuhls-Gilchrist, Canon Medical Systems USA, Inc. (USA) - “Bridging research and clinic”
John M. Sabol, GE Healthcare (USA) - “Challenges of adopting new detector technology”
Ken Taguchi, Johns Hopkins Univ. (USA) - “Status update on photon counting”
Andrey Elagin, The Univ. of Chicago (USA) - Blue Sky
Peter D. Olcott, Reflexion Medical, Inc. (USA) - Blue Sky
Karim S. Karim, KA Imaging Inc. (Canada) - Blue Sky

The Visible Human Project at its 25th Year Anniversary
Sunday 17 February 2019 • 5:45 PM - 7:45 PM

WK 4 IMAGE-GUIDED PROCEDURES, ROBOTIC INTERVENTIONS, AND MODELING (CONFERENCE 10951)

The National Library of Medicine Visible Human Project (VHP) has created a publically available, anatomically detailed, 3D representations in the form of CT, MRI and cryo-section images of a human male and female body released in 1994 and 1995, respectively. By 1998, the Visible Human data sets had been licensed for use in more than 25 countries worldwide by close to 1000 research and industry groups focused on the development of tools and techniques for image processing and analysis, visualization, modeling and biomedical computing toward yielding new paradigms in teaching, simulation, and training, anatomical and physiological modeling, equipment design, surgical simulation, and simulation of diagnostic procedures. Many of these techniques and applications were disseminated as part of this very same SPIE conference on image-guided Procedures, Visualization and Display during the late 1990s and early 2000s. This 25 year anniversary workshop will serve as a tribute to this significant milestone in medical imaging, computing, visualization, simulation and display. The event will feature some of the scientists who pioneered this project more than two decades ago, and reflect on some of the image computing, visualization and display techniques that were quintessential to deciphering the imaging data and enabling the development of applications for multi-modality imaging manipulation and visualization for diagnostic and surgical simulation and training.

Visual Search in Medical Image Interpretation: Theory and Practice
Tuesday 19 February 2019 • 5:00 PM - 7:00 PM

WK 5 IMAGE PERCEPTION, OBSERVER PERFORMANCE, AND TECHNOLOGY ASSESSMENT (CONFERENCE 10952)

This workshop will discuss several aspects of visual search in medical image interpretation. We will have a panel of radiologists and cognitive psychologists. The radiologists will discuss how they read 2d and 3d images, how they teach their residents to read images, and how they perceived changes on their reading as they accrued expertise. The cognitive psychologists will debate how visual search and expertise are related, and how you can infer one from the other. In addition, we will show videos of radiologists and trainees reading 2D and 3D images and explaining what they are doing.

Understanding Brain Development using Connectomics
Tuesday 19 February 2019 • 5:00 PM - 7:00 PM

WK 2 IMAGE PROCESSING (CONFERENCE 10949)

Few advances in neuroscience could have as much impact as a precise global description of human brain connectivity (connectome) and its variability. Understanding this connectome in detail will provide insights into fundamental neural processes and intractable neuropsychiatric diseases. So far, the majority of efforts on mapping the human connectome has concentrated on the adult brain. This workshop will focus on recent efforts to extend connectomic approaches from early childhood down to early life.

This workshop will provide an overview of two complementary projects that aim to map the human connectome during brain development. The Developing Human Connectome Project (DHCP), aims to create a dynamic map of human brain connectivity from 20 to 44 weeks post-conceptional age, which will link together imaging, clinical, behavioural, and genetic information. The UNC/UMN Baby Connectome Project (BCP) will study the connectome in children from birth through five years of age, intended to provide a better understanding of how the brain develops from infancy through early childhood and the factors that contribute to healthy brain development.

The presentations about these two projects will highlight the data that will become available as part of these projects and discuss the challenges involved in acquiring and analysing the data. This will be followed by a panel discussion and time for questions from the audience.

ORGANIZERS:
Daan Christiaens, King’s College London (UK)
Slova Karolis, Univ. of Oxford (UK)
Wellli Lin, The Univ. of North Carolina at Chapel Hill (USA)
Daniel Rueckert, Imperial College London (UK)
Dinggang Shen, The Univ. of North Carolina at Chapel Hill (USA)
Special Events • Technical Events

WORKSHOP

Live Demonstrations
Tuesday 19 February 2019 • 5:00 PM - 7:00 PM

WK 3 COMPUTER-AIDED DIAGNOSIS (CONFERENCE 10950)

WORKSHOP CHAIRS
Horst Hahn, Fraunhofer MEVIS, (Germany)
Lubomir Hadjiiski, Univ. of Michigan Health System, (USA)

CALL FOR PARTICIPATION

The goal of this workshop is to provide a forum for systems and algorithms developers to show off their creations. The intent is for the audience to be inspired to conduct derivative research, for the demonstrators to receive feedback and find new collaborators, and for all to learn about the rapidly evolving field of medical imaging. The Live Demonstration Workshop invites participation from all of the conferences that comprise the SPIE Medical Imaging symposium. We encourage the CAD, Digital Pathology, Image Processing, Imaging Informatics, Image Perception, Physics, and all other conferences to participate.

This workshop features interactive demonstrations that are complementary to the topics of SPIE Medical Imaging. Workshop demonstrations include samples, systems, and software demonstrations that depict the implementation, operation, and utility of cutting-edge as well as mature research. Having an accepted SPIE Medical Imaging paper is not required for giving a Live Demonstration; however, authors of SPIE Medical Imaging papers are encouraged to submit demonstrations that are complementary to their oral and poster presentations.

The session will include a Certificate of Merit Award presented to one demonstration considered to be of exceptional interest. We invite all workshop visitors to vote for three of their favorite demonstrations, with the final winner chosen from the top scorers by a group of appointed judges.

IMPORTANT DATES
17 January 2019: Deadline for submission
23 January 2019: Notification of acceptance
30 January 2019: Deadline for two-slide summary

JOIN THE WORKSHOP
If you would like to demonstrate at Workshop, please send an email before the submission deadline to Horst Hahn and Lubomir Hadjiiski: horst.hahn@mevis.fraunhofer.de; lhadjisk@umich.edu

In the e-mail, supply the following information:
• Title of the demo
• Names and affiliations (name of institute, city, country) of the demonstrators
• Short description of the demo, one paragraph minimum. Make sure it clearly describes the technology and application area of the demo. You may cite or include a paper describing the demo.
• Optionally, describe the public data used in the development or evaluation of the system. Include a link to the data or to a page that describes how to access that data.
• Optionally, include a link to a video showing the system in action.

NOTES
Please note the following rules and requirements:
The accepted demonstrations will be listed online in the workshop program.
If there are more proposals than presentation slots in the workshop, the organizers will accept teams for demonstrations based on the quality of the provided description, while also striving to select a representative mix of applications.
Each team is responsible for bringing their own equipment. The organization will provide a table and power supply for each demonstration. Demos should be done on a single laptop. If the demo requires an external monitor this is allowed, but there should be no more than one monitor of 25” maximum size.
Participation in the workshop is free of charge, but all demonstrators (those present during the workshop) must be registered to attend the SPIE Medical Imaging Conference.

Teams from academia (universities, university medical centers, research organizations), and from industry are invited to participate in this year’s workshop. Demonstrations from industry should be scientific and not commercial in nature; demonstration of research prototypes is highly encouraged.

All participating teams will need to provide one or two slides describing their system shortly before the conference from which the opening presentation will be compiled (two-slide summary).
After you submit a description, you will receive a confirmation by email. Notification of acceptance or rejection will follow on the date given above.

CHALLENGE

SPIE-AAPM-NCI BreastPathQ 2019: Cancer Cellularity Challenge
Wednesday 20 February 2019 • 3:30 PM - 5:30 PM

SPIE, along with the American Association of Physicians in Medicine (AAPM), and the National Cancer Institute (NCI), will conduct a BreastPathQ Grand Challenge on the development of quantitative biomarkers for the determination of cancer cellularity from whole slide images (WSI) of breast cancer hematoxylin and eosin (H&E) stained pathological slides. This challenge will invite participants to develop AI/ML algorithms to automatically assess cellularity in pathology whole slide image patches. Cellularity will be assessed as both a score and as a categorical classification (4 categories: 0 (normal), 1–30 (low cellularity), 31–70 (medium cellularity), and 71–100% (high cellularity)). As part of the 2019 SPIE Medical Imaging Conference, the BreastPathQ Challenge provides a unique opportunity for participants to compare their algorithms with those of others from academia, industry, and government in a structured, direct way on data sets of digital pathology slides.

A joint Computer-Aided Diagnosis (CAD) and Digital Pathology session at the 2019 SPIE Medical Imaging Conference will focus on describing the BreastPathQ Challenge and present the challenge results. In addition, the two top-performing teams for the two phases of the challenge (Phase 1: determining the cellularity category, Phase 2: determining the continuous percent cellularity score) will present their methods and performance results. Challenge participants are encouraged to submit their work for peer review to the SPIE Medical Imaging scientific journal, Journal of Medical Imaging.

Special Events • Social and Networking Events

Join your colleagues at various events, including the Student Dessert with the Experts, and Women’s Networking Lunch—events not to be missed!

Tuesday/Wednesday Poster Session
Wednesday 20 February 2019 • 5:30 PM - 7:00 PM
Two poster sessions are scheduled. See Poster Presentation Guidelines for additional information.

Poster authors are required to:
• Display the poster early on the first day of your session
• Attend the Poster Session to answer questions.
See Poster Presentation Guidelines for additional information.

Poster presentations from the Image Processing; Computer-Aided Diagnosis; Image Perception, Observer Performance, and Technology Assessment; Biomedical Applications in Molecular, Structural, and Functional Imaging; and Digital Pathology conferences will be included.

Author Set-Up Time: Tuesday after 9:30 AM
In order to be fully considered for a Poster Award, it is recommended to have your poster up as soon as possible.
Posters should remain on display until the end of the Poster Session on Wednesday.

Poster Session and Reception: Wednesday from 5:30 to 7:00 PM
NOTE: Extended poster viewing until 9:00 PM on Tuesday.
Poster award winners will be recognized and certificates distributed in the conference meeting rooms. Check conference schedules for times and locations. Ribbons will identify winning posters during the Poster Sessions.

Women’s Networking Luncheon
Monday 18 February 2019 • 12:10 PM - 1:20 PM
Lunch ticket required. Sign up at registration before Monday morning coffee break.
Join other women in the field for informal discussions and networking during the scheduled lunch on Monday. Welcome and opening remarks by Dr. Georgia Tourassi.

Georgia Tourassi is the founding Director of the Health Data Sciences Institute and Group Leader of Biomedical Sciences, Engineering and Computing at the Oak Ridge National Laboratory (ORNL). Concurrently, she holds appointments as an adjunct Professor of Radiology at Duke University and the University of Tennessee and as a joint UT-ORNL Professor of Mechanical, Aerospace, and Biomedical Engineering at the University of Tennessee at Knoxville.

Dessert with the Experts - A Student Networking Event
Wednesday 20 February 2019 • 6:30 PM - 7:30 PM
Open to student conference attendees. First come, first served.
Enjoy a tasty dessert and casual atmosphere while networking with some of the best and brightest minds in medical imaging. Exchange ideas, share experiences, and make valuable contacts at this complimentary student event.
Special Events • Industry Event

WORKSHOP

Current Trends in Pre-Clinical Photoacoustic Imaging of Small Animals
Tuesday 19 February 2019 • 8:30 AM - 12:30 PM

Photoacoustic tomography is an emerging biomedical imaging modality combining molecular sensitivity of optical imaging with the resolution of ultrasound. The purpose of this workshop is to present emerging photoacoustic technologies and related scientific equipment/instrumentation being used to further the advancement of pre-clinical small animal imaging.

8:30 AM - 9:05 AM
Photoacoustic Tomography: Deep Tissue Imaging by Ultrasonically Beating Optical Diffusion
Lihong Wang, California Institute of Technology (USA)

9:05 AM - 9:40 AM
Photoacoustic Fluorescence Tomography (PAFT) for Small Animal Preclinical Imaging
Sergey Ermilov, PhotoSound Technologies (USA)

9:40 AM - 10:10 AM - Coffee Break

10:10 AM - 10:35 AM
Modern Image Reconstruction Approaches for 3D Photoacoustic Computed Tomography
Mark Anastasio, Washington Univ. in St. Louis (USA)

10:35 AM - 11:00 AM
Spectral Photoacoustic Imaging of Placental Function
Carolyn Bayer, Tulane Univ. (USA)

11:00 AM - 11:25 AM
Applications of Photoacoustic Imaging in Enhanced Fetal and Maternal Care
Mohammad Mehrmohammadi, Wayne State Univ. (USA)

11:25 AM - 11:50 AM
Preclinical Development of Quantitative Photoacoustic Imaging for Improved Cancer Diagnostics and Therapy Monitoring
Richard Bouchard, PhD, MD Anderson Ctr. (USA)

11:50 AM - 12:10 PM
Choosing the Right Laser Technology for Photoacoustic Imaging
Mark Little, PhotoSound Technologies (USA)

SPONSORED BY

PhotoSound
Special Events • Award Events

2019 Poster Award Information
Monday 18 February 2019 • 8:00 AM - 8:30 AM

POSTER AWARDS IN CONFERENCE ROOMS
Check the conference schedule for exact times.

RFW AWARD FINALISTS:
Robert F. Wagner (RFW) Award finalists will be recognized and certificates distributed in the conference meeting rooms. See conference schedules for times and locations.

POSTER AWARDS:
Each conference will recognize selected poster presentations of exceptional quality at either the Cum Laude or Honorable Mention level. Winners will be chosen by members of conference review committees.

The winning posters will be identified during the receptions with award ribbons. Winners will be recognized and certificates distributed in the conference meeting rooms. See conference schedules for times and locations.

In addition, Cum Laude poster award recipients will be recognized in the Proceedings of SPIE volumes and the following year’s Call for Papers.

RECOGNITION LEVELS:
Each conference will recognize 1 selected poster at the Cum Laude level and 1 selected poster at the Honorable Mention level for the quality of work presented as well as the presentation.

BASIS FOR SELECTION:
Work should be of a standard of excellence as judged by the quality and quantity of results presented. It should include results that are both significant and new to the field of study. Conclusions should be well supported by the results, and relevant references should be cited.

Presentation should be well organized, clear, and concise. It should be self-contained, giving adequate background, concise results, and relevant references. Graphic design will be considered only to the extent that it contributes to the clarity of presentation.

A conference may give preference to first authors who are students or who are within five years of their terminal degrees.

Robert F. Wagner All-Conference Best Student Paper Award
Monday 18 February 2019 • 4:15 PM - 4:30 PM

The Robert F. Wagner All Conference Best Student Paper Award (established 2014) is an acknowledgement of his many important contributions to the Medical Imaging meeting and his many important advances in the field of medical imaging.

CO-SPONSORED BY:

Deadline for full conference manuscript and academic advisor letter is 12 November 2018. A first place winner and runner up will be recognized with a cash prize ($1,000 and $500 respectively) and a certificate during the Plenary Session at the meeting.

Robert F. Wagner Award Finalists will be recognized with certificates in their respective conference meeting rooms during the Awards Sessions. See conference schedules for times and locations.

ELIGIBILITY REQUIREMENTS
Applicant must:
• be a student without a doctoral degree
• be the first author of a paper in the current program
• be selected by the Review Committee.

TO APPLY
Submit the following by 12 November 2018. Late submissions will not be accepted:
• Full manuscript formatted according to manuscript guidelines via the SPIE Submission System
• Include “RFW Award” in Step 1 of the SPIE Submission System.
• Academic advisor letter stating that the principal contribution to the work described was made by the student. Email to the Conference Programs Coordinator (LillianD@spie.org)
• Include “RFW Award” and paper number in the subject line of your email.
Special Events • Award Events

Image-Guided Procedures, Robotic Interventions, and Modeling Awards
(CONFERENCE 10951)

Tuesday 19 February 2019 • 3:00 PM - 3:05 PM

YOUNG SCIENTIST AWARD

This award is specific to papers in the Image-Guided Procedures, Robotic Interventions, and Modeling conference 10951. The Young Scientist Award is a prize awarded to the first authors of high quality papers within the Image-Guided Procedures, Robotic Interventions, and Modeling conference.

SPONSORED BY:

Deadline for full conference manuscript and Letter of Support is 12 November 2018. The winner and runner up will be notified in late January and presented with their awards at the conference.

ELIGIBILITY REQUIREMENTS

Applicant must:
• be the first author of a paper in the current program
• and an early career scientist
• submit no later than 12 November 2018.

A Letter of Support from the author’s supervisor is required. Submitted manuscripts will be peer reviewed and judged both on their scientific merit and clinical relevance.

TO APPLY

Submit the following by 12 November 2018.
Late submissions will not be accepted:
• Full manuscript formatted according to manuscript guidelines via the SPIE Submission System
• Include “Young Scientist” in Step 1 of the SPIE Submission System
• Letter of Support from author’s supervisor. Email to the Conference Programs Coordinator (LillianD@spie.org)
• Include “Young Scientist Award” and paper number in the subject line of your email.

Image-Guided Procedures Student Paper Award
(CONFERENCE 10951)

The Image-guided Procedures, Robotic Interventions and Modeling conference is featuring a new paper award specifically dedicated to recognize outstanding papers in the area of surgical robotics and related topics. If you are an undergraduate or graduate student and are a lead author on a paper focused on robot-assisted interventions or related applications, you are eligible to submit your paper.

SPONSORED BY:

Deadline for full conference manuscript and Endorsement Letter is 12 November 2018. The winner and runner up will be notified in late January and presented with their awards at the conference.

ELIGIBILITY REQUIREMENTS

Applicant must:
• be the first author of a paper in the current program
• and an undergraduate or graduate student
• submit no later than 12 November 2018.

An endorsement letter confirming student status from the author’s advisor is required. Submitted manuscripts will be peer reviewed and judged both on their scientific merit and clinical relevance.

TO APPLY

Submit the following by 12 November 2018.
Late submissions will not be accepted:
• Full manuscript formatted according to manuscript guidelines via the SPIE Submission System
• Include “Image Guided” in Step 1 of the SPIE Submission System
• Endorsement letter confirming student status from author’s supervisor. Email to the Conference Programs Coordinator LillianD@spie.org
• Include “Image Guided Award” and paper number in the subject line of your email.

The award winners will be recognized in the conference room on Tuesday at 3:00 PM.

Poster Presentation Awards

SPONSORED BY:

NDI

The Image-Guided Procedures, Robotic Interventions, and Modeling conference will offer cash prizes as part of the poster presentation awards. Poster presentations must be displayed early on the first day of the Sunday/Monday poster session to enter the competition. The space will be available to display posters beginning at noon on Sunday. Award announcements will take place in the conference room on Tuesday at 3:00pm.

Physics of Medical Imaging Student Paper and Poster Awards

Wednesday 20 February 2019

Time: 3:00 PM - 3:05 PM

(CONFERENCE 10948)

This award is specific to papers in the Physics of Medical Imaging conference 10948.

The student paper award is a prize awarded to the first authors of high quality papers within the Physics of Medical Imaging conference.

SPONSORED BY:

GE Healthcare

Deadline for full conference manuscript and academic advisor letter is 12 November 2018. The winner and runner up will be notified in late January and presented with their awards at the conference.

ELIGIBILITY REQUIREMENTS

Applicant must:
• be a student without a doctoral degree
• the first author of a paper in the current program
• submit no later than 12 November 2018.

A letter from the author’s academic advisor attesting to their status as a student is required. Submitted manuscripts will be peer reviewed and judged both on their scientific merit and clinical relevance.

TO APPLY

Submit the following by 12 November 2018.
Late submissions will not be accepted:
• Full manuscript formatted according to manuscript guidelines via the SPIE Submission System
• Include “Physics” in Step 1 of the SPIE Submission System
• Academic Advisor Letter. Email to the Conference Programs Coordinator (LillianD@spie.org)
• Include “Physics Student Paper Award” and paper number in the subject line of your email.

The award winners will be recognized in the conference room at the scheduled award presentation time.
Physics of Medical Imaging Poster Presentation Awards

The Physics of Medical Imaging conference will offer cash prizes as part of the poster presentation awards. Poster presentations must be displayed early on the first day of the Sunday/Monday poster session to enter the competition. The space will be available to display posters beginning at noon on Sunday. Award announcements will take place in the conference room at the scheduled award presentation time.

Image Processing Student Paper and Poster Awards

Thursday 21 February 2019 • 12:10 PM - 12:15 PM
(CONFERENCES 10949)

This award is specific to papers in the Image Processing conference 10949.

The student paper award is a prize awarded to the first authors of high quality papers within the Image Processing conference.

Deadline for full conference manuscript is 12 November 2018. The winner and runner up will be notified in late January and presented with their awards at the conference.

ELIGIBILITY REQUIREMENTS

Applicant must:

• be a full-time student
• the first author of a paper in the current program
• submit no later than 12 November 2018.

Submitted manuscripts will be peer reviewed and judged both on their scientific merit and clinical relevance.

TO APPLY

Submit the following by 12 November 2018.
Late submissions will not be accepted:

• Full manuscript formatted according to manuscript guidelines via the SPIE Submission System
• Include “Image Processing” in Step 1 of the SPIE Submission System

The award winners will be recognized in the conference room at the scheduled award presentation time.

Image Processing Poster Presentation Award

The Image Processing conference will offer one cash prize as part of the poster presentation awards. Poster presentations must be displayed early on the first day of the Tuesday/Wednesday poster session to enter the competition. The space will be available to display posters beginning at noon on Tuesday. Award announcements will take place in the conference room at the scheduled award presentation time.
# Daily Events Schedule

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<tr>
<th>SATURDAY 16 February</th>
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<tr>
<td>SC086 Fundamentals of Medical Image Processing and Analysis (Deserno) 8:30 AM - 5:30 PM, p.67</td>
<td>Conference 10948: Physics of Medical Imaging Chairs: Taly Gilat Schmidt, Marquette Univ. (USA); Guang-Hong Chen, Univ. of Wisconsin-Madison (USA) and Co-Chair: Hilde Bosmans, Katholieke Univ. Leuven (Belgium)</td>
<td>Conference 10949: Image Processing Chairs: Elsa D. Angelini, Imperial College London (UK); Télécom ParisTech (France) and Bennett A. Landman, Vanderbilt Univ. (USA)</td>
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<td>Register by 1 February 2019 and save</td>
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<tr>
<td>SC1235 Introduction to Medical Image Analysis using Convolutional Neural Networks (Wenzel, Meine) 5:30 AM - 5:30 PM, p.68</td>
<td>Conference 10950: Computer-Aided Diagnosis Chairs: Kensaku Mori, Nagoya Univ. (Japan) and Horst K. Hahn, Fraunhofer MEVIS (Germany)</td>
<td>Conference 10951: Image-Guided Procedures, Robotic Interventions, and Modeling Chairs: Baowei Fei, The Univ. of Texas at Dallas (USA), The Univ. of Texas Southwestern Medical Ctr. (USA) and Cristian A. Linte, Rochester Institute of Technology (USA)</td>
<td>Conference 10952: Image Perception, Observer Performance, and Technology Assessment Chairs: Robert M. Nishikawa, Univ. of Pittsburgh (USA) and Frank W. Samuelson, U.S. Food and Drug Administration (USA)</td>
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<td>Conference 10953: Biomedical Applications in Molecular, Structural, and Functional Imaging Chairs: Barjor Gimi, Cooper Medical School, Rowan Univ. (USA) and Andrezej Krol, SUNY Upstate Medical Univ. (USA)</td>
<td>Conference 10954: Imaging Informatics for Healthcare, Research, and Applications Chairs: Po-Hao Chen, Cleveland Clinic (USA) and Peter R. Bak, McMaster Univ. (Canada)</td>
<td>Conference 10955: Ultrasonic Imaging and Tomography Chairs: Brett C. Byram, Vanderbilt Univ. (USA) and Nicole V. Ruttor, Karlsruher Institut für Technologie (Germany)</td>
<td>Conference 10956: Digital Pathology Chairs: John E. Tomaszewski, Univ. at Buffalo (USA) and Aaron D. Ward, The Univ. of Western Ontario (Canada)</td>
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<td>SC1236 Adversarial Networks: NEW From Architecture to Practical Training (Wenzel, Meine) 8:30 am to 12:30 pm, p.70</td>
<td>KEYNOTE PRESENTATION: World’s deepest-penetration and fastest optical cameras: photoacoustic tomography and compressed ultrafast photography • Conf.10948, Lihong Wang, 10:10 AM - 10:50 AM, p.6</td>
<td>WORKSHOP: Current trends in pre-clinical photoacoustic imaging of small animals, 8:30 AM - 12:30 PM, p.14</td>
<td>KEYNOTE PRESENTATION: Visual adaptation and the perception of radiological images • Conf.10952, Michael A. Webster, 8:00 AM - 9:00 AM, p.8</td>
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<td>KEYNOTE PRESENTATION: Al research and applications in radiology: experience in China • Conf.10954, Shiyuan Liu, 1:20 - 2:00 PM, p.6</td>
<td>KEYNOTE PRESENTATION: Bringing transcranial MR-guided focused ultrasound into focus • Conf.10951, Kim Butts-Pauly, 8:40 AM - 9:40 AM, p.7</td>
<td>KEYNOTE PRESENTATION: Deep learning for inverse imaging problems: some recent approaches • Conf.10949, Carola-Bibiane Schönlieb, 10:10 AM - 11:10 AM, p.8</td>
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<tr>
<td>Sunday/Monday Poster Author Set-Up: Sunday after 12:00 PM (NOON), p.10</td>
<td>Best Student Paper Awards Announcement, 4:15 PM SPIE Harrison H. Barrett Award in Medical Imaging, 4:20 PM PLENARY PRESENTATION: Dr. Thomas J. Fuchs, 4:30 PM, p.5</td>
<td>Tuesday/Wednesday Poster Author Set-Up: Tuesday after 9:30 AM, p.13</td>
<td>KEYNOTE PRESENTATION: Pixels to diagnosis: image analysis for digital pathology • Conf.10956, Melin Gurcan, 1:20 PM - 2:20 PM, p.8</td>
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<td></td>
<td>Women’s Networking Lunch, 12:10 PM - 1:20 PM, p.13</td>
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<td>Tuesday/Wednesday Poster Session/Reception, 5:30 - 7:00 PM, p.11</td>
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<td>SC1183 Modern Diagnostic X-ray Sources (Behling) 1:30 PM - 5:30 PM, p.68</td>
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<td>SC1239 Virtual Clinical Trials: An In-depth Tutorial (Maidment, Bakic, Barufaldi) 8:30 am to 12:30 pm, p.69</td>
<td>Physics of Medical Imaging Student Paper and Poster Awards • Conf. 10948, 3:00 PM - 3:05 PM, p.16</td>
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<td>SC1129 Photon Counting CT (Danielsson, Grönberg) 1:30 PM - 5:30 PM, p.67</td>
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<td>SC1236 SimpleITK Jupyter Notebooks: Biomedical Image Analysis in Python (Johnson, LoweKamp, Yaniv) 1:30 PM - 5:30 PM, p.69</td>
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<td>WORKSHOP (CONF. 10955) USCT data challenge 2019, 5:45 PM - 7:45 PM, p.10</td>
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<td>WORKSHOP (CONF. 10948) Detector innovations: from concept to product to clinical outcome, 5:45 PM - 7:45 PM, p.11</td>
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<td>WORKSHOP (CONF. 10951) The visible human project at its 25th year anniversary, 5:45 PM - 7:45 PM, p.11</td>
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**Expand Your Network with SPIE Social Media.**

![SPIE Social Media Icons](Image)

#SPIEMedicalImaging

**THIS PDF PROGRAM IS CURRENT AS OF 15 OCTOBER 2018.** Find complete, up-to-date information and create your personalized schedule at [spie.org/mi19program](http://spie.org/mi19program)
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### Daily Conference Session Schedule

#### TUESDAY 19 FEBRUARY

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<tr>
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<td>SESSION 8 Detector Physics II</td>
<td>SESSION 1 Image Reconstruction and Synthesis</td>
<td>SESSION 8 Lung II</td>
<td>SESSION 8 Keynote and Novel MRI-Guided Technologies</td>
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<td>SESSION 2 Deep Learning: Segmentation</td>
<td>SESSION 9 Radiomics I</td>
<td>SESSION 9 Optical Imaging and Guidance Technologies</td>
<td>SESSION 2 Keynote and Optical/ Vascular I</td>
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<td>SESSION 10 Image Registration and Challenge</td>
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<td>SESSION 4 Brain: Shapes and Biomarkers</td>
<td>SESSION 11 Lung III</td>
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- **SESSION 8 Detector Physics II**
  - Wei Zhao, Shiva Abbaszadeh
- **SESSION 1 Image Reconstruction and Synthesis**
  - Jerry L. Prince, Marius Staring
- **SESSION 8 Lung II**
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- **SESSION 3 Image Enhancement and Modeling**
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- **SESSION 10 Image Registration and Challenge**
  - Michael I. Miga, David J. Hawkes
- **SESSION 3 Neurological Imaging I**
  - Axel Wismüller M.D., Vikram D. Kodibagkar
- **SESSION 11 Cone Beam CT**
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- **SESSION 11 Lung III**
- **SESSION 11 Image Segmentation and Classification**
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- **SESSION 4 Pulmonary**
  - Andrzej Krol, Armando Manduca

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**Location:**

- Town & Country
- San Diego
- Golden West
- Golden Ballroom
- Pacific Salon 2
- Pacific Salon 2
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| SESSION 5 | Deep Learning Applications Maciej A. Mazurowski, Pontus Timberg, p.60
| SESSION 9 | Bone Andrzej Krol, Baohong Yuan, p.60

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9:40 AM - 9:45 AM

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| SESSION 6 | Observer Performance Elizabeth A. Krupinski, Stephen L. Hillis, p.61
| SESSION 10 | MRI and fMRI Amir A. Amini, Vikram D. Kodibagkar, p.61

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| AWARD ANNOUNCEMENTS | |

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| SESSION 11 | Deep Learning: Lesions and Pathologies Martin A. Styner, Kenji Suzuki M.D., p.62
| SESSION 7 | Observer Performance in Breast Imaging Claudia R. Mello-Thoms, Yan Chen, p.62
| SESSION 11 | Novel Imaging Techniques and Applications II Baohong Yuan, Ciprian N. Ionesa, p.62

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| AWARD ANNOUNCEMENTS | |

3:00 PM - 3:30 PM

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3:30 PM - 5:30 PM

| SESSION 12 | OCT and Microscopy Lin Shi, Mads Nielsen, p.63
| SESSION 11 | Novel Imaging Techniques and Applications II Baohong Yuan, Ciprian N. Ionesa, p.62
| SESSION 6 | Segmentation and Feature Extraction, p.63

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Conference Chairs: Barjor Gimi, Cooper Medical School, Rowan Univ. (USA); Andrzej Krol, SUNY Upstate Medical Univ. (USA)

**Imaging Informatics for Healthcare, Research, and Applications**

Conference Chairs: Po-Hao Chen, Cleveland Clinic (USA); Peter R. Bak, McMaster Univ. (Canada)

**Ultrasonic Imaging and Tomography**

Conference Chairs: Brett C. Byram, Vanderbilt Univ. (USA); Nicole V. Ruiller, Karlsruhe Institut für Technologie (Germany)

**Digital Pathology**

Conference Chairs: John E. Tomaszewski, Univ. at Buffalo (USA); Aaron D. Ward, The Univ. of Western Ontario (Canada)

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**TECHNICAL CONFERENCES**

**CONFERENCE 10953**

ROOM: PACIFIC SALON 2

Tuesday - Thursday 19–21 Feb. 2019

Proceedings of SPIE Vol. 10953

**CONFERENCE 10954**

ROOM: SAN DIEGO

Sunday - Monday 17–18 Feb. 2019

Proceedings of SPIE Vol. 10954

**CONFERENCE 10955**

ROOM: PACIFIC SALON 2

Sunday - Monday 17–18 Feb. 2019

Proceedings of SPIE Vol. 10955

**CONFERENCE 10956**

ROOM: GOLDEN BALLROOM

Wednesday - Thursday 20–21 Feb. 2019

Proceedings of SPIE Vol. 10956

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**Poster Sessions**

Two poster sessions are scheduled. See Poster Presentation Guidelines for additional information.

Poster authors are required to:
- Display the poster early on the first day of your session
- Attend the Poster Session to answer questions

Poster award winners will be recognized and certificates distributed in the conference meeting rooms. Check conference schedules for times and locations. Ribbons will identify winning posters during the Poster Sessions.

**SUNDAY/MONDAY POSTER SESSION**, see p. 38–43

Location:
Poster presentations from the Image Processing, Image Perception, Observer Performance, and Technology Assessment; Biomedical Applications in Molecular, Structural, and Functional Imaging; and Digital Pathology conferences will be included.

**Author Set-Up Time:**
Saturday after 12:00 PM (NOON)

Posters should remain on display until the end of the Poster Session on Monday.

**Poster Session and Reception:**
Monday from 5:30 TO 7:00 PM

**Tuesday/Wednesday Poster Session**, see p. 54–58

Location:
Poster presentations from the Physics of Medical Imaging, Computer-Aided Diagnosis; Image-guided Procedures, Robotic Interventions, and Modeling; Imaging Informatics for Healthcare, Research, and Applications; and Ultrasonic Imaging and Tomography conferences will be included.

**Author Set-Up Time:**
Tuesday after 9:30 am

Posters should remain on display until the end of the Poster Session on Wednesday.

**Poster Session and Reception:**
Wednesday from 5:30 TO 7:00 PM

**NOTE:** Extended poster viewing until 9:00 PM on Sunday.
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<td>ROOM: TOWN &amp; COUNTRY</td>
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<td>ROOM: SAN DIEGO</td>
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**SUNDAY 17 FEBRUARY**

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<th>SUNDAY/MONDAY POSTER VIEWING</th>
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CONFERENCE 10948
ROOM: TOWN & COUNTRY
Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10948

SESSION 3
ROOM: TOWN & COUNTRY  SUN 1:20 TO 3:00 PM
Detector Physics I
Session Chairs: Karim S. S. Karim, Univ. of Waterloo (Canada); Arundhuti Ganguly, Varex Imaging Corp. (USA)
1:20 pm: A simple Monte Carlo model for the statistics of photon counting detectors, Karl Stenstroter, Martin Hupfer, Niko Köster, Siemens Healthineers (Germany) .......... [10948-12]
1:40 pm: Quantitative comparison of Ni-Def and FPD zoom modes in an innovative detector using Relative Object Detectability (ROD) metrics, Jordan M. Krebs, Alox Shankar, Swethadi Vasam Settur Nagesh, Daniel R. Bednarz, Steven Rudin, Canon Stroke and Vascular Research Ctr., FPZ zoom modes in an innovative detector using Quantitative comparison of Hi-Def and Hsiao-Ming Lu, Harald Paganetti, Massachusetts Ethan J. Cascio, Georges El Fakhri, Kira Grogg, Popecki, Michael E. Stochaj, Incom, Inc. (USA); Foley, Alexey Lyashenko, Michael J. Minot, Mark A. applications (USA) .................... [10948-14]
2:00 pm: Optimizing overall system performance based on detector performance and tuning per the required imaging task, Isisias D. Job; Arun Ganguly, Rick Colbeth, Carol Tognin, Jin Zhang, Varex Imaging Corp. (USA) .......... [10948-14]
2:40 pm: First results developing time-of-flight proton radiography for proton therapy applications, William A. Vorstelt, Bernard W. Adams, Melvin Aviles, Till Cremer, Michael R. Foley, Alexey Lyashenko, Michael J. Minot, Mark A. Popecki, Michael E. Stochaj, incom, Inc. (USA); Ethan J. Cascio, Georges El Fakhri, Kira Grogg, Isisias D. Job; Arun Ganguly, Rick Colbeth, Carol Tognin, Jin Zhang, Varex Imaging Corp. (USA) .......... [10948-14]

CONFERENCE 10950
ROOM: GOLDEN WEST
Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10950

SESSION 3
ROOM: GOLDEN WEST  SUN 1:20 TO 3:00 PM
Breast II
1:20 pm: Response monitoring of breast cancer on DCE-MRI using convolutional neural network-generated seed points and constrained volume growing, Bas H. van der Velden, Bob D. de Vos, Univ. Medical Ctr. Utrecht (Netherlands); Claudette E. Loo, The Netherlands Cancer Institute-antoni van Leeuwenhoek Hospital (Netherlands); Hugo J. Kuifj, Ivana Ilgum, Kenneth G. A. Ghiulhius, Univ. Medical Ctr. Utrecht (Netherlands) .......... [10950-12]
1:40 pm: Multiview mammographic mass detection based on a single shot detection system, Yinhao Ren, Rui Hou, Carl E. Ravin Advanced Imaging Labs, (USA) and Duke Univ. (USA); Dehan Kong, Beijing Institute of Technology (China); Yue Geng, Tsinghua Univ. (China); Lara J. Grimm, Jeffrey R. Marks, Duke Univ. School of Medicine (USA); Joseph Y. Lu, Carl E. Ravin Advanced Imaging Labs, (USA) .......... [10950-12]
2:00 pm: A deep learning method for volumetric breast density estimation from processed full field digital mammograms, Dorieil Vanegas Camargo, Mahlet Birhanu, Univ. of Girona (Spain); Nicos Karsmeijer, Albert Gubem-Merita, Michel Kallenberg, ScreenPoint Medical (Netherlands) .......... [10950-12]
2:20 pm: Breast density follow-up decision support system using deep convolutional models, Sun Young Park, Dustin Sargent, IBM Watson Health (USA) .......... [10950-15]
2:40 pm: DCE-MRI based analysis of intratumor heterogeneity by decomposing method for prediction of HER2 status in breast cancer, Peng Zhang, Ming Fan, Yuanzhe Li, Hangzhou Dianzi Univ. (China); Maosheng Xu, Zhejiang Provincial Hospital of TCM (China); Lihua Li, Hangzhou Dianzi Univ. (China) .......... [10950-16]
Coffee Break ............. Sun 3:00 pm to 3:30 pm

CONFERENCE 10951
ROOM: CALIFORNIA
Sunday - Tuesday 17–19 Feb. 2019
Proceedings of SPIE Vol. 10952

SESSION 3
ROOM: CALIFORNIA  SUN 1:20 TO 3:00 PM
Multimodality Imaging and Modeling for Cardiac Applications
Session Chairs: Maryam E. Rettmann, Mayo Clinic (USA); Ivo Wolf, Hochschule Mannheim (Germany)
1:20 pm: Quantitative assessment of the relationship between myocardial lesion formation detected by delayed contrast-enhanced magnetic resonance imaging and proton beam planning dose for treatment of ventricular tachycardia, Maryam E. Rettmann, Atsushi Suzuki, Amanda Deisher, Stephan Hohnem, Hiroki Konishi, Songyun Wang, Jon Kruse, Laura Newman, Kay Parker, Michael Hermann M.D., Douglas Packer, Mayo Clinic (USA) .......... [10951-12]
1:40 pm: LV systolic p-cloud model to quantify accuracy of CT derived regional strain (SQUEEZ), Ashish Manohar, Gabrielle Colvert, Andrew Schultsch, Francisco Confojich, Elliot R. McVeigh, Univ. of California, San Diego (USA) .......... [10951-14]
2:00 pm: Designing lightweight deep learning models for echocardiography view classification, Hooman Vassei, Zibao Liao, Amir Hoosein Abdi, The Univ. of British Columbia (Canada); Delaram Behnam, The Univ. of British Columbia (Canada); Hany Giris, Vancouver Coastal Health (Canada); Christina Luong, Vancouver Cancer Centre Health (Canada); Fatemeh Taheri, Deizaki, Neeraj Dhungel, Robert Rohling, The Univ. of British Columbia (Canada); Ken Gin, Vancouver Coastal Health (Canada); Purang Abolmaesumi, The Univ. of British Columbia (Canada); Teresa Tsang, Vancouver Coastal Health (Canada) .......... [10951-14]
2:40 pm: A decision support system for skin cancer recognition with deep feature and multi response linear regression (MLR)-based meta learning, Md. Mahmoud Rahman, Morgan State Univ. (USA) .......... [10951-16]
Coffee Break ............. Sun 3:00 pm to 3:30 pm

SESSION 3
ROOM: SAN DIEGO  SUN 1:20 TO 3:00 PM
Artificial Intelligence and Deep Learning I
Session Chair: Shandong Wu, Univ. of Pittsburgh (USA)
1:20 pm: A decision support system for skin cancer recognition with deep feature and multi response linear regression (MLR)-based meta learning, Md. Mahmoud Rahman, Morgan State Univ. (USA) .......... [10951-16]
2:20 pm: Impact of imprinted labels on deep learning classification of AP and PA thoracic radiographs, Jennie Crosby, Thomas Rhodes, Clara Duan, Feng Li, Heber Maciwhor, Maryellen Giger, The Univ. of Chicago (USA) .......... [10951-16]
3:00 pm: Impact of imprinted labels on deep learning classification of AP and PA thoracic radiographs, Jennie Crosby, Thomas Rhodes, Clara Duan, Feng Li, Heber Maciwhor, Maryellen Giger, The Univ. of Chicago (USA) .......... [10951-16]
Coffee Break ............. Sun 3:00 pm to 3:30 pm

CONFERENCE 10954
ROOM: SAN DIEGO
Sunday–Monday 17–18 Feb. 2019
Proceedings of SPIE Vol. 10954

SESSION 3
ROOM: SAN DIEGO  SUN 1:20 TO 3:00 PM
Elastography, Tissue Classification and Doppler
1:20 pm: On the feasibility of quantifying mechanical anisotropy in transversely isotropic elastic materials using acoustic radiation force (ARF)-induced displacements, Murald Hoezian, The Univ. of North Carolina at Chapel Hill (USA) and North Carolina State Univ. (USA); Caterina M. Gaglioti, The Univ. of North Carolina at Chapel Hill (USA) .......... [10955-12]
1:40 pm: Axially-segmented cylindrical array for intravascular shear wave imaging, Arseni Telichko, Carl Herckhoff, Jeremy Dahl, Stanford Univ. (USA) .......... [10955-13]
2:20 pm: Classification of cardiac adipose tissue using spectral analysis of ultrasound radiofrequency backscatter, Akshila Karlapalem, Miranda R. Fulton, Amy H. Givan, Maria Fernandez-del Valle, Jon D. Klingensmith, Southern Illinois Univ. Edwardsville (USA) .......... [10955-14]
2:40 pm: Tracking blood flow changes in the brains of neonates using angular-coherence-based power doppler, Marko Jakovic, Stanford Univ. School of Medicine (USA); Byung Yoon, Massachusetts General Hospital (USA); Lotti Abou-Ekacem, Erika Rubesova, Jeremy Dahl, Stanford Univ. School of Medicine (USA) .......... [10955-15]
4:00 pm: An adaptive coherent flow power doppler beamforming scheme for improved sensitivity towards blood signal energy, Kathryn A. Ozgun, Brett C. Byram, Vanderbilt Univ. (USA) .......... [10955-16]
Coffee Break ............. Sun 3:00 pm to 3:30 pm

CONFERENCE 10955
ROOM: PACIFIC SALON 2
Sunday - Monday 17–18 Feb. 2019
Proceedings of SPIE Vol. 10955

SESSION 3
Room: Pacifc Salon 2 .... Sun 1:20 to 3:00 pm
Elastography, Tissue Classification and Doppler
1:20 pm: On the feasibility of quantifying mechanical anisotropy in transversely isotropic elastic materials using acoustic radiation force (ARF)-induced displacements, Murald Hoezian, The Univ. of North Carolina at Chapel Hill (USA) and North Carolina State Univ. (USA); Caterina M. Gaglioti, The Univ. of North Carolina at Chapel Hill (USA) .......... [10955-12]
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2:20 pm: Classification of cardiac adipose tissue using spectral analysis of ultrasound radiofrequency backscatter, Akshila Karlapalem, Miranda R. Fulton, Amy H. Givan, Maria Fernandez-del Valle, Jon D. Klingensmith, Southern Illinois Univ. Edwardsville (USA) .......... [10955-14]
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4:00 pm: An adaptive coherent flow power doppler beamforming scheme for improved sensitivity towards blood signal energy, Kathryn A. Ozgun, Brett C. Byram, Vanderbilt Univ. (USA) .......... [10955-16]
Coffee Break ............. Sun 3:00 pm to 3:30 pm

THIS PDF PROGRAM IS CURRENT AS OF 15 OCTOBER 2018. Find complete, up-to-date information and create your personalized schedule at spie.org/mi19program
SUNDAY 17 FEBRUARY

WORKSHOP
ROOM: TOWN & COUNTRY  SUN 5:45 TO 7:45 PM
Detector Innovations: From Concept to Product to Clinical Outcome
See Special Events for more information.

WORKSHOP
ROOM: CALIFORNIA . . . . . . SUN 5:45 TO 7:45 PM
The Visible Human Project at its 25th Year Anniversary
See Special Events for more information.

WORKSHOP
ROOM: PACIFIC SALON 2 . SUN 5:45 TO 7:45 PM
USCT Data Challenge 2019
Session Chair: Christian Boehm, ETH Zurich (Switzerland)
See Special Events for more information.

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THIS PDF PROGRAM IS CURRENT AS OF 15 OCTOBER 2018. Find complete, up-to-date information and create your personalized schedule at spie.org/mi19program
CONFERENCE 10948
ROOM: TOWN & COUNTRY
Sunday–Wednesday 17–20 Feb. 2019
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CONFERENCE 10950
ROOM: GOLDEN WEST
Sunday–Wednesday 17–20 Feb. 2019
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CONFERENCE 10951
ROOM: CALIFORNIA
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CONFERENCE 10954
ROOM: SAN DIEGO
Sunday–Monday 17–18 Feb. 2019
Proceedings of SPIE Vol. 10954

CONFERENCE 10955
ROOM: PACIFIC SALON 2
Sunday - Monday 17–18 Feb. 2019
Proceedings of SPIE Vol. 10955

SESSION 5
ROOM: TOWN & COUNTRY  MON 8:00 TO 9:40 AM
Machine Learning I
Session Chairs: Jinyin Qi, Univ. of California, Davis (USA); Kirsten Boedecker, Canon Medical Research USA, Inc. (USA)

8:00 am: Virtual clinical trial for task-based evaluation of a deep learning synthetic mammography algorithm, Andréu Badal, Kenroy H. Cha, U.S. Food and Drug Administration (USA); Sarah Drel, Stanford University (USA); Christian G. Graff, Rongping Zeng, Alido Badano, U.S. Food and Drug Administration (USA).

8:20 am: Forward and cross-scatter estimation in dual source CT using a deep convolutional neural network, Tim Voth, Joscha Maier, Marc Kachelriess, Stefan Sawall, Ruprecht-Karls-Univ. Heidelberg (Germany).

8:40 am: Focal spot deconvolution using convolutional neural networks, Jan Kuntz, Joscha Maier, Marc Kachelriess, Stefan Sawall, Deutsches Krebsforschungszentrum (Germany).

9:00 am: Low-dose CT count-domain denoising via convolutional neural network with filter loss, Nimu Yuan, Univ. of California, Davis (China) and Northeastern Univ. (USA); Jian Zhou, Canin Medical Research USA, Inc. (USA); Kuang Gong, Gordon Ctr. for Medical Imaging (USA) and Univ. of California, Davis (USA); Jinya Qi, Univ. of California, Davis (USA).

9:20 am: Image reconstruction from fully-truncated and sparsely-sampled line integrals using iCT-Net, Yincheng Li, Ke Li, Chengzhu Zhang, Juan Montoya, Guang-Hong Chen, Univ. of Wisconsin-Madison (USA).

Coffee Break. Mon 9:40 am to 10:10 am

SESSION 5
ROOM: GOLDEN WEST  . . . . MON 8:00 TO 9:40 AM
Lung I
8:00 am: PHT-bot: a deep learning based system for automatic risk stratification of COPD patients based upon signs of pulmonary hypertension, David Chertin, Omar Bregman Amitai, Amir Bar, Zebra Medical Vision, Inc. (Israel); Ilmar Arfani Tamir M.D., Clalit Health Services (Israel); Eddad Elnakev M.D., Zebra Medical Vision, Inc. (Israel).

8:20 am: Identifying disease-free chest x-ray images with deep transfer learning, Kon C. L. Wong, Mehrdi Moradi, Jiyi Wu, Tarveer Syeda-Mahmood, IBM Research - Almaden (USA).

8:40 am: Analysis of deep convolutional features for detection of lung nodules in computed tomography, Ravi K. Samala, Haeng-Ping Chan, Caleb Richter, Lubomir M. Hadjiiski, Concordia Univ. (Canada); Jian Zhou, Chengzhong Rong, Yiqiang J. Zhan, Xiang S. Zhou, Yazong Gao, Northwestern Univ. (USA).

9:20 am: StreoScenet: surgical stereo robotic scene segmentation, Ahmed Mohammed, Saleh Yildirim, Ivar Farup, Manus Pedersen, Norwegian Univ. of Science and Technology (Norway).

9:40 am: Colonoscopy tracking method based on shape estimation network, Masahiro Oda, Holger R. Roth, Nagoya Univ. (Japan); Takayuki Tozakasa, Aichi Institute of Technology (Japan); Kazuhiro Furukawa M.D., Nagoya Univ. Hospital (Japan); Ryoji Miyahara M.D., Nagoya Univ. (Japan); Yohsuk Hirokawa M.D., Nagoya Univ. Hospital (Japan); Nassir Navab, Technische Univ. München (Germany); Katsusuru Mori M.D., Nagoya Univ. (Japan).

9:00 am: Deep learning based 2D/3D flow field estimation for maximum intensity projections of 40 optical coherence tomography, Maxim Heinrich Laves, Lüder Alexander Kahrs, Tobias Ortmayer, Leibniz Univ. Hannover (Germany).


Coffee Break. Mon 9:40 am to 10:10 am

SESSION 5
ROOM: SAN DIEGO . . . . MON 8:00 TO 9:40 AM
Deep Learning
Session Chairs: Satish E. Viswanath, Case Western Reserve Univ. (USA); David R. Haynor, Univ. of Washington (USA).

8:00 am: Large-scale evaluation of multi-resolution V-Net for organ segmentation in image guided radiation therapy, Miaofei Han, Yu Zhang, Qianqiang Zhou, Chengcheng Rong, Yiqiang J. Zhan, Xiang S. Zhou, Yazong Gao, Northwestern Univ. (USA).

8:20 am: Local heating of metallic objects from switching magnetic gradients in MRI, John Stroud, Univ. of Colorado at Colorado Springs (USA); Karl Stupic, National Institute of Standards and Technology (USA); Tucker Walsh, Zbigniew Celinski, Janusz Hankiewicz, case Western Reserve Univ. (USA); Anant Madabhushi, Cleveland Clinic (USA); John Klock M.D., QT Ultrasound LLC (USA); Arman Rahmim, The Univ. of British Columbia (Canada); Emil M. Boctor, Johns Hopkins Univ. (USA); Mario Merino, National Institute of Health (USA); Mark Lenox, QT Ultrasound LLC (USA); Baris Turkbey, Bradford Wood, National Institutes of Health (USA).

8:40 am: On the feasibility of Epic electronic medical record system for tracking patient radiation doses following interventional fluoroscopy procedures, Richard Poeng, Nour Chekkali, Melissa Gröger, Jaydev K. Dave, Jefferson Health (USA).

9:00 am: Framework for guiding artificial intelligence research in combat casualty care, Kenneth H. Wong, Virginia Polytechnic Institute and State Univ. (USA).

9:20 am: Joint Gaussian copula model for mixed data with application to imaging epiphenomena study of schizophrenia, Aiying Zhang, Tatsuo Utani, Univ. of Tokyo (Japan).

AWARD ANNOUNCEMENTS
ROOM: SAN DIEGO . . . . 9:40 TO 9:45 AM
The Imaging Informatics for Healthcare, Research, and Applications conference RFW runners up and poster award recipients will be recognized and certificates distributed.

Coffee Break. Mon 9:40 am to 10:10 am

SESSION 5
ROOM: PACIFIC SALON 2 . . . . MON 8:00 TO 9:40 AM
US Tomography II
8:00 am: High SNR emission method with virtual point source in ultrasound computed tomography, Wenjing Wu, Yushi Tsutoba, Atsushi Suzuki, Kazuhiro Yamamizu, Takahide Terada, Kenichi Kawabata, Hitachi, Ltd. (Japan); Hiroko Yamashita, Fumi Kato, Mutsumi Nishida, Megumi Satoh, Hokkaido Univ. Hospital (Japan).

8:20 am: Correlation of ultrasound tomography to MRI and pathology for the detection of prostate cancer, Reza Seifabadi, Alexis Cheng, National Institutes of Health (USA); Bilal Malik, QT Ultrasound LLC (USA); Shun Kishimoto, National Institutes of Health (USA); James W. Wiskin, QT Ultrasound LLC (USA); Jeeva Munasinghe, Ayeve Nguyense, Ivaan Bakshitavili, Murali Cherukuri, Peter Choyke, Peter Pinto, National Institutes of Health (USA); Arman Rahmim, The Univ. of British Columbia (Canada); Emil M. Boctor, Johns Hopkins Univ. (USA); Mario Merino, National Institute of Health (USA); Mark Lenox, QT Ultrasound LLC (USA); Baris Turkbey, Bradford Wood, National Institutes of Health (USA).

8:40 am: 3D full inverse scattering ultrasound tomography of the human knee, James W. Wiskin, Bilal Malik, Hang Mo, Nasser Puthactively, John Klock M.D., Mark Lenox, QT Ultrasound LLC (USA).

9:00 am: A high throughout, extensible and flexible ultrasonic excitation and acquisition system for ultrasound imaging, Qude Zhang, Junjie Song, Liang Zhou, Huazhong Univ. of Science and Technology (China); Yang Peng, ZTE Corp. (China); Guan Zhou, Shanshan Wang, Xia Sun, Mingyue Ding, Ming Yuchi, Hu, Nassar Puthactively, Science and Technology (China).

9:20 am: CNN and back-projection: limited angle ultrasound tomography for speed of sound estimation, Emran Mohammad Abu Anas, Johns Hopkins Univ. (USA); Alexis Cheng, Reza Seifabadi, National Institutes of Health (USA); Fereidoun Aalami, Johns Hopkins Univ. (USA); Bradford Wood, National Institutes of Health (USA); Arman Rahmim, The Univ. of British Columbia (Canada); Emil M. Boctor, Johns Hopkins Univ. (USA).

Coffee Break. Mon 9:40 am to 10:10 am

MONDAY 18 FEBRUARY
Image Reconstruction

Session Chairs: Joseph W. Stayman, Johns Hopkins Univ. (USA); Michael Grass, Philips Research (Germany)

1:20 pm: Quantitative cone-beam CT of bone mineral density using model-based reconstruction, Qian Cao, Alejandro Sisniega, Joseph W. Stayman, Johns Hopkins Univ. (USA); John Yorkston, Carestream Health, Inc. (USA); Jeffrey H. Siewerdsen, Wojciech Zbijewski, Johns Hopkins Univ. (USA) . . . . . . . . [10948-33]

1:40 pm: CT-guided PET parametric image reconstruction using deep neural network without prior training data, Jianan Cui, Huafeng Liu, Zhejiang Univ. (China); Takanori Yokoi, Kyoto Inst. of Tech. (Japan); Song Wang, Univ. of South Carolina (USA); Xinxin Zhou, Nanyang Technological Univ. (Singapore); Takenoshi Hara, Fujita Univ. (Japan); Toshiaki Nozaki, St. Luke’s International Hospital (Japan); Hiroshi Fujita, Fujita Univ. (Japan) . . . . . . . . [10948-34]

1:40 pm: Multi-organ segment partitioning in thoracic CT images using a deep convolutional network with a majority voting, Ji He, Jianhua Ma, Southern Medical Univ., General Hospital, China (Japan); Masaki Matsusako, St. Luke’s International Hospital (Japan); Taiki Nozaki, St. Luke’s International Hospital (Japan); Takuya Kojima, Gifu Univ. (Japan); Song Wang, Univ. of South Carolina (USA); Yinlei Zhou, Nanyang Technological Univ. (Singapore); Takenoshi Hara, Fujita Univ. (Japan); Toshiaki Nozaki, St. Luke’s International Hospital (Japan); Hiroshi Fujita, Fujita Univ. (Japan) . . . . . . . . [10948-34]

2:00 pm: Radon inversion via deep learning, Ji He, Jianhua Ma Sr., Southern Medical Univ., General Hospital (China); Masaki Matsusako, St. Luke’s International Hospital (Japan); Taiki Nozaki, St. Luke’s International Hospital (Japan); Takuya Kojima, Gifu Univ. (Japan); Song Wang, Univ. of South Carolina (USA); Yinlei Zhou, Nanyang Technological Univ. (Singapore); Takenoshi Hara, Fujita Univ. (Japan); Toshiaki Nozaki, St. Luke’s International Hospital (Japan); Hiroshi Fujita, Fujita Univ. (Japan) . . . . . . . . [10948-34]

2:20 pm: Accelerating coordinate descent in iterative reconstruction, Scott S. Hsieh, John M. Lellmann, Robert Stevens M.D., Jeffrey H. Siewerdsen, Wang, Carestream Health, Inc. (USA); Nafi Aygun, Johns Hopkins Univ. (USA); David Foos, Xiaohui Wang, Carestream Health, Inc. (USA); Qian Cao, Alejandro Sisniega, Joseph W. Stayman, Johns Hopkins Univ. (USA) . . . . . . . . [10948-34]

2:40 pm: Ultra-low dose PET reconstruction using generative adversarial network with feature matching, Jiaohong Ou Yang, Carnegie Mellon Univ. (China) . . . . . . . . [10948-35]

3:00 pm: Patient evaluation of breast shape-corrected tomosynthesis reconstruction, Koen Michielssen, Tsvetanka Rangelova, Radboud Univ. Medical Ctr. (Netherlands); Isacchepolouna, Radboud Univ. Medical Ctr. (Netherlands) and LRBM (Netherlands) . . . . . . . . [10948-35]

3:20 pm: Cone-beam CT statistical reconstruction with a model for fluence modulation and electronic readout noise, Pengwei Wu, Alejandro Sisniega, Joseph W. Stayman, Wojciech Zbijewski, Johns Hopkins Univ. (USA); David Foss, Xiaohui Wang, Carestream Health, Inc. (USA); Nafi Aygun M.D., Robert Stevens M.D., Jeffrey H. Siewerdsen, Johns Hopkins Univ. (USA) . . . . . . . . [10948-35]

Coffee Break . . . . . . . . . Mon 3:40 pm to 4:10 pm

CONFERENCE 10948
ROOM: TOWN & COUNTRY
Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10948

CONFERENCE 10950
ROOM: GOLDEN WEST
Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10950

CONFERENCE 10951
ROOM: CALIFORNIA
Sunday - Thursday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10951

CONFERENCE 10955
ROOM: PACIFIC SALON 2
Sunday - Monday 17–18 Feb. 2019
Proceedings of SPIE Vol. 10955
SESSION 7 (CONTINUED)
ROOM: GOLDEN WEST . . . . MON 1:20 TO 3:40 PM

3:00 pm: A local geometrical metric-based model for polyp classification, Weiguo Cao, Marc J. Pomeroy, Zhengrong Liang, The State Univ. of New York (USA) ....................... [10950-39]

3:20 pm: Polyp-size classification with RGB-D features for colonoscopy, Hayato Itoh, Holger Roth, Nagoya Univ. (Japan); Yuichi Morii M.D., Masashi Misawa M.D., Showa Univ. Northern Yokohama Hospital (Japan); Masahiro Otani, Nagoya Univ. (Japan); Shin-El Kudo M.D., Showa Univ. Northern Yokohama Hospital (Japan); Ken'ichi Mori, Nagoya Univ. (Japan) ....................... [10950-40]

Coffee Break ................... Mon 3:40 pm to 4:10 pm

SESSION 7 (CONTINUED)
ROOM: CALIFORNIA . . . . . . MON 1:20 TO 3:40 PM

3:00 pm: Controlling virtual views in navigated breast conserving surgery, Shaun R. Lund, Lab. for Percutaneous Surgery, Queen’s Univ. (Canada); Thomas Vaughan, Lab. for Percutaneous Surgery, Queen’s Univ. (Canada); Tamas Ungi M.D., Andras Lasso, Mark Asselin, Lab. for Percutaneous Surgery, Queen’s Univ. (Canada); Jay C. Engel, Caitlin Yeo, Queen’s Univ. (Canada); Gabor Fichtinger, Lab. for Percutaneous Surgery, Queen’s Univ. (Canada) ....................... [10951-39]

3:20 pm: Electromagnetic tracking of liver tumors during open surgical resections, Oleksandra Ivashchenko, Bas Pouw, Koert Kuhlmann M.D., Ruben van Veen, Niels Kok M.D., Elisabeth Klompenhouwer M.D., Nikke Hoetjes, Jasper Nijkamp, Tho J. M. Ruers M.D., The Netherlands Cancer Institute (Netherlands) ....................... [10951-40]

Coffee Break ................... Mon 3:40 pm to 4:10 pm
A method to modify mammography images to appear as if acquired using different radiographic factors, Alistair Mackenzie, The Royal Surrey County Hospital NHS Trust (UK); Katherine L. Dunn, Univ. of Surrey (UK) and The Royal Surrey County Hospital NHS Trust (UK); Joana Bolta, Radboud Univ. Medical Ctr. (Netherlands); David R. Dance, Kenneth C. Young, The Royal Surrey County Hospital NHS Trust (UK) and HeY Healthcare, Ltd. (UK) ........................................... [10948-86]

Consideration of cerebrospinal fluid intensity variation in diffusion weighted MRI, Colin B. Hansen, Wenyue Nath, Alison E. Halinane, Kurt G. Schmitz, Pasanana Pavatharaneni, Rosa G. Bayrak, Justin A. Blaber, Vanderbilt Univ. (USA); Owen Williams, Susan Resnick, Lorien Beason-Held, National Institutes of Health (USA); Okan Iftanoglu, Carlo Pierpaoli M.D., National Institute of Biomedical Imaging and Bioengineering (USA); Adam W. Anderson, Baxter P. Rogers, Bennett A. Landman, Vanderbilt Univ. (USA). ................................................. [10948-87]

Development of a real-time scattered radiation display for staff dose reduction during fluoroscopic interventional procedures, Jonathan Troville, Joshua Killian-Meneghin, Chao Guo, Stephen Rudin, Daniel R. Bednarok, Univ. at Buffalo (USA) and Canon Stroke and Vascular Technology (Shanghai) Co., Ltd. (China) ................................. [10948-93]

Comparison of different denoising algorithms in an anthropomorphic phantom image with computed tomography: a simulation study, Jina Shim, Korea Univ. (Korea, Republic of) ; Youngjee Lee, Gachon Univ. (Korea, Republic of); Myongjuun Yoon, Korea Univ. (Korea, Republic of); Yoonuk Kim, Soonyuk Park, Gangnam Severance Hospital, Korea (Republic of). ................... [10948-94]

Simulation of CT images reconstructed with different kernels using a convolutional neural network and its implications for efficient CT workflow, Andrew Missett, Shuai Leng, Cynthia H. McCollough, Joel G. Fletcher, Lifeng Yang and Sao Clinic (USA) ..................................................... [10948-105]

Effects of loss functions and network architectures on streak artifact reduction in sparse CT via deep convolutional neural network. Nouria Salehjahromi, Jonguk Bae, Yonsei Univ. (Korea, Republic of); Jintae Kim, Seujin Kang, Sunjung Kim, OSSTEM IMPLANT Co., Ltd. (Korea, Republic of) ............................................ [10948-114]

Poster presentations from the Physics of Medical Imaging: Image-Guided Procedures, Robotic Interventions, and Modeling, Imaging informatics for Healthcare, Research, and Applications; and Ultrasound Imaging and Tomography conferences will be included. 

Author Set-Up Time: Sunday after 12:00 PM (NOON)

Posters should remain on display until the end of the Poster Session on Monday.

Poster Session and Reception: Monday from 5:30 TO 7:00 PM

See Poster Presentation Guidelines for additional information.

CONFERENCE 10948

Physics of Medical Imaging

Improved wedge scatter correction for multislice CT systems using adaptive modeling with rotation. Siemenghong Medical Equipment Ltd. (China); Karl Stierstorfer, Martin Petersikia, Siemens Healthineers (Germany); Andrew D. A. Maidment, Univ. of Pennsylvania (Belgium) and TELIN-IPI, Ghent Univ. (Belgium); Predrag R. Bakic, Univ. of Pennsylvania (USA); Ehsan Samei, Duke Univ. (USA); and TELIN-IPI, Ghent Univ. (Belgium) ........................................... [10948-93]

A TV-based ring artifact reduction method for CT reconstruction, Yi Tian, Siemens Shanghai Medical Equipment Ltd. (China). .................................................... [10948-95]

Revisit FBP: analyze the tensor data after view-by-view reconstruction methods, Juan Pablo Cruz Bastida, Ran Daniel Gomez Cardona, Guang-Hong Chen, Univ. of Wisconsin-Madison (USA) .............................................. [10948-97]

Trade-off between spatial details, motion artifact, and organ dose in multi-detector CT: a virtual clinical trial with 40 textured human models, Mahmoud Abadi, Paul Wilson Segars, Brian Harrawood, Shobhit Sharma, Thomas J. Sauder, Anuraj Kapadia, Ehsan Samiei, Duke Univ. (USA) .................................... [10948-98]

Material decomposition in photon-counting-detector CT: threshold or bin images?, Liqiang Ren, Shengzhen Tao, Cynthia H. McCollough, Lifeng Yu, Mayo Clinic (USA) .................................. [10948-99]

Experimental validation of multi-step material decomposition technique in coaxial CT, Nathaniel R. Frette, Stefano Vespucci, Min Dai, Univ. of Houston (USA) .................................................. [10948-100]

A practical analysis of scatter-to-primary ratio after beam hardening correction for x-ray CT, Heewo Gao, Shumee Jia, Tsinghua Univ. (China); Geng Fu, Eastern Blue Technologies (USA) ... [10948-109]

Low-dose CT image reconstruction based on adaptive prior feature matching and nonlocal means, Lu Chen, Qufu Normal University (China); Yuankun Zhang, Southern Medical University (China) and Fourth Military Medical University (China); Dong Zeng, Southern Medical University (China); Hao Zhang, Zhenyuan Brok, Univ. of Buffalo (USA); Young Lee, Sunnybrook Research Institute (Canada) ................................................... [10948-108]

Material decomposition in photon-counting-detector CT: threshold or bin images?, Liqiang Ren, Shengzhen Tao, Cynthia H. McCollough, Lifeng Yu, Mayo Clinic (USA) .................................. [10948-99]

Quantifying truth-based changes in radiomics features between CT imaging conditions, Jocelyn Hoye, Duke Medical U (USA); Justin Solomon, Ehsan Samei, Duke Univ. (USA) .................................................. [10948-111]

A three-dimensional registration method in metal-contaminated CT images using an iterative closest-point algorithm, Chuxiu Park, Huysong Cho, Dongyoung Lee, Yonsei Univ. (Korea, Republic of) .................................................. [10948-112]

Wasserstein generative adversarial networks for metal-contaminated computed tomography imaging, Zhanli Hu, Shenzhen Institutes of Advanced Technology (China) .......................................................... [10948-113]

MULTIDIMENSIONAL NOISE REDUCTION IN C-ARM C-BEAM CT VIA 2D-BASED LANDWEber ITERATION AND 3D-BASED DEEP NEURAL NETWORKS, Juhee Kim, Dahim Choi, Ewha Womans Univ. (Korea, Republic of); Byungjoon Kim, Jongkuk Baek, Yonsei Univ. (Korea, Republic of); Andreas Maier, Friedrich-Alexander-Universität Erlangen-Nürnberg (Germany) and Rebecca Fahrig, Siemens Healthineers (Germany); Hyun-Seok Park, Jang-Hwan Choi, Ewha Womans Univ. (Korea, Republic of) .................................................. [10948-114]

Three dimensional evaluation of impacted cavities: comparison of 2D and 3D scatter correction protocols, Ayehsa Ejaz, Univ. of Connecticut (USA) .................................................. [10948-115]

Assessment of measurement deviations: length-extended x-ray imaging for orthopedic applications, Christopher Luckner, Friedrich-Alexander-Universit¨at Erlangen-N¨urnberg (Germany); Magdalena Herbst, Ludwig Ritschi, Siemens Healthineers (Germany); Andreas Maier, Friedrich-Alexander-Universität Erlangen-Nürnberg (Germany); Steffen Kappler, Siemens Healthineers (Germany) .................................................. [10948-116]

Investigation of calibration-based projection domain dual energy decomposition CBCT technique for brain radiotherapy applications, Shailaja Saiju, Sunnybrook Research Institute (Canada); Masoud Hashemi, Royal Bank of Canada (Canada); Christopher Huyhn, Univ. of Toronto (Canada); Jiaxin Niu, Sunnybrook Research Institute (Canada); Markus Eriksson, Elekta AB (Sweden); Young Lee, Sunnybrook Research Institute (Canada); Hakan Nordstrom, Elekta AB (Sweden); Anula Nica, Arjun Sahgal, Mark Ruschyn, Sunnybrook Research Institute (Canada) .................................................. [10948-117]

SWAD: the effect of pixel geometry on the spatial uniformity of avalanche gain, Jarin Stavro, Anna Golden, Wei Zhao, Stony Brook Univ. (USA) ........................................................... [10948-118]

Translating high-resolution radiation detection technology to head-and-neck imaging: a comparison study between C2T and LYSO/SiPM technologies, Mohan Li, Shivab Abbaszadegan, Univ. of Illinois (USA) ........................................................... [10948-119]

Temporal Imaging CeBr3 Compton camera: first imaging results and perspectives in medical imaging, Christian Tzafirafirn, Alain Ilitse, Darmawan Imaging (France); Hiemon Smouss, Mohamed Ahmas, Unite de Technologie Troyes (France); Ghislain Zefaick Tadonkeng, Luc Rodrigues, Marius Lopez, Darmawan Imaging (France) ........................................................... [10948-120]

Investigation of spatial-frequency-dependent noise in columnar Csi/Ti using depth-localized single x-ray imaging, Adrian F. Howansky, A. R. Lubinsky, Wei Zhao, Stony Brook Univ. (USA) .................................................. [10948-121]
Impact of energy threshold on material quantification of contrast agents in photon-counting CT. Jayasuri Jayapragasam, Duke Univ. (USA) and National Institutes of Health (USA); Poyou Sabih, Siemens Healthcare (USA); Ehsan Abadi, Duke Univ. (USA); William F. Pritchard M.D., Brad J. Wood M.D., Elizabeth Jones M.D., National Institutes of Health (USA) (Ehsan Abadi, Duke Univ. (USA)); [10948-185]

An improved physics model for multi-material identification in spectral CT. Gustau Cao, Xu Dong, Swapnil Velkhane, Virginia Polytechnic Institute and State Univ. (USA). [10948-170]

Quantitative evaluation of total variation denoising algorithm for CTF photon counting dual-energy contrast-enhanced digital mammography imaging system. Youngjin Lee, Gachon Univ. (Korea, Republic of); Seong-Hyeon Kang, Euiji Univ. (Korea, Republic of); Seungwan Lee, Konyang Univ. (Korea, Republic of). [10948-171]

Simulation of scattered radiation with various anti-scatter grid designs in a photon counting CT. Xiaoshu Zhan, Canon Medical Research USA, Inc. (USA). [10948-172]

Quantitative phase retrieval of multi-material heterogeneous objects from spectroscopic data. Ivan Vazquez, Nathanial R. Freddette, Minis Da, Univ. of Houston (USA). [10948-173]

Novel learning-based Moiré artifacts reduction in x-ray Talbot-Lau differential phase contrast imaging. Jianjun Chen, Qing Zhang, Dong Liang, Yongshuai Ge, Shenzhen Institutes of Advanced Technology, China. [10948-174]

Single-shot x-ray differential phase contrast imaging with a modified staggared grating. Jian Fu, Xianghong Shi, Yanjun Hu, Beihang Univ. (China). [10948-175]

Mesh-based x-ray phase imaging with polycapillary optics. Weijun Sun, Congxiao He, Dantong Li, Carolyn A. MacDonald, Jonathan C. Petruccelli, Emory Univ. (USA); [10948-176]

Visibility guided differential phase contrast denoising. Brandon J. Nelson, Mayo Clinic (USA); Thomas Keong, Mayo Clinic (USA) and Zehm Imaging GmbH (Germany); Elisabeth R. Shanblatt, Shuai Li, Cynthia H. McCollough, Mayo Clinic (USA). [10948-177]

Development of a compact inkjet-printed patient-specific phantom for optimization of fluoroscopic image quality in neonates. Jiyoung Kim, Xishan Z., Cheng, Yuewen Sun, Congxiao He, Wu Y., Shuangwen Lee, Shanghai Jiao Tong University, China. [10948-180]

Using voxel-based 3D printing to create contrast-enhanced textured physical phantoms for CT. Hope Knudsen, Hongyu Tong, Michael E. Gehm, Ehsan Samiei, Joseph Lo, Duke Univ. (USA). [10948-181]

Filtered back-projection for digital breast tomosynthesis with 2D filtering. Seung H. Park, Weiyuan Sun, Congxiao He, Wu Y., Shuangwen Lee, Univ. of Wisconsin-Madison (USA). [10948-182]

Prototyping optimization problems for digital breast tomosynthesis image reconstruction with a primal-dual algorithm. Emily Y. Sidky, Ingrid S. Reiser, The University of Chicago Medical Center (USA). [10948-183]

EM:an: an unrolled deep neural network for PET image reconstruction. Kuoang Gong, Dongf Wu, Kyungsung Kim, Massachusetts General Hospital (USA); Janown Yang, Univ. of California, San Francisco (USA); Theodore Beekem, Monash University (Australia). [10948-184]

Backproject-filter (BPF) CT image reconstruction using convolutional neural network. Qiyan Zhang, Jianwei Chen, Dong Liang, Yongshuai Ge, Shenzhen Institutes of Advanced Technology, China. [10948-185]

 Bayesian reconstruction of digital breast tomosynthesis using non local Gaussian Markov random field a priori model. Dennis Salvador, Universitat Pablo de, Spain (USA); Bruno Cardoso Neto, Marcelo A. C. Vieira, Univ. de Sana Paulo (Brazil); Andrew D. A. Maidment, Univ. of Pennsylvania (USA). [10948-194]


Investigation on lesion detectability in step-and-shoot cone-beam and digital tomosynthesis systems with anatomical background. Changwo Lee, Korea Research Institute of Standards and Science (Korea, Republic of); Jihoon Kang, Chonnam National Univ. (Korea, Republic of). [10948-196]

Improvement of material decomposition accuracy using a physics and learning techniques in spectral mammography. Jiose Eom, Burnyung Kim, Wonhyung Kim, Konyang Univ. (Korea, Republic of); Youngho Seo, Univ. of North Carolina at Chapel Hill (USA). [10948-197]

Novel geometry for x-ray diffraction mammography: experimental validation on a breast phantom. Vera Feldman, Joachim Tabary, Caroline Lucas, U. F. LETI (France); Jean-Louis Hazemann, CNRS (France); Sophie Morales, CEA-LETI (France). [10948-206]

CARRA with artificial intelligence: use of machine learning for a prostate imaging. Gabriel C. Varney, Ugar Agun, Coe College (USA). [10948-207]

Spot decomposition in a novel pencil beam scanning proton computed tomography system. Yuhua Guo, Emory University (USA) and Beaumont Hospital (USA); Xiaoliang Li, Feiyang Yang, Emory University (USA); Michael Di Yan, Craig Stevens, Beaumont Hospital, (USA); Tian Liu, Emory University (USA); Xuangfeng Ding, Beaumont Hospital (USA). [10948-208]
Adventages of intraoperative cortical perfusion imaging by time-resolved thermography in neurosurgery, Juliane Müller, Valentin Schreiter, Elisa Boehr, Jens Müller, Matthias Kirsch M.D., Stephan B. Sobotta, Gabriele Schackert M.D., TU Dresden (Germany); Edmund Koch, TU Dresden (Germany); Gerald Steiner, TU Dresden (Germany). [10951-96]

Metric-based evaluation of fiducial markers for medical procedures, Christian Kunz, Vera Genten, Björn Hein, Karlsruhe Institut für Technologie (Germany). [10951-97]

An enhanced hybrid MRI thermometry technique for monitoring microwave thermal ablation, Aileh Aiver, Jaganathan Pori, Pumit Prasok, Balasubramaniyan Natarajan, Kansas State Univ. (USA). [10951-98]

Content based retrieval of video segments from minimally invasive surgery videos using deep convolutional video descriptors and iterative query refinement, Deepak Chittajal, Arun Basharat, Paul Tunison, Kitware, Inc., Katerina O. Wells, Steven G. Leeds, James W. Fleshman, Ganesh Santhanarayanan, Baylor Univ. Medical Ctr. (USA); Anindit Engouabahire, Kitware, Inc. [10951-99]

Integrating radiomics features from T2-weighted and contrast-enhanced MRI to guide tumor regression in rectal cancer after chemoradiation, Siddhartha Nanda, Jacob T. Antunes, Amirth Selvam, Kaustav Bera M.D., Case Western Reserve Univ. (USA); Justin T. Brady M.D., University of Florida M.D., Jayakrishna Gollamudi M.D., Ivy Health Network (USA); Anand Madabhushi, Mary City Clin. (USA). [10951-100]

Analysis of middle ear morphology for design of a transnasal endoscope, Minh Q. Vu, Rueben A Balanagay, Dongping Zhang, Vanderbilt Univ. (USA); Alejandro Rivas, Vanderbilt University Medical Center (USA); Lois Fichera, Worcester Polytechnic Institute (USA); Robert J Webster III, Vanderbilt Univ. (USA); Robert F Labadie, Vanderbilt University Medical Center (USA); Jack H Noble, Vanderbilt (USA). [10951-101]

Dynamic contrast imaging (DCI): solution theory for rapid, wide-field, multispectral optical imaging using fluorescence lifetime contrast mechanism, Harrison Cheng, Univ. of California, Los Angeles (USA). [10951-102]

Modalimaging tool registration of pre-and intra-interventional data for surgical planning of a transarterial chemoembolisation, Barbara Waldkirch, Mannheim Univ. of Applied Sciences (Germany); Frank G. Zollner, Universitätsschulmedizin Mannheim (Germany) and Univ. Heidelberg (Germany); Lothar R. Schad, Universitätsschulmedizin Mannheim (Germany); Ivo Wolf, Mannheim Univ. of Applied Sciences (Germany). [10951-103]

Automatic segmentation of brain tumor resections in intraoperative ultrasound images, François-Xavier Carton, Univ. Grenoble Alpes (France) and Vanderbilt Univ. (USA); Jack H Noble Sr., Vanderbilt Univ. (USA); Matthieu Chabanas, Univ. Grenoble Alpes (France). [10951-104]

Quantitative imaging analysis to guide biopsy for molecular biomarkers, Denis J. Doss, Jon S. Heisselman, Ma Luo, Logan W Clements, Matthew Miller, Mira Vaipich, Univ. of Idaho (USA); Meinrad Brion, M.D., Fan Bovacan, Vanderbilt Univ. Medical Ctr. (USA). [10951-105]

Electromagnetically tracked partial nephrectomy navigation: demonstration of concept, Hua-Lin Liu, Zachary M. C. Baun, Thomas Vaughan, Tanans Ung M.D., Lab. for Percutaneous Surgery, Queen’s Univ. (Canada); Thomas McGregor, Queen’s Univ. (Canada); Gabor Röricht, Lab. for Percutaneous Surgery, Queen’s Univ. (Canada). [10951-106]

Modulation of the charge of magnetic nanoparticles from the aorta and coronary sinuses by permanent magnets, Abigail Krueger, The Univ. of Iowa (USA); Jon Camp, David R. Holmes Jr., David R. Holmes III, Mayo Clinic. (USA). [10951-107]

Intravascular ultrasound: can we design a minimally invasive imaging-guided therapeutic probe to fit within the cerebral vascular space for ablative neuro-ontology purposes?, Nao G. Kakehata, M.D., Case Western Reserve Univ. (USA); Sonic Concepts, Inc. (USA); Stephen Restaino, Medical Development Ctr. (USA); Filip Banovac M.D., Vanderbilt Univ. Medical Ctr. (USA); Anant Madabhushi, Mayo Clinic (USA). [10951-108]

Unsupervised depth and pose learning from monocular endoscopy video, Faisal Mahmood, Daniel Borders, Nicholas Dug, Johns Hopkins Univ. (USA). [10951-109]

Heatmap generation for emergency medical planning, Harrison Cheng, Univ. of California, Los Angeles (USA); Jonatan Snir, London Regional Cancer Inst. (Canada); Stephen Restaino, Medical Development Ctr. (USA); Douglas W. Van Citters, John R. Halter, Dartmouth College (USA). [10951-110]

Tissue classification with light scanner data using machine learning for surgical planning: a pilot study, Brandon Chan, Jason Au-Yeung, Queen’s Univ. (Canada); John F. Rudan M.D., Queen’s Univ. (Canada) and Kingston General Hospital (Canada); Parvaneh Hooper, Aaron Kuster, Queen’s Univ. (Canada). [10951-111]


A knowledge-based question answering system for cognitive assistance to radiologists, Anup Pillai, Amin Katouzian, Ashutosh JadHAV, Marina Bendersky, Karina Karanja, Chaitanya Shrivade, Vadana Munakherie, Tanveer Syeda-Mahmood, IBM Research - Almaden (USA). [10954-44]

Electronic cleansing in CT colonography using fully convolutional network, Rie Tachibana, National Institute of Technology, Oshima College (Japan) and Massachusetts General Hospital (USA) and Harvard Medical School (USA); Janne Näppi, Anne Tachibana, National Institute of Technology, Oshima College (Japan) and Massachusetts General Hospital (USA) and Harvard Medical School (USA); Se Hyung Kim, Seoul National Univ. Hospital (Korea, Republic of); Hiroaki Yoshida, Massachusetts General Hospital (USA) and Harvard Medical School (USA). [10954-56]

Assessment of optimal deep learning configuration for vertebrae segmentation from CT images, Sandeep Dutta, GE Healthcare (USA); Bipul Das, Saundh Kausik, GE Global Research (India). [10954-46]  

Preliminary study of automatic nodule detection system in lung CT images using deep learning, Yangfan Ni, Dezhong Zheng, Yuanuan Yang, Shanghai Institute of Technical Physics (China). [10954-87]
POSTERS — MONDAY


Deep learning of 3D CT images for organ segmentation using 20 multi-channel SegNet models, Yingzhou Liu, Wanji Fu, Vignesh Selvakumaran, Duke Univ. School of Medicine (USA); Matthew Phelan, Duke Clinical Research Institute, Duke Univ. (USA); William Paul Segars, Ehsan Samei, Duke Univ. School of Medicine (USA); Maciej Mazurkowski, Joseph Yuan-Chieh Lo, Duke Univ. (USA); Geoffrey Rubin, Duke Univ. School of Medicine (USA); Ricardo Henao, Duke Clinical Research Institute, Duke Univ. (USA) ........................... [10954-49]

Vibroacoustic amplitude-modulated waveforms of variable frequency to predict tissue composition and margin location, Nikan Namiri, Gregory Suematsu, Peter Pellionisz, Yong Hu, Nathan C. Francis, George N. Saddik, Maie A. St. John, Warren S. Grundfest, Univ. of California, Los Angeles (USA) ........................... [10954-50]

Precision Medicine, Correlative Analytics, and Translational Research

Deep radiomic precision CT imaging for prognostic biomarkers for interstitial lung diseases, Mikio Matsuhito, Tokushima Univ. (Japan) and Massachusetts General Hospital (USA); Chintatu Watari, Janne Nӓppi, Radin Nasirudin, Tokushima Univ. (Japan); Toru Hironaka, University of Science and Technology (China); Maosheng Xu, Zhejiang Provincial Hospital (China); Lihua Li, Yuchen Qiu, Hangzhou Dianzi Univ. (China); Lihua Li, Hong Liu, Bin Zheng, The Univ. of Oklahoma (USA) ........................... [10954-51]

Assessment of short-term breast cancer risk using a frequency domain correlation based imaging marker, Morteza Heidari, The Univ. of Oklahoma (USA); Alan Hollingsworth, Mercy Health Ctr. (USA); Seyedeh-Nafiseh Mirnia-hankandezeh, Gopichand Danala, Yuchen Qiu, Hong Liu, Bin Zheng, The Univ. of Oklahoma (USA) ........................... [10954-52]

Heterogeneity of tumor and its surrounding stroma on DCE-MRI and diffusion weighted imaging in predicting histological grade and lymph node status of breast cancer, Qianqian Chen, Ming Fan, Peng Zhang, Hangzhou Dianzi Univ. (China); Maosheng Xu, Zhejiang Provincial Hospital of Traditional Chinese Medicine (China); Lizhu Li, Hangzhou Dianzi Univ. (China). ........................... [10954-53]

Prediction of histological grading in breast cancer by combining DCE-MRI and DWI features, Wenhua Zhao, Ming Fan, Hangzhou Dianzi Univ. (China); Maosheng Xu, Zhejiang Provincial Hospital of Traditional Chinese Medicine (China); Lizhu Li, Hangzhou Dianzi Univ. (China). ........................... [10954-54]

CONFERENCE 10955

Ultrasonic Imaging and Tomography

Automatic recognition processing in ultrasound computed tomography of bone, Fradi Marwa, Wajih El-Hajj Yousef, Motseen Machnith, Monastir Univ. (Tunisia); Philippe Petit, “Timone” Children’s Hospital, Assistance Publique Hôpitaux de Marseille (France); Cécile Baron, Régine Guillermier, Philippe Lasaygues, Aix-Marseille Univ. (France) and CNRS (France) ........................... [10955-38]

Study on accumulation schemes in Fresnel volume tomography for sound speed reconstruction, Xiaoyue Fang, Yun Wu, Junjie Song, Liang Zhou, Qiu Bao, Zan Zhou, Zhaoqun Gao, Mingyue Ding, Ming Yuchi, Huazhong Univ. of Science and Technology (China). ........................... [10955-40]

Adaptive truncated total least square on distorted born iterative method in ultrasound inverse scattering problem, Xingzhao Yun, The Pennsylvania State Univ. (USA); Aneta Carveić, Univ. of Split (Croatia); Ahmed Abdou, Jaye He, Mohamed El-Mekkaawy, The Pennsylvania State Univ. (USA) ........................... [10955-41]

Deep learning image reconstruction for limited-angle ultrasound tomography in prostate cancer, Alexis Cheng, National Institutes of Health (USA); Younus Kim, Johns Hopkins Univ. (USA); Emran Mohammad Abu Amin, Arman Rahmim, Emad M. Boctor, Johns Hopkins Medical Institute (USA); Reza Seifabadi, Bradford Wood, National Institutes of Health (USA). ........................... [10955-42]

Image retrieval of breast masses on ultrasound images, Chiaka Muramatsu, Shunichi Haguchi, Gifu Univ. (Japan); Takako Morita, Mikioa Oka, Nagoya Medical Ctr. (Japan); Tomonori Kawasaki, International Medical Ctr., Saitama Medical Univ. (Japan); Hiroshi Fujita, Gifu Univ. (Japan). ........................... [10955-43]

Improvement in transmission ultrasound tomography by refined dynamic programming and spatial filter, Diego Armando Cardenas, Sergio Shiguemi Furue, Univ. de São Paulo (Brazil). ........................... [10955-44]

Ultrasound-guided breast biopsy of ultrasound occult lesions using multimodality image co-registration and tissue displacement tracking, Anton Nikolaev, Hendrik H. G. Hansen, Leon de Jong, Radboud Univ. Medical Ctr. (Netherlands); Eleonora Tagliabue, Bogdan Maris, Univ. degli Studi di Verona (Italy); Vincent Groenhuis, Univ. Twente (Netherlands); Marco Caballo, Ioannis Sechopoulos, Chris L. de Korte, Radboud Univ. Medical Ctr. (Netherlands). ........................... [10955-45]

Accuracy of quantitative breast density (QBD) score based on 3D ultrasound tomography, James W. Wiskin, Bilal Malik, Rajni Natesan M.D., John Röck M.D., Mark Lenox, DT Ultrasound LLC (USA). ........................... [10955-46]

Developing a quantitative ultrasound image feature analysis scheme to assess tumor treatment efficacy using a mouse model, Seyedeh-Nafiseh Mirnia-hankandezeh, The Univ. of Oklahoma (USA); Joshua Vanosdol, Oklahoma State Univ. (USA); Gopichand Danala, Morteza Heidari, The Univ. of Oklahoma (USA); Bing Zheng, The Univ. of Oklahoma (USA). ........................... [10955-47]

Intravascular imaging for monitoring HIFU treatment of calcified occlusions, Graham C. Collins, Brooks D. Lindsey, Georgia Institute of Technology & Emory Univ. School of Medicine (USA). ........................... [10955-48]

Electroacoustic tomography system with nanosecond electric pulse excitation source, Ali Zarafshani, Siqi Wang, Jack Merrill, Bin Zheng, Liangzhong Xiang, The Univ. of Oklahoma (USA). ........................... [10955-49]

Neighborhood resonance phenomenon for cell imaging via scanning probe acoustic microscope, Xiaoqin Li, Wenjie Deng, Mingyue Ding, Huazhong Univ. of Science and Technology (China). ........................... [10955-50]

Carcinoma tissue detection based on photoacoustic imaging using deep 3D neural network, Kamal Jivavall, Rochester Institute of Technology (USA); Bhargava Chinm, Vikram Dogra, Univ. of Rochester (USA); Navalpurand Rao, Rochester Institute of Technology (USA). ........................... [10955-51]
** SESSION 7**

**ROOM: SAN DIEGO** ....... TUE 8:00 TO 9:40 AM

**Image Reconstruction and Synthesis**

Session Chairs: Jerry L. Prince, Johns Hopkins Univ. (USA); Marius Staring, Leiden Univ. Medical Ctr. (Netherlands)

8:00 am: Self-consistent deep learning-based boosting of 4D cone-beam computed tomography reconstruction

Frederic Medesta, Tobias Sauer, Thilo Sentker, René Werner, Universitatsklinikum Hamburg-Eppendorf (Germany)  

8:20 am: Image-domain multi-material decomposition for dual energy CT with non-convex sparsity regularization

Uhih Lyu, Daniel O'Connor, Univ. of California, Los Angeles (USA); Tianye Niu, Institute of Translational Medicine, Zhejiang Univ. School of Medicine (China); Ke Sheng, Univ. of California, Los Angeles (USA)  

8:40 am: Non-learning based deep parallel MRI reconstruction (NLDRMRD)

Ali Pour Yazdanpanah, Harvard Medical School (USA) and Boston Children's Hospital (USA)  

9:00 am: Unpaired MRI to CT synthesis with multi-view adversarial learning

Yuhao Ge, Robotics Institute of Shanghai Jiao Tong Univ. (China) and Shanghai United Imaging Intelligence Co., Ltd. (China); Zhong Xie, Yiqiang Zhan, Xiang Zhou, Shanghai United Imaging Intelligence Co., Ltd. (China)  

9:20 am: Iterative reconstruction for low dose CT using Plug-and-Play ADMK framework

Guo Lyu, Dan Ruan, John Marian Hoffman, Ryan Neph, Michael Mackiew-Gray, Ke Sheng, Univ. of California, Los Angeles (USA)  

Coffee Break  

** SESSION 8**

**ROOM: GOLDEN WEST** ....... TUE 8:40 TO 9:40 AM

**Lung II**

8:00 am: Handling label noise through model confidence and uncertainty: application to chest radiograph classification

Erli Calli, Diagnostic Image Analysis Group (Network) (USA)  

8:20 am: Classification of chest CT using case-level weak supervision

Ruxiang Tang, Songyue Han, Rui Hou, Geoffrey D. Rubin, Joseph Y. Lo, Duke Univ. (USA)  

8:40 am: Deep adversarial one-class learning for normal and abnormal chest radiograph classification

Yuxing Wang, National Institutes of Health Clinical Ctr. (USA); Yaobiao Tang, National Institutes of Health (USA)  

9:00 am: Image biomarkers for quantitative assessment of idiopathic interstitial pneumonia

Young-Wook Kim, Télécim SudParis (France) and Avicenne Hospital (France); Sebastián Roberto Tarando, Télécim SudParis (France); Pierre-Yves Brillot, Univ. Paris 13 (France) and Avicenne Hospital (France); Catalin Petita, Télécim SudParis (France)  

9:20 am: Patient-specific outcome simulation after surgical correction of pectus excavatum: a preliminary study

Mahtafa Couto, João Gomes-Fonseca, Instituto de Investigação em Ciências da Vida e da Saúde, Univ. do Minho (Portugal); Jaime C. Fonseca, António C. M. Pinho, Instituto de Investigação em Ciências da Vida e da Saúde, Univ. do Minho (Portugal); Jorge Correia-Pinto, Instituto Politécnico do Cávado e do Ave (Portugal)  

Coffee Break  

** SESSION 9**

**ROOM: GOLDEN WEST** ....... WED 8:40 TO 9:40 AM

**Keynote and Novel MRI-Guided Technologies**

Session Chairs: Baowei Fei, The Univ. of Texas at Dallas (USA), The Univ. of Texas Southwestern Med Ctr. (USA); Cristian A. Linte, Rochester Institute of Technology (USA)

8:00 am: Automatic operator digitization for MRI-based cervical cancer brachytherapy planning using two surface models

William T. Hinrichs, Marc Morcos, Akila Sumanar, National Institutes of Health (USA); Ronald M. Summers, National Institutes of Health (USA)  

9:00 am: Advanced MR imaging coil and body-mounted robot for MRI-guided pediatric arthrography: SNR and phantom study

Reza Montafredi, Children’s National Health System (USA); Wolfgang Leowen, Christopher Ireland, Cincinnati Children’s Hospital Medical Ctr. (USA); Viktoria Beskin, Children’s National Health System (USA); Ronald Pratt, Randy Glazagoon, Charles Dumoulin, Cincinnati Children’s Hospital Medical Ctr. (USA); Keeray Cleary, Karun Sharma, Children’s National Health System (USA)  

Coffee Break  

** SESSION 10**

**ROOM: GOLDEN WEST** ....... WED 9:40 TO 10:00 AM

**Novel Imaging Techniques and Applications I**

Session Chairs: Andrezej Krol, SUNY Upstate Medical Univ. (USA); Armanda Mandona, Mayo Clinic (USA)

8:00 am: Rapid cone-beam computed tomography (CBCT) using an ultra-high frame rate imaging photon counting detector (PCD) with 100 μm resolution

Alek Shankar, Canon Stroke and Vascular Research Ctr. (USA) and Univ. at Buffalo (USA); Jordan M. Krebs, Alexander R. Podgorsk, Ciprian N. Ionita, Daniel R. Bednarek, Stephen Rudin, Canon Stroke and Vascular Research Ctr. (USA)  

8:20 am: Towards 50 ps TOF-PET for brain imaging

Eric S. Harmon, LightSpin Technologies, Inc. (USA); Michael O. Thompson, Cornell Univ. (USA); C. Ross Schmidt, Memorial Sloan-Kettering Cancer Ctr. (USA); James N. Tumer, Binghamton Univ. (USA); Andrezej Krol, SUNY Upstate Medical Univ. (USA)  

8:40 am: Design, fabrication and evaluation of non-imaging, label-free pre-screening tool using quantified bio-electrical tissue profile

Ali Zarafshan, Seyyedeh Nasri Mirmahkandeh, Farazan Aghaei, Morteza Heidari, Yuzhi Wang, Bing Zhang, The Univ. of Oklahoma (USA)  

9:00 am: Radiologic-pathologic validation of transmission ultrasound tomography using microscopy with UV surface excitation (MUSE), Bilal H. Malik, OT Ultrasound LLC (USA); Austin Todd, UC Davis Medical Ctr. (USA); Alysion Terry, OT Ultrasound LLC (USA); Farzad Fereidouni, UC Davis Medical Ctr. (USA); Rajni Natesan M.D., John Klock, OT Ultrasound LLC (USA); Richard M. Levenson, UC Davis Medical Ctr. (USA)  

9:20 am: Investigation of Pockels effect in optical property modulation-based radiation detection method for position emission tomography

Yuli Wang, Huazhong Univ. of Science and Technology (China)  

Coffee Break  

** SESSION 11**

**ROOM: GOLDEN WEST** ....... THU 8:40 TO 9:40 AM

**Novel Imaging Techniques and Applications II**

Session Chairs: Tomaž Vrtovec, Mayo Clinic (USA) and Shanghai United Imaging Intelligence Co., Ltd. (China) and Shanghai United Imaging Intelligence Co., Ltd. (China)  

8:00 am: Automatic operator digitization for MRI-based cervical cancer brachytherapy planning using two surface models

William T. Hinrichs, Marc Morcos, Akila Sumanar, National Institutes of Health (USA); Ronald M. Summers, National Institutes of Health (USA)  

9:00 am: Advanced MR imaging coil and body-mounted robot for MRI-guided pediatric arthrography: SNR and phantom study

Reza Montafredi, Children’s National Health System (USA); Wolfgang Leowen, Christopher Ireland, Cincinnati Children’s Hospital Medical Ctr. (USA); Viktoria Beskin, Children’s National Health System (USA); Ronald Pratt, Randy Glazagoon, Charles Dumoulin, Cincinnati Children’s Hospital Medical Ctr. (USA); Keeray Cleary, Karun Sharma, Children’s National Health System (USA)  

Coffee Break  

** SESSION 12**

**ROOM: GOLDEN WEST** ....... THU 9:40 TO 10:00 AM

**Applications I**

Session Chairs: Tomaž Vrtovec, Mayo Clinic (USA) and Shanghai United Imaging Intelligence Co., Ltd. (China) and Shanghai United Imaging Intelligence Co., Ltd. (China)  

8:00 am: Automatic operator digitization for MRI-based cervical cancer brachytherapy planning using two surface models

William T. Hinrichs, Marc Morcos, Akila Sumanar, National Institutes of Health (USA); Ronald M. Summers, National Institutes of Health (USA)  

9:00 am: Advanced MR imaging coil and body-mounted robot for MRI-guided pediatric arthrography: SNR and phantom study

Reza Montafredi, Children’s National Health System (USA); Wolfgang Leowen, Christopher Ireland, Cincinnati Children’s Hospital Medical Ctr. (USA); Viktoria Beskin, Children’s National Health System (USA); Ronald Pratt, Randy Glazagoon, Charles Dumoulin, Cincinnati Children’s Hospital Medical Ctr. (USA); Keeray Cleary, Karun Sharma, Children’s National Health System (USA)  

Coffee Break
Imaging and Acquisition
10:00 am: Physical modeling of launchers and detection of contrast agents.
Matthew Wilson, Steven Tilley II, Joseph W. Stayman, Johns Hopkins Univ. (USA) [10948-45]
10:30 am: Experimental comparison of two contrast agents: an experimental comparison.
Liang Ren, Cynthia H. Moyo, Michael R. Savona, Vanderbilt Univ. Medical Ctr. (USA); Cristian T. Badea, Duke Univ. School of Medicine (USA); Bennett A. Landman, Vanderbilt Univ. Medical Ctr. (USA); Benjamin R. G.eid, The Univ. of Chicago (USA) ... [10950-46]
Jesse Tanguay, Miranda Kirby, Ryerson Univ. (Canada) ... [10950-47]

Radiomics
10:10 am: Effect of diversity of patient population and acquisition systems on the use of radiomics and machine learning for classification of 2,981 breast lesions.
Heather M. Whitney, Wheaton College (USA) and The Univ. of Chicago (USA); Yu Jia, Tianjin Medical Univ. Cancer Institute & Hospital (China) and The Univ. of Chicago (USA); Hui Li, Alexandra Edwards, John Papaioannou, The Univ. of Chicago (USA); Peifang Liu, Tianjin Medical Univ. Cancer Institute & Hospital (China); Tye Strobeck, The Univ. of Chicago (USA) ... [10950-48]
10:30 am: Radiogenomic characterization of response to chemotherapy in glioblastoma is associated with PISK/akt/mTOR and apoptosis signaling pathways.
Nina G. Beig, Prateek Prasanna, Case Western Reserve Univ. (USA); Virginia Hill, Northwestern Univ. (USA); Ruchika Verma, Viney Varadat, Anant Madabhushi, Pallavi Tiwari, Case Western Reserve Univ. (USA) ... [10950-49]
10:50 am: Identifying optimal input using multilevel radiomics for predicting pulmonary function in lung cancer patients treated with radiotherapy.
Sanjay Purshottam, Piyush Han, Russell K. Hales, Khinit R. Vood, Todd R. McNult, Junghoon Lee, Johns Hopkins Univ. School of Medicine (USA) ... [10950-50]

Deep Learning: Segmentation
10:10 am: Two-level training of a 3D U-Net for accurate segmentation of the intra-cochlear anatomy in head CT with limited ground truth training data.
Dongqing Zhang, Rueben Banalagay, Jianing Wang, Yuxuan Zhao, Jack H. Nobeit, Benoit M. Davant, Vanderbilt Univ. (USA). ... [10948-6]
10:30 am: Improving splenomegaly segmentation by learning from heterogeneous multi-source labels.
Yucheng Tang, Yuerkai Hu, Yunzi Xiong, Hyeonsoo Moon, Vanderbilt Univ. (USA); Tamara K. Moyo, Michael R. Savona, Vanderbilt Univ. Medical Ctr. (USA); Albert Asaad, Incyte Corp. (USA); Richard Abramov, New York-Presbyterian Hospital (USA); Bennett A. Landman, Vanderbilt Univ. (USA) ... [10948-47]
10:50 am: Simultaneous MR knee image segmentation and bias field correction using deep learning and partial convolution.
Fengkai Wan, Orjan Smedby, Chunliang Wang, KTH Royal Institute of Technology (Sweden) ... [10948-48]
11:10 am: Distributions deep learning for robust multi-site segmentation of CT imaging after traumatic brain injury.
Samuel Remedios, Ctr. for Neuroscience and Regenerative Medicine, Henry M. Jackson Foundation (USA) and National Institutes of Health Clinical Ctr. (USA); Justin Blaber, Camilo Bermudez, Vishwesh Nath, Vanderbilt Univ. (USA); Mayur B. Patel, Ctr. for Health Services Research, Vanderbilt Univ. Medical Ctr. (USA) and Ctr. for Critical Illness, Brain Dysfunction, and Survivability, Vanderbilt Univ. Medical Ctr. (USA); and Tennessee Valley Healthcare System VA Medical Ctr. (USA); John A. Butman, National Institutes of Health Clinical Ctr. (USA); Bennett A. Landman, Vanderbilt Univ. (USA); Dzung L. Pham, Ctr. for Neuroscience and Regenerative Medicine, Henry M. Jackson Foundation (USA) and National Institutes of Health Clinical Ctr. (USA) ... [10948-49]

Optical Imaging and Guidance Technologies
10:10 am: Image-based measurement by instrument tip tracking for tymanoplasty using digital surgical microscopy.
Nicolas Gard, Jean-Claude Rosensthal, Silvio Jurk, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany); Armin Schneider, Arnold & Richter Cine Technik GmbH & Co. Betriebs KG (Germany); Peter Eiser, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany) ... [10951-44]
10:30 am: Cancer margin evaluation using machine learning in hyperspectral images of head and neck cancer.
Martin Halicek, Himar Fabiole, The Univ. of Texas at Dallas (USA); Samuel Ortega, Univ. de Las Palmas de Gran Canaria (Spain); James V. Little M.D., Emory Univ. School of Medicine (USA); Xu Wang, Emory Univ. School of Medicine (USA); Larry Myers, The Univ. at Texas Southwestern Medical Ctr. at Dallas (USA); Amy Y. Chen, Emory Univ. School of Medicine (USA); Gustavo M. Calicó, Univ. as Nac. de Salud, Gran Canaria Spain (Spain); Joonhee Fei, The Univ. of Texas at Dallas (USA) and The Univ. of Texas Southwestern Medical Ctr. at Dallas (USA) ... [10951-45]
10:50 am: Development and in vivo application of real-time intracranial flow display to guide liver dissection in minimally invasive surgery.
Jaeyeong Cha, Children’s National Health System (USA); Gyeong Woo Cheon, GE Global Research (USA); Sunghoon Choi, GE Global Research (Korea, Republic of) and Children’s National Health System (USA) ... [10951-46]
11:10 am: Deep learning segmentation of coronary calcified plaque from intravascular optical coherence tomography (IVOCT) images with application to finite element modeling of stent deployment.
Yazan Gharaibeh, David Prabhu, Christopher Filippi, North Shore-Long Island Jewish Health System (USA) and Columbia Univ. (USA) ... [10951-47]
TUESDAY 19 FEBRUARY

SESSION 2 (CONTINUED)
ROOM: SAN DIEGO  ... TUE 10:10 AM TO 12:10 PM
11:30 am: Multi-class abdominal organs segmentation with improved V-Nets. Chen Shen, Nagoya Univ. (Japan); Fausto Millefari, NVIDIA Corp. (USA); Holger R. Roth, Hirohisa Oda, Masahiro Oda, Yuichiro Hayashi, Nagoya Univ. (Japan); Kazunari Misawa M.D., Aichi Cancer Ctr. (Japan); Kensaku Mori, Nagoya Univ. (Japan) .... [10949-10]

TUESDAY/WEDNESDAY POSTER VIEWING
ROOM: GRAND HALL  ... 12:00 PM TO 9:00 PM
Posters will be on display Tuesday and Wednesday with extended viewing until 9:00 pm on Tuesday. The poster session with authors in attendance will be Wednesday evening from 5:30 to 7:00 pm. Award winners will be identified with ribbons during the reception. Award announcement times are listed in the conference schedule.

Lunch Break .......... Tue 12:10 pm to 1:20 pm

SESSION 9 (CONTINUED)
ROOM: GOLDEN WEST .... TUE 10:10 AM TO 12:10 PM
11:30 am: Quantitative vessel tortuosity radiomics on non-contrast lung CT predict response to immunotherapy, overall survival and are associated with PD-L1 expression. Mehdi Alilou, Pranjal Vaidya, Case Western Reserve Univ. (USA); Alexia Zagouras, Pardnya Patil, Cleveland Clinic (USA); Mohammad Mahdavieh Kharami, Case Western Reserve Univ. (USA); Pingfu Fu, Vamsidhar Velcheti, Cleveland Clinic (USA); Anant Madabhushi, Case Western Reserve Univ. (USA) .... [10950-51]
11:50 am: Magnetically anchored pan-tilt stereoscopic robot with optical-inertial stabilization for minimally invasive surgery. Mojtaba Karimi, Saeed Shiry Ghidary, Amirkabir Univ. of Technology (Iran, Islamic Republic of); Raj Shekhar, Children’s National Health System (UK); Timothy Kane M.D., Reza Montafari, Children’s National Health System (USA) ........ [10951-48]

TUESDAY/WEDNESDAY POSTER VIEWING
ROOM: GRAND HALL  ... 12:00 PM TO 9:00 PM
Posters will be on display Tuesday and Wednesday with extended viewing until 9:00 pm on Tuesday. The poster session with authors in attendance will be Wednesday evening from 5:30 to 7:00 pm. Award winners will be identified with ribbons during the reception. Award announcement times are listed in the conference schedule.

Lunch Break .......... Tue 12:10 pm to 1:20 pm

SPIE seeks to cultivate a culture of openness and inclusivity. Help us eradicate bias and make the world of optics and photonics a shining example of all minds coming together to innovate regardless of gender, race, nationality, culture, educational background, politics, sexuality, body-type and age, for the betterment of life.

Educate yourself on the issues faced by a diverse workforce, challenge your own assumptions, and tap into the rich pool of talent, perspectives, and ideas offered by people different from you.
**Monday, Feb 18, 2019**

**Session 1**

**Room: Town & Country**

**12:00 PM**

*Breast Imaging*

Session Chairs: Nidhi Bosmans, KU Leuven (Belgium); John M. Sabel, GE Healthcare (USA)

1:00 pm: The feasibility study for classification of breast microcalcifications based on photon counting spectral mammography, Hyemi Kim, Do hyeon Kim, Minjae Lee, Hee-Joung Kim, Yonsei Univ. (Korea, Republic of) .................................................. [10948-51]

1:20 pm: Counting spectral mammography, Hyemi Kim, Yonsei Univ. (Korea, Republic of) .................................................. [10948-51]

**12:30 PM**

*Image Enhancement and Modeling*

Session Chairs: Murray H. Low, The George Washington Univ. (USA); Alexandre X. Falcão, Univ. Estadual de Campinas (Brazil)

1:20 pm: Multi-modal image fusion for multispectral super-resolution in microscopy, Neel Dey, Shije Li, NYU Tandon School of Engineering (USA); Katharina Bermond, Universitätsklinikum Würzburg (Germany); Rainer Heintzmann, Friedrich-Schiller-Univers. Jena (Germany); Christine A. Curcic, The Univ. of Alabama at Birmingham (USA); Thomas Ach, Universitätsklinikum Würzburg (Germany); Guido Gerig, NYU Tandon School of Engineering (USA) .................................................. [10948-12]

1:40 pm: Sharpness preserved sinogram synthesis using convolutional neural networks for sparsely-view CT imaging, Jianxi Tan, The Graduate Ctr., CUNY (USA) and Stony Brook Univ. (USA) and The City Univ. of New York (USA); Zhongrong Li, Jiangsu Province Key Lab of Digital Medicine, East China Normal University, Shanghai (China) and The University of New South Wales (Australia); Yumei Hua, The Graduate Ctr., CUNY (USA) and College of Staten Island (USA) and The City Univ. of New York (USA); Lihong Li, College of Staten Island (USA) and The City Univ. of New York (USA); Yumei Hua, The Graduate Ctr., CUNY (USA) and College of Staten Island (USA) and The City Univ. of New York (USA); Lihong Li, College of Staten Island (USA) and The City Univ. of New York (USA) .................................................. [10948-13]

2:00 pm: Deep residual dense U-Net for resolution enhancement in accelerated MRI acquisition, Pak Lun Kevin Ding, Vanderbilt Univ. (USA); John C. Gore, Vanderbilt Univ. Medical Ctr. (USA); Adam W. Anderson, Zhaohua Li, Zhongliang Zu, Baxter P. Rogers, Vanderbilt Univ. Medical Ctr. (USA); Michael I. Miga, Vanderbilt Univ. (USA) .................................................. [10948-50]

2:20 pm: Artificial neural network filters for enhancing 3D optical microscopy images of neurites, Shih-Luen Wang, Seiyed M. M. Kahaki, John Hopkins Univ. (USA); Shih-Luen Wang, Seiyed M. M. Kahaki, John Hopkins Univ. (USA); Priyanshu Tiwari, John Hopkins Univ. (USA) .................................................. [10948-14]

2:40 pm: Volumetric texture modeling using dominant and discriminative binary patterns, Parmeet S. Bhatia, Siemens Healthineers (USA); Amir Kole, Bosch Corporate Research and Technology Ctr. (India); Zhigang Peng, Siemens Healthineers (USA) .................................................. [10948-16]
SESSION 12
ROOM: TOWN & COUNTRY  WED 8:00 TO 9:40 AM

Vascular and Radiomics II
8:00 am: A semi-supervised CNN learning method with pseudo-class labels for vascular calcification detection on low dose CT scans.
Jiamin Liu, Jianhua Yao, Mohammadhadi Bagheri, Ronald M. Summers, National Institutes of Health (USA) .................................................. [10950-57]
8:20 am: Variability in radiomics features among dose reconstruction levels, Joseph J. Foy, The University of Chicago (USA); Mena Shenouda, Univ. of Michigan (USA); Sahar Ramahi, Univ. of Washington (USA); Samuel G. Armutlu III, Daniel Ginat, The University of Chicago (USA) .................................................. [10950-58]
8:40 am: Development and validation of a radiomics-based method for macrovascular invasion prediction in hepatocellular carcinoma with prognostic implications, Jingwei Wei, Institute of Automation (China); Simu Fu, Zhuhai People’s Hospital (China); Shaoting Zhang, Institute of Automation (China); Jie Zhang, Zhuhai People’s Hospital (China); Dongsheng Gu, Institute of Automation (China); Xiaoxin Li, Zhongshan City People’s Hospital (China); Xudong Chen, Shenzhen People’s Hospital (China); Xiaofeng He, Nantong Hospital of the Southern Medical University (China); Jianfeng Yan, Yangjiang People’s Hospital (China); Lipong Lu, Ctr. of Intervention Radiology (China); Jie Tian, Institute of Automation (China) .................................................. [10950-59]

9:00 am: A combination of intra- and peri-tumoral radiomic features from MRI predict prostate cancer risk: a multi-site study. Ahmad Alghory, Case Western Reserve University (USA) .................................................. [10950-60]

9:20 am: Efficient detection of vascular structures using locally connected filtering. Amelie Florence Kouvahe, Catalin Fetea, TeleSudParis (France) .................................................. [10950-61]

Coffee Break.  Wed 9:40 am to 10:10 am

SESSION 12
ROOM: GOLDEN WEST  WED 9:40 TO 9:50 AM

fMRI and DTI
Session Chairs: Martin A. Stynor, The Univ. of North Carolina at Chapel Hill (USA); David R. Haynor, Univ. of Washington (USA) 8:00 am: Detecting connectivity changes in autism spectrum disorder using large-scale Granger causality, Anas Z. Aibdlin, Univ. of Rochester (USA); Adaora M. D’Osuza, Axel Wismuller M.D., Univ. of Rochester Medical Ctr. (USA) .................................................. [10949-21]
8:20 am: Brain network identification in asymptomatic task fMRI data using robust and scalable tensor decomposition, Jan Li, Jessica L. Wisnowski, Anand A. Joshi, Richard M. Leahy, The Univ. of Southern California (USA) .................................................. [10949-22]
8:40 am: Harmonizing 1.5/3T73 adjustment weighted MRI through development of deep learning stabilized microarchitecture estimators, Vishwesh Nath, Vanderbilt Univ. (USA); Samuel Remedios, Middle Tennessee State Univ. (USA); Prasanna Parvathareni, Colin E. Hansen, Reza G. Bayrak, Camilo Bermudez, Justin A. Blaber, Karthik Ramadass, Kurt G. Schilling, Vaibhav A. Janve, Yuji Gao, Yaukincu Hao, Ilwuo Lyu, Vanderbilt Univ. (USA); Owen Williams, Lori Beason-Held, Susan Reenicke, National Institutes of Health (USA); Baxter P. Rogers, Ivona Stepnevicsa, Adam W. Bennett, A. Landman, Vanderbilt Univ. (USA) .................................................. [10949-23]
9:00 am: Improved estimation/denoising connectivity from resting-state fMRI data. Biao Cai, Tulane Univ. (USA); Julia M. Stephen, The Mind Research Network (USA); Tony W. Wilson, Univ. of Nebraska Medical Ctr. (USA); Vine D. Calhoun, The Mind Research Network (USA) and The Univ. of New Mexico (USA); Yu-ping Wang, Tulane Univ. (USA) .................................................. [10949-24]
9:20 am: Longitudinal structural connectivity in the developing brain with projective non-negative matrix factorization, Hjeojung Kim, New York Univ. (USA) .................................................. [10949-25]

Coffee Break.  Wed 9:40 am to 10:10 am

AWARD ANNOUNCEMENTS

ROOM: TOWN & COUNTRY  WED 8:40 TO 9:45 AM
The Physics of Medical Imaging conference RFW runners up, student paper and student poster award recipients will be recognized and certificates distributed.

Coffee Break.  Wed 9:40 am to 10:10 am

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CONF. 10951 continued page 50

CONF. 10952 continued page 50

CONF. 10953 continued page 50

SESSION 1
ROOM: CALIFORNIA  WED 8:00 TO 9:40 AM

Image Perception
Session Chairs: Frank W. Samuelson, U.S. Food and Drug Administration (USA); Robert M. Nishikawa, Univ. of Pittsburgh (USA)
8:00 am: Visual adaptation and the perception of radiological images. (Keynote Presentation), Michael A. Webster, Univ. of Nevada, Reno (USA) .................................................. [10952-1]
9:00 am: Does the strength of the Gist signal predict the difficulty of breast cancer detection in usual presentation and reporting mechanisms? Ziba Gandomkar, Ernest U. Ekpo, Sarah J. Lewis, The Univ. of Sydney (Australia); Karla K. Evans, Univ. of York (UK); Kriscia A. Tapia, Phuong Dung Trieu, The Univ. of Sydney (Australia); Jeremy M. Wolfe, Harvard Medical School; Patrick C. Brennan, The Univ. of Sydney (Australia) .................................................. [10952-2]
9:20 am: Occulomotor behaviour of radiologists reading digital breast tomosynthesis (DBT), Nicholas D’Ardenne, Robert M. Nishikawa, Univ. of Pittsburgh (USA); Chia-Cher Wu, Jeremy M. Wolfe, Visual Attention Lab., Harvard Univ. (USA) .................................................. [10952-3]
Coffee Break.  Wed 9:40 am to 10:10 am

SESSION 1
ROOM: GOLDEN WEST  WED 8:00 TO 9:40 AM

10:00 am: Innovations in Image Processing I
Session Chairs: Vikram D. Kodibagkar, Arizona State Univ. (USA); Nicholas J. Tustison, Univ. of Virginia (USA) 8:00 am: Multiseg pipeline: automatic tissue segmentation of brain MR images with subject-specific atlases. Kevin Pham, The Univ. of North Carolina at Chapel Hill (USA); Xiao Yang, Marc Niethammer, Juan Carlos Prieto, Martin A. Stynor, The Univ. of North Carolina at Chapel Hill (USA) .................................................. [10953-18]
8:20 am: Unsupervised segmentation of micro-CT images based on a hybrid of variational inference and adversarial learning. Takayasu Moriya, Holger R. Roth, Shota Nakamura, Hiroshi Oda, Masahiro Oda, Nagoya Univ. (Japan); Kensaku Mori, Nagoya Univ. and National Advanced Institute of Science and Technology (Japan) .................................................. [10953-19]
8:40 am: Developing a computer-aided image analysis and visualization tool to predict region-specific brain tissue “at risk” for developing acute ischemic stroke, Soopinchan Dansalia, Morteza Heidari, Faranak Aghaei, The Univ. of Oklahoma (USA); Bappaditya Ray, The Univ. of Oklahoma Health Sciences Ctr. (USA); Bin Zheng, The Univ. of Oklahoma (USA) .................................................. [10953-20]
9:00 am: Large-scale parcellation of the ventricular system using convolutional neural networks, Hans E. Allison, Univ. of Iceland (Iceland); Muhan Shao, Johns Hopkins Univ. (USA); Vidar Robertson M.D., Univ. of Iceland (Iceland); Sigurdur Sigurdsson, Icelandic Heart Association (Iceland); Vilumund Guðmundsdottir M.D., Icelandic Heart Association (Iceland) and University of Iceland (Iceland); Jerry L. Prince, Johns Hopkins Univ. (USA); Lotta M. Ellingsen, Univ. of Iceland (Iceland) and Johns Hopkins Univ. (USA) .................................................. [10953-21]
9:20 am: Effective 3D scapula extraction method using low-contrast and high-shape-variability MR data for initial shoulder proproative diagnosis. Xiaoxiao He, Chaowei Tan, Yuting Qiao, Dimitris Metaxas, Kang Li, Rutgers, The State Univ. of New Jersey (USA) .................................................. [10953-22]
Coffee Break.  Wed 9:40 am to 10:10 am
Photon Counting Imaging

Session Chairs: Mats Danielsson, KTH Royal Institute of Technology (Sweden); Rebecca Fahrig, Siemens Healthineers (Germany)

10:10 am: Indirect photon-counting x-ray imaging using CMOS Photon Detector (CPD), Toshikazu Nishihara, Sony Semiconductor Solutions Corp. (Japan); Hiroyasu Baba, Sony Global Manufacturing & Operations Corp. (Japan); Masao Matsumura, Ochi Kumagai, Takashi Izawa, Sony Semiconductor Solutions Corp. (Japan). [10948-65]

10:30 am: Simulation model for evaluating energy-resolving photon-counting CT detectors based on generalized linear-systems framework and dose efficiency for silicon photon-counting detectors for full-field CT using an ASIC with adjustable shape time. Christel Sundborg, KTH Royal Institute of Technology (Sweden); Mats Persson, Stanford Univ. (USA). [10948-66]

10:50 am: Increased count-rate performance and dose efficiency for silicon photon-counting detectors for full-field CT using an ASIC with adjustable shape time. Christel Sundborg, KTH Royal Institute of Technology (Sweden); Mats Danielsson, KTH Royal Institute of Technology (Sweden). [10948-67]

11:10 am: Frequency-dependent MTF and DQE of photon-counting x-ray imaging detectors. Jesse Tanguay, Ryerson Univ. (Canada); Nicholas Mantella, The Univ. of British Columbia Okanagan (Canada); Ian A. Cunningham, Western Univ. (Canada). [10948-68]

11:30 am: Experimental study of neural network material decomposition to account for pulse-pileup effects in photon-counting spectral CT. Parker Jenkins, Taly Gilat Schmidt, Marquette Univ. (USA). [10948-69]

11:50 am: Impacts of photon counting detector to cerebral CT angiography maximum intensity projection (MIP) images. Evan Harvey, Mun Feng, Xu Ji, Ran Zhang, Guang-Hong Chen, Ke Li, Univ. of Wisconsin-Madison (USA). [10948-70]

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Keynote and Highlights

Session Chairs: Tomaž Vrtovec, Univ. of Ljubljana (Slovenia); Hayit Greenspan, Tel Aviv Univ. (Israel)

10:10 am: Deep learning for inverse imaging problems: some recent approaches (Keynote Presentation). Carola-Bibiane Schönlieb, Univ. of Cambridge (UK). [10949-28]

11:10 am: PADDIT: Probabilistic Augmentation of Data using Diffeomorphic Image Transformation. Mauricio Orive, Univ. of Copenhagen (Denmark) and King’s College London (UK) and Biomediq (Denmark).

11:30 am: Effect of statistical mismatch between training and test images for CNN-based deblurring model, D. Ketcha, Tharindu De Silva, Runze Han, Ali Uneri, Johns Hopkins Univ. (USA); Sebastian Vogt, Gerhard Kleinzig, Siemens Healthineers (Germany); Jeffrey H. Siewerdsen, Johns Hopkins Univ. (USA). [10949-28]

11:50 am: Segmentation of corneal optical coherence tomography images using randomized Hough transform. Amr Elsayw, Mohamed Abdel-Mottaleb, Univ. of Miami (USA); Mohamed Abu Shousha, Bascom Palmer Eye Institute (USA). [10949-29]

Lunch Break.  Wed 12:10 pm to 1:20 pm

12:10 pm: Age prediction using a large chest x-ray dataset, Alexandros Karargyris, Satyananda Kashyap, Joy T. Wu, Arjun Sharma, Mehdi Moradi, Evan Harvey, Mun Feng, Xu Ji, Ran Zhang, Guang-Hong Chen, Ke Li, Univ. of Wisconsin-Madison (USA). [10949-69]

12:30 pm: Using multi-task learning to improve diagnostic performance of convolutional neural networks, Mengjie Fang, Di Dong, Institute of Automation (China) and Univ. of Chinese Academy of Sciences (China); Ruijie Sun, Beijing Cancer Hospital (China); Li Fan, Changzhen Hospital, Second Military Medical University (China); Yingyi Sun, Beijing Cancer Hospital (China); Shiyun Liu, Changzhen Hospital, Second Military Medical University (China); Jie Tian, Institute of Automation (China) and Univ. of Chinese Academy of Sciences (China). [10949-67]

Lunch Break.  Wed 12:10 pm to 1:20 pm

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TUESDAY/WEDNESDAY POSTER VIEWING

ROOM: GRAND HALL  12:00 PM TO 9:00 PM

Posters will be on display Tuesday and Wednesday with extended viewing until 9:00 pm on Tuesday. The poster session with authors in attendance will be Wednesday evening from 5:30 to 7:30 pm. Award winners will be identified with ribbons during the reception. Award announcement times are listed in the conference schedule.

Lunch Break.  Tues 12:10 pm to 1:20 pm

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Innovations in Image Processing II

Session Chairs: Vikram D. Kodibagkar, Arizona State Univ. (USA); Nicholas J. Tustison, Univ. of Virginia (USA)

10:10 am: Convex shape model for automated segmentation and landmark localization in high-resolution CT of the foot and ankle. Michael Brehler, Asef Isfam, Johns Hopkins Univ. (USA); Levon O. Voselsang, Dong Yang, William J. Sehnert, Carestream Health, Inc. (USA); Delaram Shakoor, Shapour Demehri M. D., Jeffrey H. Siewerdsen, Wojciech Ziemlewski, Johns Hopkins Univ. (USA). [10953-23]

10:30 am: Skin lesion boundary segmentation with fully automated deep extreme cut methods, Manu Goyal, Manchester Metropolitan Univ. (UK); Jiahui Ng, The Univ. of Sheffield (UK); Moi Hooy Yap, Manchester Metropolitan Univ. (UK). [10953-24]

10:50 am: The effect of color constancy algorithms on semantic segmentation of skin lesions, Jiahui Ng, The Univ. of Sheffield (UK); Manu Goyal, Moi Hooy Yap, Manchester Metropolitan Univ. (UK). [10953-25]

11:10 am: Using deep machine learning to detect esophageal lesions in PET-CT scans, Ian Ackerley, Univ. of Surrey (UK); Rhoide L. Smith, Univ. Hospital of Wales (UK); James W. Scuffham, Emma Lewis, Mark D. Halling-Brown, The Royal Surrey County Hospital NHS Trust (UK); Kevin Wells, Ctr. for Vision Speech & Signal Processing, Univ. of Surrey (UK); Emilie Schueler, Kenneth A. Fetterly, Mayo Clinic (USA). [10953-26]

11:30 am: A web-based system for statistical shape analysis in temporomandibular joint osteoarthritis, Loic Michoud, Univ. of Michigan (USA); Chao Huang, The Univ. of North Carolina at Chapel Hill (USA); Marilla S. Yatake, Antonio Carlos O. Ruelas, Marcos Isshida, Univ. of Michigan (USA); Beatrix Paniagua, Kitware, Inc. (USA); Martin A. Styner, The Univ. of North Carolina at Chapel Hill (USA); Lucie Cevadines, Univ. of Michigan (USA); Juan Carlos Pierre, The Univ. of North Carolina at Chapel Hill (USA). [10953-27]

11:50 am: Measuring hippocampal neuroanatomical asymmetry to better diagnose Alzheimer’s disease. Antonio Martinez-Torteya, Felix Rodriguez-Cantu, Monica Rivera-Davila, Univ. of Monterrey (Mexico); José M. Colayá-Padilla, Univ. Autónoma de Zacatecas (Mexico); José G. Tamez-Peña, Tecnológico de Monterrey (Mexico). [10953-28]

Lunch Break.  Wed 12:10 pm to 1:20 pm
Session Chairs: Quanzheng Li, Massachusetts General Hospital (USA); Yuxiang Xing, Tsinghua Univ. (China).

3:30 pm: Volumetric scout CT images reconstructed from conventional two-view radiograph localizers using deep learning. Juan Montoya, Chenghu Zhang, Ke Li, Guang-Hong Chen, Univ. of Wisconsin-Madison (USA). [10948-76]

3:50 pm: Harnessing the power of deep learning for volumetric CT imaging with single or limited number of projections. Lijue Shen, Wei Zhao, Lei Xing, Stanford Univ. (USA). [10948-77]

4:10 pm: Image quality improvement in cone-beam CT using cycle-GAN with residual block. Yang Lei, Tonghe Wang, Higgins, Xiaofeng Yang, Emory Univ. (USA). [10948-78]

4:30 pm: Artifacts reduction method for phase-resolved cone-beam CT (CBCT) images via a prior image-guided CNN. Shaohua Zhi, Xuanqin Mou, Xi'an Jiaotong Univ. (China). [10948-79]

4:50 pm: Multi-organ segmentation in clinical-computed tomography for patient-specific image quality and dose metrology. Wanqi Fu, Shobhit Sharma, Taylor B. Smith, Rui Hou, Vignesh Agunwa, Mehdi Moradi, Ken C. L. Wong, Medical Systems, Inc. (Switzerland); Jan Klein, Fraunhofer MEVIS Inc. (USA); Volker Dicken, Annika Haensch, Jan Klein, Fraunhofer MEVIS (Germany). [10948-80]

3:50 pm: Interpretable explanations of black box classifiers applied on medical images by meaningful perturbations using variational autoencoders. Hristina Uzunova, Jan Ehrhardt, Timo Kepp, Heinz Handsel, Institut für Medizinische Informatik, Universität zu Lübeck (Germany). [10948-36]

4:10 pm: Fourier decomposition free-breathing 1H MRI perfusion maps in asthma. Alexander M. Matheson, Robarts Research Institute, Western Univ. (Canada); Dante P. I. Capadali, Stanford Univ. (USA); Fumin Guo, Sunnybrook Research Institute, Univ. of Toronto (Canada); Rachel L. Eddy, Robarts Research Institute (Canada); David G. McCormack, London Health Sciences Ctr. (Canada); Grace Parraga, Robarts Research Institute (Canada). [10948-37]


4:50 pm: Quantitative and qualitative methods for efficient evaluation of multiple 3D organ segmentations. Volker Dicken, Arminika Haensch, Jan Moltz, Fraunhofer MEVIS (Germany); Benjamin Haas, Thomas Coradi, Varian Medical Systems, Inc. (Switzerland); Tomasz Morgas, Varian Medical Systems, Inc. (USA); Jan Klein, Fraunhofer MEVIS (Germany). [10948-39]
SESSION 8 (CONTINUED)
ROOM: SAN DIEGO  WED 3:30 TO 5:30 PM

5:10 pm: Spatiotemporal classification of echocardiography videos in point-of-care devices, Arijit Patra, Mohammed Ali Maraci, Institute of Biomedical Engineering, Univ. of Oxford (UK) .................. [10949-40]

SESSION 8 (CONTINUED)
ROOM: PACIFIC SALON 2  WED 3:30 PM TO 5:30 PM

4:50 pm: Initial assessment of neuro pressure gradients in carotid stenosis using 3D printed patient-specific phantoms, Lauren M. Shepard, Univ. at Buffalo (USA) and Canon Stroke and Vascular Research Ctr. (USA); Adnan H. Siddiqui, Kenneth V. Snyder, Elad I. Levy M.D., Jason M. Davies, Canon Stroke and Vascular Research Ctr. (USA) and Univ. at Buffalo (USA); Ciprian N. Ionita, Univ. at Buffalo (USA) and Canon Stroke and Vascular Research Ctr. (USA) . . [10953-38]

5:10 pm: Toward an automatic segmentation of mitral valve chordae, Daryna Panicheva, Pierre-Frederic Villard, Marie-Odile Berger, Lab. Lorrain de Recherche en Informatique et ses Applications (France) and Institut National de Recherche en Informatique et en Automatique (France) ........[10953-39]
Multiscale deep desmoking for laparoscopic surgery. Congcong Wang, Ahmed Kerdoud Mohammed, Faouzi Alayache, Norwegian Univ. of Science and Technology (Norway); Azeddine Begdagh, Univ. Paris 13 (France); Elio Elle, Oleo Univ. Hospital (Norway). [10949-68]


Choroid segmentation in OCT images based on improved U-net. Xuanha Cheng, Xinjian Chen, Yuhui Ma, Weifang Zhu, Soochow Univ. (China); Ying Fan, Shanghai General Hospital (China); Fei Shi, Soochow Univ. (China). [10949-71]

Towards machine learning prediction of deep brain stimulation (DBS) intra-operative efficacy maps. Camilo Bermudez, William J. Rodriguez, Yuankai Huo, Allen E. Hainline, Rui Li, Robert Schulze, Pierre D. D’Haese, Vanderbilt Univ. (USA); Peter E. Konrad, Vanderbilt Univ. Medical Center (USA); Benoit M. Dawant, Bennett A. Landman, Vanderbilt Univ. (USA). [10949-72]

Automated segmentation of the optic disc using the deep learning. Lei Wang, Jiartao Pu, Han Liu, Univ. of Pittsburgh (USA). [10949-73]

Generation of retinal OCT images with diseases based on cGAN. Xuewei Zha, Fei Shi, Yuhui Ma, Weifang Zhu, Xinjian Chen, Soochow Univ. (China). [10949-74]

A probabilistic approach for the registration of images with miss-matched correspondence. Marco Krieger, Jan Ehrhardt, Sandra Schultz, Heinz Handsch, Univ. zu Lübeck (Germany). [10949-75]

Active shape dictionary for automatic segmentation of pathological lung in low-dose CT image. Geng Chen, Dehui Xiang, Haitong Tian, Weifang Zhu, Fei Shi, Soochow Univ. (China); Bin Zhang, The First Affiliated Hospital of Soochow Univ. (China); Xinjian Chen, Soochow Univ. (China). [10949-76]

A genome-predictive framework to capture altered brain activity in fMRI and its association with genetic risk: application to schizophrenia. Sayan Ghosal, Archana Venkataraman, Johns Hopkins Univ. (USA). [10949-77]

Stack-U-Net: refinement network for improved optic disc and cup image segmentation. Artem Sevastopolsky, Youth Labs. Ltd. (Russian Federation) and Skolkovo Institute of Science and Technology (Russian Federation); Tsvetan Draperov, Biostat Labs. Ltd. (Russian Federation) and M.V. Lomonosov Moscow State Univ. (Russian Federation); Konstantin Kiselev, Youth Labs. Ltd. (Russian Federation); Blake M. Snyder, University of Colorado School of Medicine (USA) and Francis I. Proctor Foundation for Research in Ophthalmology (USA) and Univ. of California, San Francisco (USA); Jeremy D. Keenan, Univ. of California, San Francisco (USA) and Francis I. Proctor Foundation for Research in Ophthalmology (USA); Anastasia Georgievskaya, Youth Labs. Ltd. (Russian Federation) and Gorky Academic College of RAS (Russian Federation). [10949-78]

Left ventricle segmentation in LGE-MRI using multi-class learning. Tanja Kurzendorfer, Siemens Healthcare GmbH (Germany) and Friedrich-Alexander-Univers. Erlangen-Nürnberg (Germany); Katharina Breiinger, Stefan Stel, Andreas Maurer, Friedrich-Alexander-Univers. Erlangen-Nürnberg (Germany); Rebecca Fahring, Siemens Healthcare GmbH (Germany) and Friedrich-Alexander-Univers. Erlangen-Nürnberg (Germany). [10949-79]

A CNN based retinal regression model for Bruch’s Membrane Opening detection. Yuhe Shen, Soochow Univ. (China). [10949-80]

Robust harmonic field based tooth segmentation in real-time noisy scanned mesh. Jiaoyang Huang, Shanding Li, Xi Chen, Soochow Univ. (China); Yiming Wang, Lei Ye, Tongzhou Dong. [10949-81]

Tissue segmentation in volumetric laser endomicroscopy datasets from fusionnet and a domain-specific method. Joost van der Putten, Fons van der Sommen, Technische Univ. Eindhoven (Netherlands); Maarten Struyvenberg, Jeroen de Groot, Amsterdam UMC (Netherlands); Wouter Crul, Erik Schoon M.D., Catharina Hospital (Netherlands); Jacques G.J.H.M. Bergman M.D., Amsterdam UMC (Netherlands). [10949-82]


Deep learning based classification for metastasis of hepatocellular carcinoma with microscopic images. Hui Meng, Yuan Gao, Kun Wen, Jie Tian, Institute of Automation (China) and Univ. of Chinese Academy of Sciences (China). [10949-84]


Fully automated lung lobe segmentation in volumetric chest CT with 3D U-Net. Jongha Park, Minho Lee, Seoul National Univ. (Korea, Republic of); Minho Lee, Seoul National Univ. (Korea, Republic of); Hyunsuk Shim, Walter J. Curran, Hui-Kuo Shu, Emory Univ. (USA). [10949-86]

Automatic end-to-end pipeline for CT image based EGRF mutation status classification. Lin Tian, Ruija Technology, Inc. (China); Rong Yuan, Peking Univ. Shenzhen Hospital (China). [10949-87]

MRI-based synthetic CT generation based on domain-specific loss function. Seung Chai Jung, Univ. of Ulsan College of Medicine, Republic of Korea; Sungwook Song, Soojoon Lee, Yoseong Seo, Yonsei Univ. (Korea, Republic of); Minsoo Lee, Soonchunhyang Univ. (Korea, Republic of). [10949-88]

Automatic dental root CBCT image segmentation based on CNN and level set methods. Jun Ma, Nanjing Univ. of Science and Technology (China); Xiaoying Yang, Nanjing Univ. (China). [10949-89]

Automatic rat brain segmentation from MRI using statistical shape models and random forest. Simone Bendzinski, KTH Royal Institute of Technology (Sweden); Irene Brusini, KTH Royal Institute of Technology (Sweden) and Karolinska Institutet (Sweden); Peter Damberg, KTH Royal Institute of Technology (Sweden); Orjan Smedby, KTH Royal Institute of Technology (Sweden); Leif Andersson, Uppsala Univ. (Sweden); Chunliang Wu, KTH Royal Institute of Technology (Sweden). [10949-90]


Reproducibility evaluation of SLANT whole brain analysis of diffusion weighted imaging (DTI) and tract based spatial statistics (TBSS) in healthy subjects with deep convolutional network. Calley I. Kerley, Yuankai Huo, Shikha Chaganty, Shuming Bao, Vanderbilt Univ. (USA); May B. Patel, Vanderbilt Univ. (USA) and Tennessee Valley Healthcare System (USA) and Veterans Affairs Medical Ctr. (USA); Bennett A. Landman, Vanderbilt Univ. (USA). [10949-93]

Group-wise alignment of resting fMRI in space and time. Halesh Akrami, Anand A. Joshi, Jian Li, Richard M. Leahy, Signal and Image Processing Institute, The Univ. of Southern California (USA). [10949-94]
A robust index for global tissue deformation analysis in ultrasound images. Arnaud Brignol, École de Technologie Supérieure (Canada); Farida Cheriet, École Polytechnique de Montréal (Canada); Catherine Laporte, École de Technologie Supérieure (Canada). [10949-104]

Nuclei counting in microscopy images with three dimensional generative adversarial networks. Shuo Han, Sooam Lee, Chichun Fu, Purdue Univ. (USA); Paul Salama, Indiana Univ. - Purdue Univ. Indianapolis (USA); Kenneth W. Dunn, Indiana Univ. School of Medicine (USA); Edward J. Delp III, Purdue Univ. (USA). [10949-105]

Cycle-consistent 3D-generative adversarial network for virtual bowel cleansing in CT colonography. Jannis J. Nägele, Hiroaki Yoshida, Massachusetts General Hospital (USA) and Harvard Medical School (USA). [10949-106]

Robust discomfort detection for infants using an unsupervised roll estimation. Cheng Li, Technische Universität Dresden (Germany). [10949-107]

Automatic detection of the region of interest in corneal endothelium images using dense convolutional neural networks. Juan Pedro Viguera Guillel, Rotterdam Ophthalmic Institute (Netherlands) and Technische Univ. Delft (Netherlands); Hans G. Leming, Jeroen van Rooij, The Rotterdam Eye Hospital (Netherlands); Kimnaand A. Vermeer, Rotterdam Ophthalmic Institute (Netherlands); Lucas J. van Vliet, Technische Univ. Delft (Netherlands). [10949-108]

Pulmonary lobary segmentation from computed tomography scans based on a statistical finite element model and deep learning. Mahyar Osanlouy, Ayesh Clark, Harbinal Kumar, Auckland Bioengineering Institute, The Univ. of Auckland (New Zealand); Margaret Wilsher, David Milne, Auckland City Hospital (New Zealand); Auckland District Health Board (New Zealand); Eric A. Hoffman, The Univ. of Iowa (USA); Merryn Tawhai, Auckland Bioengineering Institute, The Univ. of Auckland (New Zealand). [10949-109]

Fully automated detection and quantification of multiple retinal diseases in OCT volumes based on deep learning and improved DRLSE. Liling Guan, Kai Yu, Xinjiang Chen, Soochow Univ. (China). [10949-110]

Fully automated airway segmentation on CT images using 2.5D and 3D convolutional neural net. Jiyue Yun, Asan Medical Ctr., Univ. of Ulsan College of Medicine (Korea, Republic of); Minho Lee, Seoul National Univ. Hospital (Korea, Republic of); Min Ho Kim, Seoul National Univ. College of Medicine, Asan Medical Ctr. (Korea, Republic of). [10949-111]

Is hippocampus getting fatter with age? a quantitative analysis of fine-scaled dentation feature under the hippocampus on 502 healthy subjects, Shuatu Cui, Xiaoya Xu, Shenzhen Univ. (China); Qishuo Zhang, The Hong Kong Polytechnic Univ. (Hong Kong, China); Chuan Huang, Stony Brook Univ. (USA); Yi Gao, Shenzhen Univ. (China). [10949-112]

Improving action recognition of robotic surgery for prostate cancer via adversarial training. Heechul Jung, Hosomin Yang, Kyungmoon Lee, HUfToM (Korea, Republic of); Jummo Kim, HUfToM (Korea, Republic of) and KAST (Korea, Republic of). [10949-113]


Region-guided adversarial learning for anatomical landmark detection in uterine ultrasound image. Hong Joo Lee, Hak Gu Kim, Hyungseok Cho, KMU/CIST (Korea, Republic of); Yong Man Ro, KAIST (Korea, Republic of). [10949-115]

The impact of MRT-CT registration errors on deep learning-based synthetic CT generation. Malteus C. Florlok, Frank Zijlstra, Image Sciences Institute, Univ. Medical Ctr. Utrecht (Netherlands); Linda G. W. Kemker-Meijer M.D., Matteo Maspero, Cornelis A. T. van den Berg, Univ. Medical Ctr. Utrecht (Netherlands); Marinj van Stralen, Peter R. Seevinck, Image Sciences Institute, Univ. Medical Ctr. Utrecht (Netherlands). [10949-116]

Evolutionary multi-objective meta-optimization of deformion and tissue removal parameters improves the performance of deformable image registration of pre- and post-surgery images. Kleopatra Ppirina, The Netherlands Cancer Institute (Netherlands); Peter A. N. Braun, Medizinische Universität zu Lübeck (Germany) & Informatica (Netherlands); Jan-Jakob Sonke, The Netherlands Cancer Institute (Netherlands); Marcel van Herk, The Univ. of Manchester (UK); Tanja Aderkinderen, Amsterdam UMC (Netherlands). [10949-117]

Renal parenchyma segmentation from abdominal CT images using multi-atlas method with intensity and shape constraints. Hyeyun Kim, Helen Hong, Seoul Women’s Univ. (Korea, Republic of); Chul Hee Jang, Seoul National Univ. College of Medicine, Asan Medical Ctr. (Korea, Republic of); Kiond Chang, Koon Ho Rha, Yonsei Univ. College of Medicine (Korea, Republic of). [10949-118]

Discrimination of benign and malignant pulmonary tumors in computed tomography: effective priori information of fast learning network architecture. Hao-Jun Wang, Leng-Rong Chen, Li-Wei Hsu, Hsiang-Chuan Yang, National Taiwan Univ. (Taiwan); Mong-Wei Lin, National Taiwan Univ. Hospital (Taiwan); Joseph Chang, National Taiwan Univ. (Taiwan); Chia-Chen Li, Institute of Biomedical Engineering National Taiwan Univ. (Taiwan); Jin-Shing Chen, Yuan-Chung Chang, National Taiwan Univ. Hospital (Taiwan); Chung-Ming Chen, Institute of Biomedical Engineering National Taiwan Univ. (Taiwan). [10949-119]

Constructing an average geometry and diffusion tensor magnetic resonance field from freshly explanted porcine hearts. Mia Mojica, Univ. of Ontario Institute of Technology (Canada); Mihaele Pop, Sunnysbrook Research Institute (Canada); Maxime Sermersant, Institut National de Recherche en Informatique et en Automatique (France); Mehran Ebrahim, Univ. of Ontario Institute of Technology (Canada). [10949-120]

 Orbital bone segmentation in head and neck CT images using multi-gray level fully convolutional networks, Min Jin Lee, Helen Hong, Seoul Women’s Univ. (Korea, Republic of); Kyu Won Shim, Yonsei Univ. College of Medicine, Asan Medical Ctr. (Korea, Republic of) and Severance Children’s Hospital (Korea, Republic of); Seongeun Park, Yonsei Univ. College of Medicine (Korea, Republic of). [10949-121]

 Lung cancer detection using co-learning from chest CT images and thoracic X-rays. Jiachen Wang, Yanukai Hsu, Shuxiu Cai, Xiaxia Yu, Shenzhen Univ. (China). [10949-122]

Lung cancer detection and localization of bone erosion using 3D-CGNN. Jie Peng, Lili Chen, Xiaodan Xing, Shanghai United Imaging Intelligence Co., Ltd. (China); Madodel M., Univ. of Copenhagen (Denmark); Ellen M. Hause M.D., Kresten K. Meldorff, M.D., Rasmus K. Jensen, Aarhus Univ. (Denmark); Francois B. Laze, Univ. of Copenhagen (Denmark). [10949-123]


Obtaining the potential number of models/atlases needed for capturing anatomic variations in reproduction images. Ze Jin, Jayaram K. Udapa, Drew A. Torian, Univ. of Pennsylvania (USA). [10949-125]


Deep learning techniques to synthesize µCT from CT for cochlear implant neural activation models, Jeffrey L. Zhang, Jiayang Wang, Jack H. Noble Sr., Vanderbilt Univ. (USA); Robert Labadie M.D., Vanderbilt Univ. Medical Ctr. (USA). [10949-127]


Offset regression networks for view plane estimation in 3D fetal ultrasound. Alexander Schmitt-Riechberg, Nicole Schadowietz, Tobias Kinder, Philips Research (Germany); Robert Trautmann, Earl Canfield, David Roundhill, Philips Ultrasound, Inc. (USA); Cristian Lorenz, Philips Research (Germany). [10949-129]

Brain

 Cranial volumetric prediction in 2D cranial ultrasound images using deep neural networks. Poonam Roshanatib, Children’s National Medical Center (USA). [10949-78]

 Learning semantic segmentation through cross-domain relationships with generative adversarial networks. Thomas Hasso, Platter-Institut (Germany). [10949-79]

 Spatial and depth weighted neural network for diagnosis of Alzheimer’s disease. Qingfeng Li, Shanghai United Imaging Intelligence Co., Ltd. (China). [10950-80]

 Effective discrimination of Alzheimer’s disease states using an ensemble neural network’s model. Junik Eom, Hanbyol Jang, Jinsong Jang, Dongkuk Hwang, Yonsei Univ. (Korea, Republic of). [10950-81]

 Feasibility study of deep neural networks to classify intracranial aneurysms using angiographic parametric imaging, Mohammad Mahdi Shiral Bhurrwadi, Alexander R. Podgorsak, Anusha Ramesh Chandra, Ryan A. Rava, Univ. at Buffalo (USA) and Canon Stroke and Vascular Research Ctr. (USA); Kenneth V. Snyder, Eldad I. Levy, Jason M. Davies, Adnan H. Siddiqui, Canon Stroke and Vascular Research Ctr. (USA) and Univ. at Buffalo (USA); Ciprian N. Ionita, Univ. at Buffalo (USA) and Canon Stroke and Vascular Research Ctr. (USA). [10950-82]

 Non-invasive genotype prediction of chromosome 1p/19q co-deletion by development and validation of an MRI-based radiomics signature in lower-grade gliomas. Je Tian, Institute of Automation (China). [10950-83]

 Diagnosis of OCD using functional connectome and Riemann kernel PCA. Xiaodan Xing, Shanghai United Imaging Intelligence Co., Ltd. (China); Lili Jin, South China Normal Univ. (China); Feng Shi, Shanghai United Imaging Intelligence Co., Ltd. (China); Zhen Peng, Shanghai Key Laboratory of Medical Imaging Computing (China). [10950-84]

 Breast

 Evaluation of U-net segmentation models for infraclavicular volume measurement in acute ischemic stroke: comparison with fixed ADC threshold-based methods. Chaoran Xing, Shanghai United Imaging Intelligence Co., Ltd. (Korea, Republic of) and SAMSUNG Medical Ctr. (Korea, Republic of); Ji-En Lee, Wu Yu, Y-Young Baek, SAMSUNG Medical Ctr. (Korea, Republic of); Han-Gil Jeong, Boon-Joon Kim, Seoul National Univ. Hospital (Korea, Republic of); Joon-Kyung Seong, Shanghai United Imaging Intelligence Co., Ltd. (China). [10950-85]
Multi-path deep learning model for automated mammographic density categorization, Xiangyu Ma, Sun Yat-Sen Univ. (China) and Univ. of Michigan (USA); Caleb E. Fisher, Jun Wei, Mark A. Helvie, Heang-Ping Chan, Chuan Zhou, Lubomir M. Hadjiiski, Yao Lu, Sun Yat-Sen Univ. (China) .......................... [10950-96]

Exploratory learning with convolutional autoencoder for discrimination of architectural distortion in digital mammography, C. Oliveira, Univ. de São Paulo (Brazil); Carlos F. E. Melo, Clínica Eco & Mama Diagnóstico Digital (Brazil); Juliana H. Catani, Nestor Barnos, Marcelo A. Vieira, Univ. de São Paulo (Brazil) .......................... [10950-87]

Computationally-efficient wavlet-based characterization of breast tumors using conventional B-mode ultrasound images, Manar Mahmoud, Mohamed Salaheldien, Muhammad Rashidul, Cairo Univ (Egypt); Iman Ewais, Eman Hosny, Hanan Gewefel, Women and Fetal Imaging Ctr. (Egypt); Ahmed Mahmoud, Cairo Univ. (Egypt) .......................... [10950-88]

Breast dispersion imaging using undersampled rapid dynamic contrast-enhanced MRI, Lixi Shi, Stanford Univ. (USA) .......................... [10950-90]

Deep learning approach predicting breast tumor response to neoadjuvant treatment using two DCE-MRI exams, Mohammed El Adou, Mohamed Amine Larti, Université Libre de Bruxelles (Belgium); Stylianos Drisis M.D., Institut Jules Bordet (Belgium); Mohammed Benjelloun, Univ. de mons (Belgium) .......................... [10950-90]

Computer-aided detection and classification of breast masses in digital mammograms using deep convolution neural network, Guanxiang Cai, Sun Yat-Sen Univ. (China); Yinhao Ren, Duke Univ. (USA); Lars J. Grimm, Maciej K. Borowski, German Cancer Research Center (Krankenhaus Eppendorf) (Germany) .......................... [10950-100]

A shell and kernel descriptor based joint deep learning model for predicting breast lesion malignancy, Zhiguo Zhou, The Univ. of Texas Southwest Medical Ctr. (USA); Gengqiang Qin, Southern Medical College (China); Pingkan Yu, Rensselaer Polytechnic Institute (USA); Hongxia Qiao, Xidian Univ. (China); Steve Jeng, Jing Wang, The Univ. of Texas Southwest Medical Ctr. (USA); Daniel (USA) .......................... [10950-100]

Automatic deep learning model for whole-breast segmentation in diffusion-weighted breast MRI, Mei Zhang, A. Mohamed, Rui Hou, Bingjie Zheng, Univ. of Pittsburgh (USA); Margarita Zuley, Univ. of Pittsburgh Medical Ctr. (USA); Shangdong Wu, Univ. of Pittsburgh (USA) .......................... [10950-97]

Malignant microcalcification clusters detection using unsupervised graph convolution and machine learning, Yi Wang, Tianjin Univ. (China) and The State Univ. of New York (USA); Marc J. Pomeroy, Weiguo Cao, Yongfeng Gao, Stony Brook Univ. (USA); Edward Sun, The State Univ. of New York (USA); Samuel Stanley III, Washington Univ. in St. Louis (USA); Zhengrong Liang, The State Univ. of New York (USA) .......................... [10950-103]

Texture feature analysis of neighboring colon wall for colorectal polyp classification, Marc J. Pomeroy, Almas Abbasi, Kevin Baker, Matthew Barish, Stony Brook Univ. (USA); Samuel Stanley III, Washington Univ. in St. Louis (USA); Perry J. Pickhardt, Univ. of Wisconsin-Madison (USA); Zhengrong Liang, Stony Brook Univ. (USA) .......................... [10950-104]

The development of non-polypoidal colorectal lesions using the texture features extracted from intact colon wall: a pilot study, Sang Hainan, Meng Jiang M.D., Yang Liu, Hongbing Li, Fourth Military Medical Univ. (China) .......................... [10950-95]

Differentiation of polyps by clinical colonoscopy via integrated color image analysis and machine learning, Yi Wang, Tianjin Univ. (China) and The State Univ. of New York (USA); Marc J. Pomeroy, Weiguo Cao, Yongfeng Gao, Stony Brook Univ. (USA); Edward Sun, The State Univ. of New York (USA); Samuel Stanley III, Washington Univ. in St. Louis (USA); Zhengrong Liang, Stony Brook Univ. (USA) .......................... [10950-96]

Early detection of retinopathy of prematurity using deep learning from retinal images, Ponnurangam Mulay, Keerthi Ram, Mohanakrishnan Sugrapakasm, Indian Institute of Technology Madras (India); Anand V. Veenker, Narayana Nethralayaya Postgraduate Institute of Ophthalmology (India) .......................... [10950-110]

Longitudinal matching of in vivo adaptive optics images of fluorescent cells in the human eye using stochastically consistent superpixels, Jianli Liu, Hao Wen, Jung Tao, Liu Johnny Yam, National Institute of Health (USA) .......................... [10950-100]

Computer-based detection of age-related macular degeneration and glaucoma using retinal images and clinical data, Vinayak Joshi, Luke A. Chaplin, Tim F. Cootes, The Univ. of Manchester (UK); Jordan Fuhrman, Jennie Crosby, The Univ. of Chicago (USA); Claudia Henschke, Bilal Quadri, Abhinav Vij M.D., David Fetzer M.D., Takeshi Yokoo M.D., Alan Moody, Sunnybrook Health Sciences Ctr (Canada) .......................... [10950-115]


Heart

Develop MRI post processing protocol for cardiovascular risk detection in asymptomatic diabetic patients, Mariam Afshtin, Rashma Mahmoud, Alan Moody, Sunnybrook Health Sciences Ctr (Canada) .......................... [10950-115]


Detection and classification of coronary artery calcifications in low dose thoracic CT using deep learning, Jordan Fuhrman, Jennie Crosby, The Univ. of Chicago (USA); Claudia Henschke, David Yankelowitz, Icahn School of Medicine at Mount Sinai (USA); Mariellen L. Giger, The Univ. of Chicago (USA) .......................... [10950-117]

Head


Quantitative evaluation of local head malformations from 3D photography: application to craniosynostosis, Luyu Tu, Antonio R. Porras, Sheikh Zayed Institute for Pediatric Surgical Innovation, Children’s National Health System (USA); Albert Oh, Children’s National Health System (USA); Natasha Lepore, Children’s Hospital Los Angeles (USA) and The Univ. of Southern California; Graham C. Buck, Sheikh Zayed Institute for Pediatric Surgical Innovation, Children’s National Health System (USA); Debi Taerum, Children’s National Health System (USA); Annet Eshoefahou, Khware, Inc. (USA); Robert Keating, Children’s National Health System (USA) .......................... [10950-113]

Predicting resection volume in the nasal cavity to estimate surgical outcomes, Manuel Berger, Medicinska Univeristad Innsbruck (Austria) and MCI Management Center Innsbruck Internationale Hochschule GmbH (Austria); Martin Piltie, Friedrich-Alexander-Universit Erlangen-Nurnberg (Germany) and MCI Management Center Innsbruck Internationale Hochschule GmbH (Austria); Andreas Mehr, MCI Management Center Innsbruck Internationale Hochschule GmbH (Austria); Wolfgang Recheis, Management Center Innsbruck Internationale Hochschule GmbH (Austria); Michael Kranzer, MCI Management Center Innsbruck Internationale Hochschule GmbH (Austria) .......................... [10950-114]

Kidneys

Deep learning based bladder cancer treatment response assessment, Eric Wu, Lubomir M. Hadjiiski, Ravi K. Samala, Haneng-Ping Chen, Univ. of Michigan (USA); Kenny H. Cha, U.S. Food and Drug Administration (USA); Caleb Richter, Richard H. Cohan, Elaine M. Caooli, Chintanta Paramagul, Ajai Alva, Alan Z. Weizer, Univ. of Michigan (USA) .......................... [10950-120]

Liver

Application of deep learning convolutional neural networks to the detection of liver disease severity from ultrasound texture, Alex Treacher, Daniel Beauchamp, Bilal Quadri, Abhinav Vij M.D., David Fetzer M.D., Takeshi Yokoo M.D., Alan Moody, Sunnybrook Health Sciences Ctr (Canada) .......................... [10950-121]

Lung

Automated identification of thoracic pathology from chest radiographs with enhanced training pipeline, Adora D. Mosoua, Univ. of Rochester (USA); Keisuke Matsuoka, Univ. of Rochester Medical Ctr. (USA) .......................... [10950-123]

3D fully convolutional network-based segmentation of lung nodules in CT images with a clinically inspired data synthesis method, Atsushi Yaguchi, Toshiba Corp. (Japan); Kota Aoyagi, Canon Medical Systems Corp. (Japan); Akiyuki Tanizawa, Toshiba Corp. (Japan); Yoshinari Ohno, Kobe Univ. School of Medicine (Japan) .......................... [10950-124]

A lung graph model for the classification of interstitial lung disease on CT images, Guillaume Vanost, INP-ENSEEHT (France) and Fachhochschule NordWestschweiz (Switzerland); Yasmin Doreite D, Fachhochschule NordWestschweiz (Switzerland) and Ude De Genève (Switzerland); Adrien Depeursinge, Fachhochschule NordWestschweiz (Switzerland) and Ctr. Hospitalier Uvaodis, Carlet Univ. (Switzerland) .......................... [10950-125]
As a conference participant, your research is making important contributions to imaging developments. We ask you to consider the *Journal of Medical Imaging* as your journal of choice to publish this important work.

Maryellen L. Giger  
The University of Chicago 
Editor-in-Chief

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THURSDAY 21 FEBRUARY

CONFERENCE 10949
ROOM: SAN DIEGO
Wed. - Thurs. 20–21 Feb. 2019
Proceedings of SPIE Vol. 10949

CONFERENCE 10952
ROOM: CALIFORNIA
Wed. - Thurs. 20–21 Feb. 2019
Proceedings of SPIE Vol. 10952

CONFERENCE 10953
ROOM: PACIFIC SALON 2
Wed. - Thurs. 20–21 Feb. 2019
Proceedings of SPIE Vol. 10953

CONFERENCE 10956
ROOM: GOLDEN BALLROOM
Wed. - Thurs. 20–21 Feb. 2019
Proceedings of SPIE Vol. 10956

SESSION 9
ROOM: SAN DIEGO ........................ THU 8:00 AM TO 9:40 AM
Cardiac Imaging
Session Chairs: Punam Kumar Saha, The Univ. of Iowa (USA); Hayit Greenspan, Tel Aviv Univ. (Israel)
8:00 am: Automatic cardiac landmark localization by a recurrent neural network, Mike van Zon, Mitko Veta, Technische Univ. Eindhoven (Netherlands); Shuo Li, Digital Imaging Group of London (Canada) and Western Univ. (Canada) ................. [10949-42]
8:20 am: Coronary calcium detection using 3D attention identical dual deep network based on weakly supervised learning, Yuankai Huo, James G. Terry, Jiachen Wang, Sandro Queirós, Pedro Morais, Weimin Zhou, Sayantan Bandyopadhyay, Yonsei Institute of Convergence Technology, Yonsei Univ. (Korea, Republic of) .......... [10952-20]
8:40 am: Semi-automatic aortic valve tract segmentation in 3D cardiac magnetic resonance images using shape-based B-spline explicit active surfaces, Sandro Queirós, Pedro Morais, Jaime C. Fonseca, Life and Health Sciences Research Institute (Portugal); Jan D’hooge, KU Leuven (Belgium); Júlia L. Vilaca, Instituto Politécnico do Cavado e do Ave (Portugal) ... [10949-43]
9:00 am: Towards increased trustworthiness of deep learning segmentation methods on cardiac MRI, Jörg Sander, Bob D. de Vos, Jelmer M. Wolterink, Ivana Ilgum, Univ. Medical Ctr. Utrecht (Netherlands) ................. [10949-44]
Coffee Break ................................ Thu 9:40 am to 10:10 am

SESSION 5
ROOM: CALIFORNIA .................... THU 8:00 AM TO 9:40 AM
Deep Learning Applications
Session Chairs: Maciej A. Mazurowski, Duke Univ. (USA); Pontus A. Timberg, Scaniaas Univ. Hospital (Sweden)
8:00 am: Correlation between a deep-learning-based model observer and human observer for a realistic lung nodule localization task in chest CT, Hao Gong, Andrew Walther, Isabelle Hu, Chi Wan Koo, Edwin A. Takahashi, David L. Levin, Tucker F. Johnson, Shuai Long, Joel G. Fletcher, Cynthia H. McCollough, Lifeng Yu, Mayo Clinic (USA) ................. [10952-19]
8:20 am: Implementation of an ideal observer model using convolutional neural network for breast CT images, Gihan Kim, Minh Anh Han, Huyang Shim, Jongduk Baek, Yonsei Institute of Convergence Technology, Yonsei Univ. (Korea, Republic of) ................. [10952-20]
8:40 am: Learning stochastic object model from noisy imaging measurements using AmbientGANs, Weimín Zhou, Sayantan Bandyopadhyay, Frank Brooks, Mark A. Anastasio, Washington Univ. in St. Louis (USA) ................. [10952-21]
9:00 am: BI-RADS density categorization using deep neural networks, Ziba Gandomkar, Moayyad E. Suleiman, Delgermaa Paniagua, Kitware, Inc. (USA); Antonio Carlos O. Ruellas, Univ. of Otago, Christchurch (New Zealand); Nigel G. Anderson, Univ. of Otago, Christchurch (New Zealand); Anthony Butler, Univ. of Otago, Christchurch (New Zealand); Kenzie Baer, Seamus Tredinnick, Tim Woodfield, Univ. of Otago, Christchurch (New Zealand); Marzieh Anjomrouz, MARS Bioimaging Ltd. (New Zealand); Fatemeh Asghariomabad, Univ. of Otago, Christchurch (New Zealand) and Human Interface and Human Interface Technology Lab. (New Zealand); Shishir Dahal, Univ. of Otago, Christchurch (New Zealand) and Ministry of Health (New Zealand); Aurijoy Majumdar, Univ. at Buffalo, State University of New York (USA); Kuang-Yu Jen, Univ. of California, Davis (USA); Sanjay Jain, Washington Univ. in St. Louis (USA); John E. Tomaszewski, Pinaki Sarder, Univ. at Buffalo (USA) ................. [10956-6]
9:40 am: A deep learning framework for context-aware mitotic activity estimation in whole slide images, Pushpak Patt, IBM Research - Zürich (Switzerland) and ETH Zurich (Switzerland); Paul Catena, Maria Gabriani, IBM Research - Zürich (Switzerland) ................. [10956-7]
9:00 am: Assessment of metal implant induced artefacts using photon counting spectral CT, Maya Rajasekari Amma, Kenzie Baer, Seamus Tredinnick, Tim Woodfield, Univ. of Otago, Christchurch (New Zealand); Peter Walker, Univ. of Otago (New Zealand); Benjamin Bamford, Amrit R. Jaya, Univ. of Otago, Christchurch (New Zealand); Anthony Butler, Univ. of Otago, Christchurch (New Zealand) and MARS Bioimaging Ltd. (New Zealand) and of Canterbury (New Zealand); Bikash Pratap, Univ. of Otago, Christchurch (New Zealand) and Human Interface Technology Lab. (New Zealand); Steven D. Alexander, Univ. of Canterbury (New Zealand); Nigel G. Anderson, Univ. of Otago, Christchurch (New Zealand); Marzieh Anjomrouz, MARS Bioimaging Ltd. (New Zealand); Fatemeh Agharhoramibadd, Univ. of Otago, Christchurch (New Zealand); Ali Alfarhadi, Stephen P. Bell, MARS Bioimaging Ltd. (New Zealand); Smriti Bheesette, Pierre Carbonne, Univ. of Otago, Christchurch (New Zealand) and CERN (Switzerland); Alexander I. Chernogolov, Lincoln’s Inn Fields (New Zealand) and Human Interface Technology Lab. (New Zealand); Shishir Dahal, Univ. of Otago, Christchurch (New Zealand) and Ministry of Health and Population (Nepal) and National Academy of Medical Sciences (Nepal); etc. ... [10953-43]
9:20 am: Quantitative cartilage imaging using spectral photon-counting detector based computed tomography, Kishore Rajendran, Shengchen Tao, Amy Benike, Shuai Long, Cynthia H. McCollough, Mayo Clinic (USA) ................. [10953-44]
Coffee Break ................................ Thu 9:40 am to 10:10 am

SESSION 9
ROOM: PACIFIC SALON 2 ............. THU 8:00 AM TO 9:40 AM
Bone
Session Chairs: Andrzej Krol, SUNY Upstate Medical Univ. (USA); Baohong Yuan, The Univ. of Texas at Arlington (USA)
8:00 am: Methods for quantitative characterization of bone injury from computed-tomography images, Pablo Hernandez-Cerdan, Beatriz Paniagua, Kitware, Inc. (USA); Jack Prothero, James S. Marron, Eric Livingston, Ted Bateman, The Univ. of North Carolina at Chapel Hill (USA); Matthew M. McCormick, Kitware, Inc. (USA) ................. [10953-40]
8:20 am: Quantitative evaluation of bone microstructure using high-resolution extreme cone-beam CT with a CMOS detector, Shalini Subramanian, Michael Brehler, Gihan Cao, Johns Hopkins Univ. (USA); Fernando J. Quevedo-González, Ryan E. Breighner, John A. Carrino, Timothy Wright, Hospital for Special Surgery (USA); John I. Yorkton, Carestream Health, Inc. (USA); Jeffrey L. Siebersdorff, Wojciech Zbjezowski, Johns Hopkins Univ. (USA) ................. [10953-41]
8:40 am: Advanced statistical classification to classify high-dimensional textural probability-distribution matrices, Jack Prothero, The Univ. of North Carolina at Chapel Hill (USA); Jean-Baptiste Vilmot, Kitware, Inc. (USA); Antonio Carlos O. Ruellas, Univ. of Michigan (USA); James S. Marron, The Univ. of North Carolina at Chapel Hill (USA); Matthew M. McCormick, Kitware, Inc. (USA); Lucia Cevaditas, Erika Benavides, Univ. of Michigan (USA); Beatriz Paniagua, Kitware, Inc. (USA) ................. [10953-42]
9:00 am: Assessment of metal implant induced artefacts using photon counting spectral CT, Maya Rajasekari Amma, Kenzie Baer, Seamus Tredinnick, Tim Woodfield, Univ. of Otago, Christchurch (New Zealand); Peter Walker, Univ. of Otago (New Zealand); Benjamin Bamford, Amrit R. Jaya, Univ. of Otago, Christchurch (New Zealand); Anthony Butler, Univ. of Otago, Christchurch (New Zealand) and MARS Bioimaging Ltd. (New Zealand) and of Canterbury (New Zealand); Bikash Pratap, Univ. of Otago, Christchurch (New Zealand) and Human Interface Technology Lab. (New Zealand); Steven D. Alexander, Univ. of Canterbury (New Zealand); Nigel G. Anderson, Univ. of Otago, Christchurch (New Zealand); Marzieh Anjomrouz, MARS Bioimaging Ltd. (New Zealand); Fatemeh Agharhoramibadd, Univ. of Otago, Christchurch (New Zealand); Ali Alfarhadi, Stephen P. Bell, MARS Bioimaging Ltd. (New Zealand); Smriti Bheesette, Pierre Carbonne, Univ. of Otago, Christchurch (New Zealand) and CERN (Switzerland); Alexander I. Chernogolov, Lincoln’s Inn Fields (New Zealand) and Human Interface Technology Lab. (New Zealand); Shishir Dahal, Univ. of Otago, Christchurch (New Zealand) and Ministry of Health and Population (Nepal) and National Academy of Medical Sciences (Nepal); etc. ... [10953-43]
9:20 am: Quantitative cartilage imaging using spectral photon-counting detector based computed tomography, Kishore Rajendran, Shengchen Tao, Amy Benike, Shuai Long, Cynthia H. McCollough, Mayo Clinic (USA) ................. [10953-44]
Coffee Break ................................ Thu 9:40 am to 10:10 am

AWARD ANNOUNCEMENTS
ROOM: PACIFIC SALON 2 ............. 9:40 AM TO 9:45 AM
Award Announcements
The Biomedical Applications in Molecular, Structural, and Functional Imaging conference RFW runners up and poster award recipients will be recognized and certificates distributed.

Coffee Break ................................ Thu 9:40 am to 10:10 am
SESSION 10

ROOM: SAN DIEGO ................. THU 10:10 AM TO 12:10 PM
Registration and Motion
Session Chairs: Murray H. Loew, The George Washington Univ. (USA); Olivier Colliot, Ctr. National de la Recherche Scientifique (France)

10:10 am: Bayesian inference for uncertainty quantification in point-based deformable image registration, Sandra Schultz, Julia Krüger, Heinz Handels, Jan Enthardt, Univ. zu Lübeck (Germany) ................................... [10949-46]

10:30 am: Unsupervised learning for large motion thoracic CT follow-up registration, Alessa Hering, Stefan Heldmann, Fraunhofer MEVIS (Germany) ................................ [10949-47]


11:10 am: Accurate registration of 3D time-lapse microscopy images, Seyed M. M. Kahaki, Shih-Luen Wong, Armen Stepanyants, Northeastern Univ. (USA) ................................ [10949-49]

11:30 am: Analysis of the cinematic motion of the wrist from 4D magnetic resonance imaging, Babool Abbas, James Fishbaugh, New York Univ. (USA); Catherine Petchprapa, Riccardo Lattanzi, NYU Langone Health (USA); Guido Gerig, New York Univ. (USA) ........................................................ [10949-50]

11:50 pm: Automatic left ventricular segmentation in 4D interventional ultrasound data using a patient-specific temporal synchronized shape prior, Pedro Morais, Sandro Queiró, Carla Pereira, Maria J. Baptista, Life and Health Sciences Research Institute (Portugal); Nuno F. Rodrigues, Instituto Politécnico do Cávado e do Ave (Portugal); Jan D’hooge, KU Leuven (Belgium); Daniel Barbosa, João L. Vilaça, Instituto Politécnico do Cávado e do Ave (Portugal) ................................... [10949-51]

AWARD ANNOUNCEMENTS

ROOM: SAN DIEGO .................. 12:10 PM TO 12:15 PM
Award Announcements
The Image Processing Student Paper Award, conference FWI runners up, and poster award recipients will be recognized and certificates distributed.

Lunch Break ........................... Thu 12:10 pm to 1:20 pm

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SESSION 6

ROOM: CALIFORNIA ............... THU 10:10 AM TO 11:50 AM
Observer Performance
Session Chairs: Elizabeth A. Krupinski, Emory Univ. School of Medicine (USA); Stephen L. Hillis, The Univ. of Iowa (USA)

10:10 am: Development of methods to evaluate probability of reviewer’s assessment bias in blinded independent central review (BICR) RECIST (response evaluation criteria in solid tumors) imaging studies, J. Michael O’Connor, PAREXEL International Corp. (USA); Manish Sharma M.D., Anitha Singareddy M.D., PAREXEL International Corp. (India) ........ [10952-24]

10:30 am: Reader disagreement index: a better measure of overall review quality in an oncology trial compared to adjudication rate, Manish Sharma M.D., PAREXEL International Corp. (India); J. Michael O’Connor, PAREXEL International Corp. (USA); Anitha Singareddy M.D., PAREXEL International Corp. (India) .......................... [10952-25]

10:50 am: A 2-AFC study to validate artificially inserted microcalcification clusters in digital mammography, Lucas R. Borges, Marcelo A. C. Vieira, Escola de Engenharia de São Carlos (Brazil) .......................................... [10952-26]

11:10 am: The relationship between breast screening readers’ real-life performance and their associated performance on the PERFORMS scheme, Ling Dong, Loughborough Univ. (UK); Jacque Jenkins, Public Health England (UK); Eleanor Cornford, Cheltenham General Hospital (UK); Yan Chen, Loughborough Univ. (UK) .......................................................... [10952-27]

11:30 am: Comparing senior residents’ performance to experienced radiologists in Jordan in lung cancer detection, Bader Al-Mohammed, The Univ. of Sydney (Australia); Stephen L. Hillis, The Univ. of Iowa (USA); Warren M. Reed, Patrick C. Brennan, The Univ. of Sydney (Australia) ........................ [10952-28]

AWARD ANNOUNCEMENTS

ROOM: CALIFORNIA .................. 11:50 AM TO 11:55 AM
Award Announcements
The Image Perception, Observer Performance, and Technology Assessment conference FWI runners up and poster award recipients will be recognized and certificates distributed.

Lunch Break ........................... Thu 12:10 pm to 1:20 pm

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SESSION 10

ROOM: PACIFIC SALON 2 ........ THU 10:10 AM TO 11:50 AM
MRI and fMRI
Session Chairs: Amir A. Amini, Univ. of Louisville (USA); Vikram D. Kodibagkar, Arizona State Univ. (USA)

10:10 am: Auto-labeling of respiratory time points in free-breathing thoracic dynamic MR image acquisitions for 4D image reconstruction, Changan Sun, Jilin Univ. (China) and Univ. of Pennsylvania (USA); Yubing Tong, Jayaram K. Udupa, Caiyun Wu, Univ. of Pennsylvania (USA); Shuxu Gu, Jilin Univ. (China); Joseph M. McDonough, The Children’s Hospital of Philadelphia (USA); Drew A. Torigni, Univ. of Pennsylvania (USA); Robert M. Campbell, The Children’s Hospital of Philadelphia (USA) ........... [10953-45]

10:30 am: Semi-automatic myocardial segmentation of T1-mapping cardiovascular magnetic resonance images using deformable non-rigid registration from CINE images, Nadia A. Farrag, Carleton Univ. (Canada); James A. White M.D., Univ. of Calgary (Canada); Eranana Ukwatta, Univ. of Guelph (Canada); Christian Overgaard, Kalle Åström, Anders Heyden, Lund Univ. (Sweden) .......................... [10953-46]

10:50 am: Classification of autism spectrum disorder from resting-state fMRI with mutual connectivity analysis, Adora M. D’Souza, Univ. of Rochester (USA); Anas Z. Abidin, Axel Wismüller, Univ. of Rochester Medical Ctr. (USA) ....... [10953-47]

11:10 am: Automated signal drift and global fluctuation removal from 4D fMRI data based on principal component analysis as a major preprocessing step for fMRI data analysis, Harshit S. Parmar, Brian Nutter, Sunanda D. Mitra, Texas Tech Univ. (USA); Rodney Long, Sameer K. Antani, National Institutes of Health (USA) ................ [10953-48]

11:30 am: Serial 9.4 MRI of the mouse circle of Willis to study flow-induced cerebral vascular remodeling, Vincent Tutino, Hamidreza Razjabzadeh-Oghaz, Anusha Ramech Chandra, Liza Gutierrez, Ferdinand Schweser, Adnan H. Siddiqui, Ciprian N. Ionita, Univ. at Buffalo (USA) .............. [10953-49]

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SESSION 4

ROOM: GOLDEN BALLROOM ........ THU 10:10 AM TO 12:10 PM
Precision Medicine and Grading

10:30 am: Computer aided antibody screening for IHC assay development, Faranak Aghaei, Univ. of Oklahoma (USA); Yao Nee, Roche Tissue Diagnostics (USA) ................................ [10956-10]

10:50 am: Automatic high-grade cancer detection on prostatectomy histopathology images, Wenchao Han, Western Univ. (Canada); Carol Johnson, London Health Science Ctr. (Canada); Mona Gued, Jose Gomez-Lemus, Madeleine Moussa, Joseph Chn, Stephen Paultier, Glenn Bauman, Aaron Ward, Western Univ. (Canada) .................. [10956-11]

11:10 am: Automatic detection of small areas of Gleason grade 5 in prostate tissue using CNN, Kasper Tall, Ida Avdissid, Niels Christian Overgaard, Katte Aström, Anders Heyden, Lund Univ. (Sweden) .......................... [10956-12]

11:30 am: Two-tier classifier for identifying small objects in histological tissue classification: experiments with colon cancer tissue mapping, Chen-Yu Sun, Scott Doyle, Weiqiu Liu, Univ. at Buffalo (USA) ................ [10956-13]

11:50 am: Persistent homology for the automatic classification of prostate cancer aggressiveness in histopathology images, Peter J. Lawson, Tulane Univ. (USA); Jordan Schupbach, Montana State Univ. (USA) .................. [10956-14]

Lunch Break ........................... Thu 12:10 pm to 1:20 pm

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**SESSION 11**

**ROOM: SAN DIEGO**

**THURSDAY 21 FEBRUARY**

ROOM: SAN DIEGO  ................ THU 1:20 PM TO 3:00 PM

Deep Learning: Lesions and Pathologies

Session Chairs: Martin A. Styner, The Univ. of North Carolina at Chapel Hill (USA); Kenji Suzuki M.D., Illinois Institute of Technology (USA)

1:20 pm: Unsupervised brain lesion segmentation from MRI using a convolutional autoencoder, Hans E. Altfaun, Univ. of Iceland (Iceland); Akselie M.D., Lands lavda (Iceland); Sigurdur Sigurdsdottir, Icelandic Heart Association (Iceland); Vilumund Guðmundsdottir, Icelandic Heart Association (Iceland) and Univ. of Iceland (Iceland); Lotta M. Ellingsen, Univ. of Iceland (Iceland) and Johns Hopkins Univ. (USA)  .... [10949-52]

1:40 pm: Fully automated untrapped intracranial aneurysm detection and segmentation from digital subtraction angiography series using an end-to-end spatiotemporal deep neural network, Hailan Jin, Union Strong Technology Co., Ltd. (China); Yin Yin, Nuance Communications Inc. (USA); Minghui Hu, Guangming Yang, Lan Qin, Union Strong Technology Co., Ltd. (China)  .... [10949-53]

2:00 pm: CT synthesis from MRI images for orthopedic applications in the lower arm using a conditional generative adversarial network, Frank Zijlstra, Koen Willemsen M.D., Maitcecz C. Florêkow, Ralph J. B. Sakkers M.D., Harrie H. Weins, Bart C. H. van der Wal M.D., Mirjana van Stralen, Peter R. Seevinck, Univ. Medical Ctr. Utrecht (Netherlands)  .... [10949-54]

2:20 pm: Weakly supervised fully convolutional network for PET lesion segmentation, Saarabeh Atsunari, Aisha Bentaieb, Zohra Minia Ata, Ghassan Hamamneh, Simon Fraser Univ. (Canada)  .... [10949-55]

2:40 pm: Lesion focused super resolution, Jin Zhu, Univ. of Cambridge (UK); Guang Yang, Cardiovascular Biomedical Research Unit, Royal Brompton Hospital (UK) and National Heart and Lung Institute, Imperial College London (UK); Pietro Lio, Univ. of Cambridge (UK)  .... [10949-56]

Coffee Break  ....................... Thu 3:00 pm to 3:30 pm

**SESSION 7**

**ROOM: CALIFORNIA**

**THU 1:20 PM TO 3:00 PM**

Observer Performance in Breast Imaging

Session Chairs: Claudia R. Mello-Thoms, The Univ. of Sydney (Australia); Yan Chen, Loughborough Univ. (UK)

1:20 pm: Binding of the second reader in mammography screening: impact on behaviour and cancer detection, Sten Taylor-Phillips, The Univ. of Warwick (UK)  .... [10952-29]

1:40 pm: An observer study to assess the detection of different types of lesions using 2D mammography, digital breast tomosynthesis and synthetic 2D imaging, Alastair MacKenzie, The Royal Surrey County Hospital NHS Trust (UK); Emma L. Thomson, The Royal Surrey County Hospital NHS Trust (UK) and Univ. of Surrey (UK); Premkumar Elangovan, The Royal Surrey County Hospital NHS Trust (UK); Chantal Van Ongeval, Lesley Cockram, KU Leuven (Belgium); Lucy M. Warren, The Royal Surrey County Hospital NHS Trust (UK); Rosalind M. Givens Wilson, St George’s Univ. Hospitals NHS Foundation Trust (UK); Louise S. Wilkinson, Oxford Univ. Hospitals NHS Foundation Trust (UK); Matthew G. Walls, Cambridge Univ. Hospitals NHS Foundation Trust (UK) and NIHR Cambridge Biomedical Research Ctr. (UK); David R. Dance, Kenneth C. Young, The Royal Surrey County Hospital NHS Trust (UK)  .... [10952-30]

2:00 pm: 2D single-slice versus 3D viewing of simulated tomosynthesis images of a small-scale breast tissue model, Christiana Battla, Ioannis Sechopoulos, Radboud Univ. Medical Ctr. (Netherlands); Wouter J. H. Veldcamp, Leiden Univ. Medical Ctr. (Netherlands); Ruben E. van Engen, Radboud Univ. Medical Ctr. (Netherlands); Ingrid S. Reiser, The Univ. of Chicago (USA)  .... [10952-31]

2:20 pm: Changes in breast density, Lucy M. Warren, Mark D. Halling-Brown, The Royal Surrey County Hospital NHS Trust (UK); Louise S. Wilkinson, Oxford Univ. Hospitals NHS Foundation Trust (UK); Rosalind M. Givens Wilson, St George’s Hospital NHS Foundation Trust (UK); Rita McAviney, Jarvis Breast Screening Trust (UK); Matthew G. Walls, Cambridge Univ. Hospitals NHS Foundation Trust (UK); David R. Dance, Kenneth C. Young, The Royal Surrey County Hospital NHS Trust (UK) and Univ. of Surrey (UK)  .... [10952-32]

2:40 pm: Assessment of a quantitative mammographic imaging marker for breast cancer risk prediction, Mortiz Bernardi, Seyyelkhatysh Mirkhakbarvand, Abolfazl Zarifi Khuzani, The Univ. of Oklahoma (USA); Wei Qian, The Univ. of Texas at El Paso (USA); Yuchen Qiu, Bin Zheng, The Univ. of Oklahoma (USA)  .... [10952-33]

**CONFERENCE 10949 continued page 63**
3:30 pm: Variational autoencoding tissue response to microenvironment perturbation, Geoffrey Schau, Young Hwan Chang, Oregon Health & Science Univ. (USA) .................. [10949-57]
3:50 pm: Approximation of a pipeline of unsupervised retina image analysis methods with a CNN, Friso G. Heslinga, A. J. H. M. Houben, Maastricht Univ. Medical Ctr. (Netherlands); Metin N. Gurcan M.D., Wake Forest Baptist Medical Ctr. (USA) ............................. [10956-25]
4:10 pm: Segmentation of corneal optical coherence tomography images using Graph Search and Radon transform, Amr Elsawy, Mohamed Abdel-Mottaleb, Univ. of Miami (USA); Mohamed Abou Shousha, Bascom Palmer Eye Institute (USA) .................. [10956-22]
4:30 pm: Predicting Histopathological Findings of Gastric Cancer via Deep Generalized Multi-instance Learning, Mengjie Fang, Institute of Automation (China) and Univ. of Chinese Academy of Sciences (China); Wenjuan Zhang, Lanzhou Univ. Second Hospital (China); Di Dong, Institute of Automation (China) and Univ. of Chinese Academy of Sciences (China); Junlin Zhou, Lanzhou Univ. Second Hospital (China); Je Tian, Institute of Automation (China) and Univ. of Chinese Academy of Sciences (China) .................. [10956-21]
5:10 pm: Joint region and nucleus segmentation for machine learning based approach for fully automated segmentation of Muscularis Propria from histopathology images of intestinal specimens, Fatemeh Zabihollahy, Conor McKeen, Jinu Kurian, Adrian D. C. Chan, Carleton Univ. (Canada); Dina E. Demellawy, Univ. of Ottawa (Canada); Eranga Ukwatta, Carleton Univ. (Canada) .................. [10956-20]
4:50 pm: Machine learning based approach for fully automated segmentation of Muscularis Propria from histopathology images of intestinal specimens, Fatemeh Zabihollahy, Conor McKeen, Jinu Kurian, Adrian D. C. Chan, Carleton Univ. (Canada); Dina E. Demellawy, Univ. of Ottawa (Canada); Eranga Ukwatta, Carleton Univ. (Canada) .................. [10956-20]
5:10 pm: Segmentation and Feature Extraction
3:30 pm: Joint region and nucleus segmentation for characterization of tumor infiltrating lymphocytes in breast cancer, Mohamed Amgad, Emory Univ. School of Medicine (USA); Annya Sarkar, Chukua Srinivas, Roche (USA); Rachel Redman M.D., Roche Diagnostics Information Solutions (USA); Sinrath Ratra, Roche (USA); Charles J. Bechert M.D., Roche Diagnostics Information Solutions (USA); Benjamin C. Calhoun, Karen Mrazek, Cleveland Clinic (USA); Uday Kurkure, Roche (USA); Lee A. D. Cooper, Emory Univ. School of Medicine (USA); Michael Barnes M.D., Roche Diagnostics Information Solutions (USA) ... [10956-20]
3:50 pm: Adversarial U-net with spectral normalization for multi-organ histopathology image segmentation, Faisal Mahmood, Richard Chen, Daniel Borders, Gregory N. McKay, Kevan Salmanian, Nicholas J. Durr, Johns Hopkins Univ. (USA) ... [10956-21]
4:10 pm: Automated profiling of amyloid plaque, microglia barrier and neuronal damage on confocal fluorescence images to aid drug discovery in Alzheimer’s Disease, Ikunn Icke, Sophia Bardehle, Alice Z. Zhang, Sonal Singh, Belma Dogtas, Christian Mirescu, Merck & Co., Inc. (USA); Matthew Kennedy, Merck and Co., Inc. (USA) .................. [10956-22]
4:30 pm: Machine learning based approach for fully automated segmentation of Muscularis Propria from histopathology images of intestinal specimens, Fatemeh Zabihollahy, Conor McKeen, Jinu Kurian, Adrian D. C. Chan, Carleton Univ. (Canada); Dina E. Demellawy, Univ. of Ottawa (Canada); Eranga Ukwatta, Carleton Univ. (Canada) .................. [10956-23]
4:50 pm: Detection of acini in histopathology slides: towards automatic prediction of breast cancer risk, Suzanne C. Wettelstein, Technische Univ. Eindhoven (Netherlands); Allison M. Orken M.D., Gabrielle M. Baker M.D., Michael E. Pyle, Seth Israel Deaconess Medical Ctr. (USA); Josien P. W. Plum, Technische Univ. Eindhoven (Netherlands); Rulla M. Tamimi, Brigham and Women’s Hospital (USA) and Harvard Medical School (USA); Yujing J. Heng, Seth Israel Deaconess Medical Ctr. (USA); Mitko Veta, Technische Univ. Eindhoven (Netherlands) .................. [10956-24]
5:10 pm: Segmentation of follicles from CD8-stained slides of follicular lymphoma using deep learning, Caglar Senaras, Muhammad Khalid Khan Nozi, Wake Forest Baptist Medical Ctr. (USA); Vidya Arole, The Ohio State Univ. (USA); Weiwei Chen, Berkman Sahiner, Ctr. for Devices and Radiological Health, U.S. Food and Drug Administration (USA); Anrea Shanah, The Ohio State Univ. (USA); Amber Louisant, Robert Paul Hasserjian, Massachusetts General Hospital (USA); Gerard Lozanski, The Ohio State Univ. (USA); Metin N. Gurcan M.D., Wake Forest Baptist Medical Ctr. (USA) .................. [10956-25]
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Jiang Hsieh
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Sabine Koelle and Matthias Trottmann
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<td>Medical Imaging 2019: Physics of Medical Imaging</td>
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<td>Medical Imaging 2019: Image-Guided Procedures, Robotic Interventions, and Modeling</td>
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<td>Medical Imaging 2019: Image Perception, Observer Performance, and Technology Assessment</td>
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<td>Medical Imaging 2019: Biomedical Applications in Molecular, Structural, and Functional Imaging</td>
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<tr>
<td>SC1236 SimpleITK Jupyter Notebooks: Biomedical Image Analysis in Python (Johnson, Lowekamp, Yaniv) 1:30 pm to 5:30 pm, p.69</td>
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SATISFACTION GUARENTEED OR YOUR MONEY BACK.
Fundamentals of Medical Image Processing and Analysis

**SC086 • Course Level: Intermediate • CEU: 0.7**
$550 Members • $286 Student Members • $640 Non-Members USD
Saturday 8:30 am to 5:30 pm

This course gives an overview of medical image formation, enhancement, analysis, visualization, and communication with many examples from medical applications. It starts with a brief introduction to medical imaging modalities and acquisition systems. Basic approaches to display one-, two-, and three-dimensional (3D) biomedical data are introduced. As a focus, image enhancement techniques, segmentation, texture analysis and their application in diagnostic imaging will be discussed. To complete this overview, storage, retrieval, and communication of medical images are also addressed.

In addition to this theoretical background, a 45 min practical demonstration with ImageJ is given. ImageJ is a Java-based platform for medical image enhancement and visualization. It is developed by the National Institutes of Health, USA, open source and freely available in the public domain. For this course, ImageJ is appropriately configured with useful plug-ins (e.g. DICOM import, 3D rendering) and distributed on CD-ROM. Attendees are welcome to perform on their own laptop computers.

**LEARNING OUTCOMES**

- identify major processes involved in formation of medical images
- recognize the imaging modality from their visualization
- classify the various medical image processing algorithms
- describe fundamental methods of image enhancement
- enhance medical images using appropriate software
- visualize all types of medical image data
- appraise efficacy and drawbacks of several techniques of image segmentation
- get familiar with the fundamental concepts of texture analysis
- explain the basic principles of medical image communication
- get started with ImageJ and self-perform fundamentals of medical image processing

**INTENDED AUDIENCE**

Engineers, scientists, biomedical researchers and managers who need a basic understanding of medical image processing technologies and methods. Some prior background with image processing and computer technology will be helpful.

**INSTRUCTOR**

Thomas Deserno (né Lehmann), PhD, is full professor of Medical Informatics at TU Braunschweig University, Germany, where he heads the Peter L. Reichertz Institute for Medical Informatics of TU Braunschweig and Hannover Medical School. He lectures undergraduate and graduate courses on biomedical signal and image acquisition and processing, co-authored the textbook Image Processing for the Medical Sciences (1997), and edited the Handbook of Medical Informatics (2005) and Biomedical Image Processing (2011). His research interests include signal and image analysis for computer-assisted diagnoses and event prediction as well as eHealth applications, where he has authored over 100 scientific publications. Dr. Deserno is Senior Member of IEEE and SPIE, where he is member of the Program Committee of the Medical Imaging Symposium (both, computer-aided diagnosis and imaging informatics tracks). He is a member of the International Association of Dentomaxillofacial Radiology (IADMFR), and serves on the International Editorial Boards of PLOS ONE, the European Journal for Biomedical Informatics, Methods of Information in Medicine, Dentomaxillofacial Radiology, World Journal of Radiology, Acta Informatics Medica, and GMS Medical Informatics, Biometry and Epidemiology (MiBE). He is Co-editor Europe of the International Journal of Healthcare Information Systems and Informatics and Associated Editor of the SPIE Journal of Medical Imaging. He is the German representative in the International Medical Informatics Association (IMIA).

This course is also available in online format.

**ATTENDEE TESTIMONIAL:**

Excellent depth and breadth—I really enjoyed the course.

**Photon Counting CT**

**SC1129 • Course Level: Introductory • CEU: 0.4**
$315 Members • $178 Student Members • $370 Non-Members USD
Sunday 1:30 pm to 5:30 pm

This course explains the principles of photon counting detectors for spectral x-ray imaging. Typical technical implementations are described and fundamental differences to energy integrating systems are pointed out. In particular, the issues of high-rate handling and the effect of detector cross talk on energy resolution are described. Requirements on electronics for spectral imaging in computed tomography is also discussed.

A second objective of the course is to describe how energy sensitive counting detectors make use of the energy sampling of the linear attenuation coefficients of the background and target materials for any given imaging task; methods like material basis decomposition and optimal energy weighting will be explained.

The second objective highlights the interesting fact that while the spatial-frequency descriptor of signal-to-noise-ratio transfer (DQE) of a system gives a complete characterization of performance for energy integrating (and pure photon counting) systems, it fails to characterize multibin systems since a complete description of the transfer characteristics requires specification of how the information of each energy bin is handled. The latter is in turn dependent on the imaging case at hand which shows that there is no such thing as an imaging case independent system DQE for photon counting multibin systems. We also suggest how this issue could be resolved.

**LEARNING OUTCOMES**

- list essential requirements on read-out electronics and predict effect on image quality if not fulfilled
- explain the physical origin of pile-up and separate between the effects of decreased energy resolution and loss of counts
- explain the physical origins of cross-talk and how it degrades performance, both in terms of resolution and noise
- compute optimal weights for the energy bins
- illustrate how poor choice of weights results in inferior image quality
- perform material basis decomposition and explain why noise in decomposed images is a poor figure-of-merit
- distinguish between system DQE and task dependent DQE and suggest solutions to allow comparison at system level between multibin energy resolved systems and other solutions

**INTENDED AUDIENCE**

Scientists, engineers, or managers who wish to learn more about basic strengths and challenges of photon counting detectors for spectral x-ray imaging, how the data is treated and how performance can be quantified.

**INSTRUCTOR**

Fredrik Grönberg holds a Master of Science in applied mathematicsin from KTH Royal Institute of Technology, Stockholm, Sweden. His research is about applications of basis decomposition in spectral computed tomography and in particular he has focused on third material separation, dimensionality and background cancellation. Fredrik is currently a PhD student in the Physics of Medical Imaging group in the Physics Department at the KTH Royal Institute of Technology.

**ATTENDEE TESTIMONIAL:**

Great course, summarized the research into photon counting detectors well as well as providing some interesting open questions in the field.
Courses

Modern Diagnostic X-ray Sources

SC1183 • Course Level: Introductory • CEU: 0.4 • $445 Members $230 Student Members • $500 Non-Members • USD
Sunday 1:30 pm to 5:30 pm

During recent decades, in particular since the advent of computed tomography and the increasing sophistication of interventional X-ray systems, progress in the development of diagnostic X-ray sources has been tremendous. More than 100,000 diagnostic X-ray tubes are being installed or replaced every year. Tubes for detial application, healthcare demands for trade-offs between value and cost, and other surgeons with interest in X-ray diagnostics and interventional X-ray application, students of engineering, radiology and physics, X-ray system and X-ray tube developers, X-ray manufacturing staff, bodies, suppliers and personnel responsible for quality insurance in the field of X-ray equipment, members of standardization committees, managers responsible for costs of service. Undergraduate training in engineering or equivalent science is assumed.

LEARNING OUTCOMES

This course will enable you to:
- analyze X-ray tubes by their initial and service costs in an imaging system
- discuss failure patro's and means to extend tube life
- predict the impact of the X-ray tube design on the clinical work-flow
- name the measures for protection against hazards of ionizing radiation
- evaluate future application of X-ray tubes, e.g. for phase contrast imaging, dark-field imaging, spectral imaging with various concepts
- summarize dead-ends of development
- compare X-ray production from X-ray tubes and other means (brilliance, photon flux, costs)

INTENDED AUDIENCE

Medical physicists, researchers who intend to use vacuum electronic X-ray sources, X-ray physicists, radiologists, cardiologists and other surgeons with interest in X-ray diagnostics and interventional X-ray application, students of engineering, radiology and physics. X-ray system and X-ray tube developers, X-ray manufacturing staff, bodies, suppliers and personnel responsible for quality insurance in the field of X-ray equipment, members of standardization committees, managers responsible for costs of service. Undergraduate training in engineering or equivalent science is assumed.

INSTRUCTOR

Rolf Behling is a physicist, Fellow Scientist of the Philips group and a veteran in the field of medical imaging. During his 35-year tenure in this industry, he headed departments for vacuum technology development, was responsible for international project coordination and global innovation, head of marketing and field support for X-ray tubes, department head for x-ray tube development, project manager, and manufacturing process physicist. The first ever game changing X-ray tube with liquid bearing was developed under his project leadership. Rolf Behling currently heads the Philips group for advanced development of X-ray tubes and X-ray generators at Philips Healthtech in Hamburg, Germany. He is a part-time lecturer at the University of Hamburg, and has contributed numerous patents and publications in the field of vacuum technology and medical imaging.

COURSE PRICE INCLUDES the text Modern Diagnostic X-Ray Sources, Technology, Manufacturing, Reliability (CRC Press, 2015) by Rolf Behling.

Introduction to Medical Image Analysis using Convolutional Neural Networks

SC1235 • Course Level: Introductory • CEU: 0.7 • $565 Members • $292 Student Members • $655 Non-Members • USD
Saturday 8:30 am to 5:30 pm

Segmentation, detection, and classification are major tasks in medical image analysis and image understanding. Medical imaging researchers heavily use the results of recent developments in machine learning approaches, and with deep learning methods they achieve significantly better results in many real-world problems compared to previous solutions. The course aims to enable students and professionals to apply deep learning methods to their data and problem. Using an interactive programming environment, participants of the course will explore all required steps in practice and learn the tools and techniques from data preparation to result interpretation. We will work on example data and train models to segment anatomical structures, to detect abnormalities, and to classify them. Participants will work in dockerized environments providing selected deep learning toolkit installations, example data, and teaching notebooks.

LEARNING OUTCOMES

This course will enable you to:
- describe the state of the art of deep learning methods in medical applications
- construct computing pipeline using Python based infrastructure, using the same frameworks (Keras, Tensorflow) commonly used for research
- select a suitable deep learning network architecture for a given problem and implement it
- explain and interpret learning progress using appropriate metrics
- interpret the resulting model performance using simple visual analytics

INTENDED AUDIENCE

Students, researchers, and engineers from academia and industry, who seek to obtain first practical working knowledge in deep learning.

INSTRUCTOR

Markus Wenzel works on machine learning methods for medical applications since 2005 and has published more than 30 conference and journal papers on the subject. He received his PhD for his work on decision support systems for breast care. At Fraunhofer MEVIS, he is a senior scientist for cognitive medical computing. He is a funded member of the Fraunhofer Society research class “Cognitive Machines” and is experienced in teaching and lecturing for academia and industry. He has acquired and led several international research projects.

Hans Meine is a senior scientist who has been using machine learning for image analysis since 2002, and focused on various medical applications at Fraunhofer MEVIS since 2011. Since early 2016, he is organizing the internal training and coaching of Fraunhofer MEVIS staff for the new methodologies in Deep Learning, and now leads the "Image and Data Analysis" competence area that incorporates both image and non-image data. Recently, his team scored the the top positions in the “Liver and Tumor Segmentation” challenges at ISBI and MICCAI 2017 using Deep Learning.

This is an interactive course and participants will need to bring their own laptops. This course is limited to 40 attendees. Early registration is recommended.

ATTENDEE TESTIMONIAL:

Fantastic intro to a complex topic.
SimpleITK Jupyter Notebooks: Biomedical Image Analysis in Python

**SC1236** · Course Level: Intermediate · CEU: 0.4
$325 Members · $182 Student Members · $380 Non-Members USD
Sunday 1:30 pm to 5:30 pm

SimpleITK is a simplified programming interface to the algorithms and data structures of the Insight Segmentation and Registration Toolkit (ITK). It supports bindings for multiple programming languages including C++, Python, R, Java, C#, Lua, Ruby and TCL. Combining SimpleITK’s Python binding with the Jupyter notebook web application creates an environment which facilitates collaborative development of biomedical image analysis workflows.

In this course, we will use a hands-on approach utilizing Python based SimpleITK Jupyter notebooks to explore and experiment with various toolkit features. Participants will follow along using their personal laptops, enabling them to explore the effects of changes and settings not covered by the instructor. We start by introducing the toolkit’s two basic data elements, Images and Transformations. We then combine the two, illustrating how to perform image resampling. Having mastered the concept of data resampling, we show how to use SimpleITK as a tool for image preparation and data augmentation for deep learning via spatial and intensity transformations. We then turn our focus to the toolkit’s registration framework, exploring various components including: optimizer selection, the use of linear and deformable transformations, the embedded multi-resolution framework, self-calibrating optimizers and the use of callbacks for registration progress monitoring. Finally, we illustrate the use of a variety of SimpleITK filters to implement an image analysis workflow that includes segmentation and shape analysis.

**LEARNING OUTCOMES**

This course will enable you to:

- **describe the components that comprise the SimpleITK registration framework.**
- **use the SimpleITK registration framework to register their own data by selecting the appropriate components and settings.**
- **list all of the SimpleITK transformation types and image intensity manipulation filters.**
- **use SimpleITK to prepare images as input for deep learning networks, including generation of synthetic images for data augmentation.**

**INTENDED AUDIENCE**

Students, researchers and engineers involved in biomedical image analysis with the need for convenient image IO, image registration and image manipulation via spatial and intensity transformations. Knowledge of the Python programming language is assumed.

**INSTRUCTOR**

Hans Johnson is an Associate Professor in the Department of Electrical and Computer Engineering, University of Iowa. He has taught university courses using SimpleITK to graduate students from multiple programs. He is actively involved in the development of open source software, contributing to multiple projects including BRAINSFit, 3D Slicer, ITK, and SimpleITK. He is the current Treasurer of the Insight Software Consortium. Dr. Johnson has authored over 100 peer-reviewed journal and conference papers, with his research supported by multiple NIH grants and contracts.

**Virtual Clinical Trials: An In-depth Tutorial**

**SC1239** · Course Level: Intermediate · CEU: 0.4 · $315 Members · $178 Student Members · $370 Non-Members USD
Tuesday 8:30 am to 12:30 pm

In 2014, it was estimated that there were just 450 anatomic phantoms in the world. Today, based on advanced models of breast anatomy, an infinite number of models exist. As such, it is possible to simulate individuals and specific pathologies from the population of all humans with increasingly higher accuracy. Thus, together with advanced models of image simulation, image processing and image reconstruction, means that we can create arbitrarily large databases of simulated images. At the same time, advances in machine observer methods mean that it is possible to conduct virtual clinical trials using the simulated images, together with simulations of medical displays, human optical perception and cognition.

The logistics of conducting VCT with thousands of patients is similar to the logistics of organizing the data from clinical trials of similar size. As such, we have developed a standards document outlining methods for conducting VCT, storing VCT results (intermediate and final), and communicating these image data and associate metadata between VCT components. In this course, we will use our experience in conducting large-scale VCT to encourage those new to the field to adopt VCT methods and to aid those already conducting VCT. The course will have applicability to VCT for designing new medical imaging equipment and methods, to use VCT data for prototyping and/or complementing the conduct of real clinical trials, and for preparing VCT data for regulatory approvals of new systems and methods.

**LEARNING OUTCOMES**

This course will enable you to:

- **describe the roles and methods for conducting VCT.**
- **identify the necessary constituent software components for conducting VCT.**
- **name the standards relevant for conducting VCT, including DICOM, ASME, IEEE, AAPM, etc.**
- **construct and Design examples of VCTs to illustrate their usage.**
- **demonstrate existing use cases.**
- **explain the underlying statistical considerations for conducting VCT.**

**INTENDED AUDIENCE**

Clinicians, scientists, and administrators from academia, industry and government interested in adopting or gaining further knowledge of VCT methods.

**INSTRUCTOR**

Andrew D. Maidment has 30 years of experience in breast cancer research, with specific training and expertise in development of digital x-ray detectors and 3D breast x-ray imaging. Dr. Maidment has been conducting research into VCT for nearly 20 years, has extensive grant funding in VCTs, and has published extensively in this field. As an Associate Professor in Radiology at the University of Pennsylvania, he has extensive teaching experience.

Predrag Bakic has more than 20 years experience in breast cancer research, with specific training and expertise in developing and conducting VCT. Dr. Bakic’s PhD thesis was on the topic of breast anatomy models for imaging simulation.

Bruno Barufaldi received his Ph.D. from the University of Sao Paolo in 2016. For the last 2 years, he has been active in the field of VCT, designing much of the pipeline software used in the OpenVCT suite of software.

The latest draft of the OpenVCT standard will be provided to participants. This document is open-source and does not have copyright restrictions. Instructors will quickly introduce the material to those unfamiliar with VCT. However, the majority of the material will be at the intermediate to advanced level to benefit those with VCT experience.
Adversarial Networks: New From Architecture to Practical Training

SC1262 • Course Level: Intermediate • CEU: 0.4
$315 Members • $178 Student Members • $370 Non-Members USD Sunday 8:30 am to 12:30 pm

This half-day deep dive course will guide researchers with some background knowledge, e.g. from the introductory course, SC1235 Introduction to Medical Image Analysis using Convolutional Neural Networks, through the latest literature of generative adversarial networks (GANs) and their application to medical data. First and foremost, GANs are powerful appearance models, and thus inherently bring a deep understanding of their respective domain. However, GANs can also be used to map between different domains (such as between CT and MRI) or to help training better segmentation models.

Adversarial training can be introduced into several learning tasks in medical image analysis. It has been shown to help make image analysis algorithms more robust to variability in the data and to reduce the probability of failure on unseen cases. GANs in their initial implementation have been known to be hard to configure and train, but recent advances have helped them catch ground in applications of classification and segmentation, without requiring too much “witchcraft”.

We will introduce GANs, give an overview of their development towards the state of the art, and explain specific architectural decisions and developments that have been introduced to stabilize their training (CycleGAN, Wasserstein based loss). We will show code examples and illustrate the course content with live demonstrations on downsampled data, so that the participants gain some first-hand experience on the subject.

LEARNING OUTCOMES
This course will enable you to:
• explain adversarial training in general
• identify several applications of GANs in medical image analysis
• summarize how to implement at least one specific GAN architecture
• describe typical problems in the training and how to mitigate them

INTENDED AUDIENCE
This intermediate-level course assumes basic knowledge in deep learning on the level of the Basic Course, SC1235 ||Introduction to Medical Image Analysis using Convolutional Neural Networks||. We also assume basic programming skills in Python, as we will show code examples that participant will obtain for later review and self-learning.

INSTRUCTOR
Markus Wenzel works on machine learning methods for medical applications since 2005 and has published more than 30 conference and journal papers on the subject. He received his PhD for his work on decision support systems for breast care. At Fraunhofer MEVIS, he is a senior scientist for cognitive medical computing. He is a funded member of the Fraunhofer Society research class “Cognitive Machines” and is experienced in teaching and lecturing for academia and industry. He has acquired and led several international research projects.

Hans Meine is a senior scientist who has been using machine learning for image analysis since 2002, and focused on various medical applications at Fraunhofer MEVIS since 2011. Since early 2016, he is organizing the internal training and coaching of Fraunhofer MEVIS staff for the new methodologies in Deep Learning, and now leads the “Image and Data Analysis” competence area that incorporates both image and non-image data. Recently, his team scored top positions in the “Liver and Tumor Segmentation” challenges at ISBI and MICCAI 2017 using Deep Learning.

This course is limited to 40 attendees. Early registration is recommended.

Spectral CT Imaging

SC987 • Course Level: Intermediate • CEU: 0.4
$315 Members • $178 Student Members • $370 Non-Members USD Sunday 8:30 am to 12:30 pm

This course provides attendees with an advanced knowledge of spectral CT imaging. The course focuses on the properties of a spectral CT measurement and the main applications in spectral CT reconstruction and spectral CT image postprocessing. Many clinical examples of spectral CT imaging applications are provided to illustrate the diagnostic outcome of this technique.

LEARNING OUTCOMES
• describe the system properties of a spectral CT system
• compare different system approaches to acquire spectral CT data, such as dual source CT, kV switching and energy-resolving detectors
• summarize various algorithms for spectral CT reconstructions and spectral CT image postprocessing
• list the relevant clinical applications of spectral CT
• explain the main challenges of spectral CT techniques

INTENDED AUDIENCE
This material is intended for anyone who is interested in the usage of the spectral information provided by modern CT systems. Those who wish to update their knowledge on the CT measurement and reconstruction process and who work with spectral CT applications will find this course valuable.

INSTRUCTOR
Bernhard Schmidt is head of the Siemens Healthcare CT Scanner Applications and Algorithm Predevelopment Group. Over the last few years, he has been closely involved into the development of the Dual Energy product provided by Siemens.

Thomas Flohr is head of Siemens Healthcare CT physics and applications development and has been instrumental in developing multi-detector row CT and dual-source CT. He is an assistant professor at the Eberhard-Karls University, Tübingen, Germany.

Katharine Grant earned her BS in Physics from Miami University and her PhD from the Mayo Clinic. Dr. Grant joined Siemens Healthcare as a Staff Scientist in 2009 and served as a scientific research collaboration manager within the Computed Tomography business. She is currently a Principle Key Expert and the Senior Director of CT Research and Development in North America. Her main role is to drive new innovations, serve as a liaison between luminary customers/collaborators and Siemens’ physicists and product development specialists, while supporting marketing and sales efforts within the USA.
General Information

ONSITE REGISTRATION AND BADGE PICK-UP HOURS
Atlas Foyer
Saturday February 16 7:15 AM - 4:00 PM
Sunday February 17 7:15 AM - 4:00 PM
Monday February 18 7:30 AM - 4:00 PM
Tuesday February 19 7:30 AM - 4:00 PM
Wednesday February 20 7:30 AM - 4:00 PM
Thursday February 21 7:30 AM - 1:30 PM

CONFERENCE REGISTRATION
Includes admission to all conference sessions, plenaries, panels, and poster sessions, coffee breaks, and a choice of online proceedings.

COURSE AND WORKSHOP REGISTRATION
Courses and workshops are priced separately. Course-only registration includes your selected course(s), course notes, and coffee breaks. Course prices include applicable taxes. Onsite, please go to the registration desk after picking up your badge.

EARLY REGISTRATION PRICING AND DATES
Conference registration prices increase by $150 (Students, $50) and course prices increase $75 after 1 February 2019. The online form will automatically display the increased prices.

SPIE MEMBER, SPIE STUDENT MEMBER, AND STUDENT PRICING
• SPIE Members receive conference and course registration discounts. Discounts are applied at the time of registration.
• SPIE Student Members receive a 60% discount on all courses.
• Student registration rates are available only to undergraduate and graduate students who are enrolled full time and have not yet received their PhD. Post-docs may not register as students. A student ID number or proof of student status is required with your registration.

PRESS REGISTRATION
For credentialed press and media representatives only. Please email contact information, title, and organization to media@spie.org.

SPIE CASHIER
Registration Desk, Atlas Foyer

OPEN DURING REGISTRATION HOURS
REGISTRATION PAYMENTS
If you are paying by cash or check as part of your onsite registration, wish to add a course, workshop, or special event requiring payment, or have questions regarding your registration, visit the SPIE Cashier at Registration.

RECEIPT AND CERTIFICATE OF ATTENDANCE
Preregistered attendees who did not receive a receipt or attendees who need a Certificate of Attendance may obtain those from the SPIE Cashier.

BADGE CORRECTIONS
Badge corrections can be made by the SPIE Cashier at Registration. Please have your badge removed from the badge holder and marked with your changes before approaching the counter.

REFUND INFORMATION
There is a $50 service charge for processing refunds. Requests for refunds must be received by 7 February 2019. All registration fees will be forfeited after this date. Membership dues, SPIE Digital Library subscriptions, or Special Events purchased are not refundable.

U.S. GOVERNMENT CREDIT CARDS
U.S. Government credit card users may have your purchasing officer contact the credit card company and get prior authorization before attempting to register. Advise your purchasing agent that SPIE is considered a 5968 company for authorization purposes.

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General Information
Onsite Services

INTERNET ACCESS
Complimentary wireless access available; instructions will be posted onsite.

SPIE CONFERENCE AND EXHIBITION APP
Search and browse the program, special events, participants, exhibitors, courses, and more. Free Conference App available for iPhone and Android phones. Check out the SPIE App.

SPIE BOOKSTORE
Atlas Foyer
Stop by the SPIE Bookstore to browse the latest SPIE Press Books, proceedings, and educational materials. While there, get a t-shirt or educational toy to bring home to the family.

SPIE EDUCATION SERVICES
Atlas Foyer, Registration Desk
Browse course offerings or learn more about SPIE courses available in portable formats such as Online and customized, In-company courses.

SPIE LUGGAGE AND COAT CHECK
Complimentary luggage, package, and coat storage are available through the hotel concierge for hotel guests.

BUSINESS CENTER
Atlas Foyer
6:00 AM - 6:00 PM

RESTAURANT AND CITY INFORMATION
Atlas Foyer
Sunday through Wednesday . . . . . . . . 8:30 AM - 10:00 AM and 3:00 PM - 4:00 PM
Services include sightseeing, shopping and restaurant information

URGENT MESSAGE LINE
An urgent message line is available during registration hours: (619) 908-5047

LOST AND FOUND
Atlas Foyer, Registration
Found items will be kept at Registration until 4:00 PM each day. At the end of the meeting, all found items will be turned over to the Town and Country Resort and Convention Center, (619) 291-7131.

Food and Beverage Services

COFFEE BREAKS
Complimentary coffee will be served twice each day of the conference. Check individual conference listings for exact times and locations.

FOOD AND REFRESHMENTS FOR PURCHASE
Terrace Café
Open 11:00 AM - 10:00 PM
Serving breakfast, lunch, and dinner in a bistro style café.

THE MARKET
Open 6:00 AM - 10:00 PM
Grab and go snacks and beverages.

TRIXIE
Times published onsite.
Lounge bar serving beverages and appetizers.

SPIE-Hosted Lunches
Grand Plaza
Sunday–Thursday ..................... 12:10 PM - 1:00 PM
SPIE hosted lunches are included in registration packets for full-conference registrants Sunday through Thursday. Student attendees receive complimentary lunch tickets for Monday, Tuesday and Wednesday with their registration.
All attendees need to make their own lunch arrangements on Saturday.
Should inclement weather prevent outdoor lunches, they will be served in the Grand Exhibit Hall.
Hotel

Reserve your hotel room in the SPIE contracted hotel for discounted rates. Attendees receive discounted convention rates by reserving their hotel room through the official housing reservation system for SPIE Medical Imaging. Housing is now open.

**TOWN AND COUNTRY RESORT & CONVENTION CENTER**
500 Hotel Circle North, San Diego, CA 92108

Town and Country Resort & Convention Center offers the perfect setting for business or pleasure. The hotel is a landmark hotel in Mission Valley, San Diego for over 60 years. The new Town and Country is a modern expression of the 1960’s Southern California vibe, relaxed, playful and connected, with service that is engaging, approachable yet unobtrusive, where everyone feels welcome. Guests of the hotel enjoy a premier location that is near the San Diego airport and many popular San Diego attractions and activities.

**WARNING: UNOFFICIAL HOUSING SOLICITATIONS**

SPIE has arranged special discounted hotel rates for SPIE conference attendees. Use the SPIE Official Housing Vendor to book your room.

SPIE has arranged special discounted hotel rates for SPIE conference attendees. To receive special hotel rates for this meeting, you must use the SPIE Official Housing Vendor.

SPIE strongly recommends you DO NOT book housing from any company that contacts you via phone or email.

- The reservation system that SPIE uses for this event is available only via the Hotel page on the event website.
- SPIE Official Housing Vendors use an Official SPIE Contractor logo to verify they are authorized by SPIE.
- Our housing vendors DO NOT reach out to you with solicitations.
- Our housing vendors may follow up with you about housing once you have begun booking via our website, but NOT as an initial solicitation.
- SPIE cannot be liable for any claims made by unofficial entities or for any damages suffered by you if you use any vendor or service that is not an SPIE Official Housing Vendor.

**Car Rental**

Hertz Car Rental is the official car rental agency for this event. To reserve a car, identify yourself as a SPIE Medical Imaging attendee using the Hertz Meeting Code CV# 029B0024. Discount rates apply for roundtrip rentals up to one week prior through one week after the conference dates. (Some one-way rentals qualify for the discount rates based on their pick-up and drop-off locations. Vehicles rented in Northern California can be returned to any corporate Hertz location within Northern California and vehicles rented in Southern California can be returned to any corporate Hertz location within Southern California). Note: When booking from international Hertz locations, the CV # must be entered with the letters CV before the number, i.e. CV029B0024.

Book online at Hertz.com

- In the United States call 1-800-654-2240
- In Canada call 1-800-263-0600, or 1-416-620-9620 in Toronto.
- In Europe and Asia call the nearest Hertz Reservation Center or travel agent.
- Outside of these areas call 1-405-749-4434

**Airport Information**

- San Diego International Airport (SAN) is conveniently located three miles northwest of downtown San Diego.
Acceptance of Policies and Registration Conditions

The following Policies and Conditions apply to all SPIE Events. As a condition of registration, you will be required to acknowledge and accept the SPIE Registration Policies and Conditions contained herein.

Attendee Registration and Admission Policy
SPIE, or their officially designated event management, in their sole discretion, reserves the right to accept or decline an individual’s registration for an event. Further, SPIE, or event management, reserves the right to prohibit entry or to remove any individual whether registered or not, be they attendees, exhibitors, speakers, volunteers, contractors, service providers, venue staff, or SPIE staff. This Code of Conduct applies to all SPIE meeting-related events, including those sponsored by other organizations but held in conjunction with SPIE events, in public or private facilities.

Reporting of Unethical or Inappropriate Behavior
Onsite at an SPIE meeting, contact any SPIE Staff with concerns or questions for thorough follow-up. If you feel in immediate danger, please dial the local emergency number for police intervention.

Unauthorized Solicitation Policy
Unauthorized solicitation in the Exhibition Hall is prohibited. Any nonexhibiting manufacturer or supplier observed to be distributing information or soliciting business in the aisles, or in another company’s booth, will be asked to leave immediately.

Recording Policy
Conferences, courses, and poster sessions: For copyright reasons, recordings of any kind are prohibited without prior written consent of the presenter or instructor. Attendees may not capture or use materials presented in any meeting/course room or in course notes on display without written permission. Consent forms are available at Speaker Check-In or SPIE Registration. Individuals not complying with this policy will be asked to leave a given session and/or asked to surrender their recording media. Refusal to comply with such requests is grounds for expulsion from the event.

Identification Requirement Policy
To verify registered participants and provide a measure of security, SPIE will ask attendees to present a government-issued photo identification at registration to collect registration materials.

Payment Policy
Registrations must be fully paid before access to the conference is allowed. SPIE accepts VISA, MasterCard, American Express, Discover, Diner’s Club, checks and wire transfers. Onsite registrations can also be paid with cash.

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Capture and Use of a Person’s Image
By registering for an SPIE event, you grant full permission to SPIE to capture, store, use, and/or reproduce your image or likeness by any audio and/or visual recording technique and create derivative works of these images and recordings in any SPIE media now known or later developed, for any legitimate SPIE marketing or promotional purpose.
By registering for an SPIE event, you waive any right to inspect or approve the use of the images or recordings or of any written copy. You also waive any right to royalties or other compensation arising from or related to the use of the images, recordings, or materials. By registering, you release, defend, indemnify and hold harmless SPIE from and against any claims, damages or liability arising from or related to the use of the images, recordings or materials, including but not limited to claims of defamation, invasion of privacy, or rights of publicity or copyright infringement, or any misuse, distortion, blurring, alteration, optical illusion or use in composite form that may occur or be produced in taking, processing, reduction or production of the finished product, its publication or distribution.

Laser Pointer Safety Information/Policy
SPIE supplies tested and safety-approved laser pointers for all conference meeting rooms. For safety reasons, SPIE requests that presenters use provided laser pointers.
Use of a personal laser pointer represents the user’s acceptance of liability for use of a non-SPIE-supplied laser pointer. If you choose to use your own laser pointer, it must be tested to ensure <5 mW power output. Laser pointers in Class II and Ila (<5 mW) are eye safe if power output is correct, but output must be verified because manufacturer labeling may not match actual output. You are required to sign a waiver releasing SPIE of any liability for use of potentially non-safe, personal laser pointers. Waivers are available at Speaker Check-In.

Unsecured Items Policy
Personal belongings should not be left unattended in meeting rooms or public areas. Unattended items are subject to removal by security. SPIE is not responsible for items left unattended.

Wireless Internet Service Policy
At most events, SPIE provides wireless access for attendees. Properly secure your computer before accessing the public wireless network. SPIE is not responsible for computer viruses or other computer damage.

No-Smoking Policy
Smoking, including e-cigarettes, is not permitted at any SPIE event.

Agreement to Hold Harmless
Attendee agrees to release and hold harmless SPIE from any and all claims, demands, and causes of action arising out of or relating to your participation in the event you are registering to participate in and use of any associated facilities or hotels.

Event Cancellation Policy
If for some unforeseen reason SPIE should have to cancel an event, processed registration fees will be refunded to registrants. Registrants will be responsible for cancellation of travel arrangements or housing reservations and the applicable fees.
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