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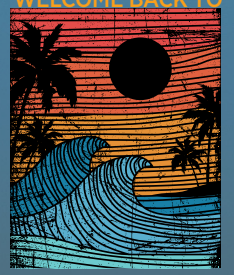

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16–21 February 2019
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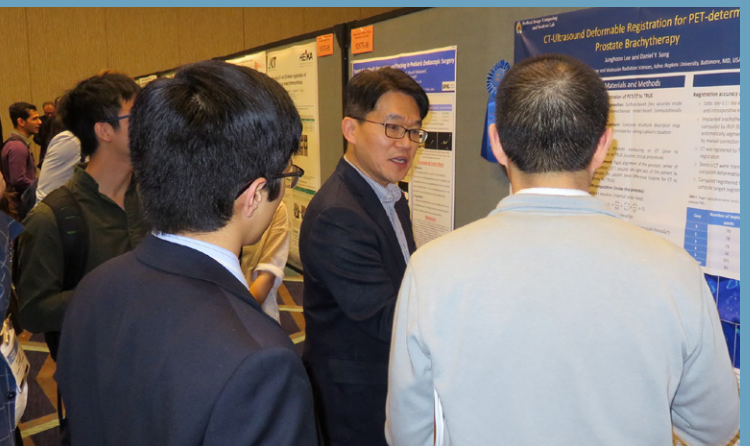

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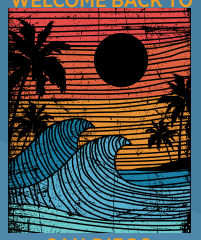

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SPIE would like to express its deepest appreciation to the symposium chairs, conference chairs, program committees, session chairs, and authors who have so generously given their time and advice to make this symposium possible.

The symposium, like our other conferences and activities, would not be possible without the dedicated contribution of our participants and members. This program is based on commitments received up to the time of publication and is subject to change without notice.

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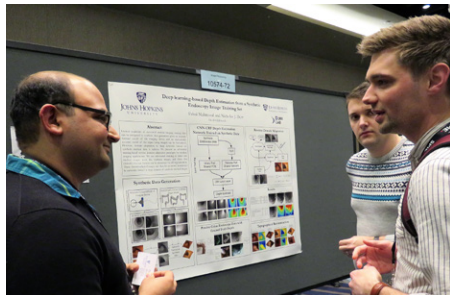

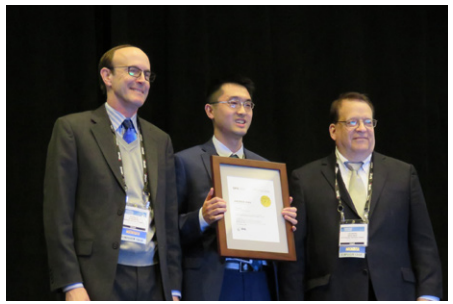

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10
PLENARY AND KEYNOTE PRESENTATIONS

6
TECHNICAL WORKSHOPS, PANELS, AND DEMOS

3
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8
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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.

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Symposium Chairs:

Ronald M. Summers
National Institutes of Health Clinical Center (USA)

Georgia D. Tourassi
Oak Ridge National Laboratory (USA)

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Awards and Plenary Session

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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.

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.

PHYSICS OF MEDICAL IMAGING

Conference 10948 • Paper Number 10948-28

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 organelles 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.

ULTRASONIC IMAGING AND TOMOGRAPHY

Conference 10955 • Paper Number 10955-34

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.

IMAGE-GUIDED PROCEDURES, ROBOTIC INTERVENTIONS, AND MODELING

Conference 10951 • Paper Number 10951-43

Bringing transcranial MR-guided focused ultrasound into focus

Tuesday 19 February 2019 • 8:40 AM - 9:40 AM

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, and a member of the American Institute for Medical and Biological Engineering (AIMBE)'s College of Fellows.

BIOMEDICAL APPLICATIONS IN MOLECULAR, STRUCTURAL, AND FUNCTIONAL IMAGING

Conference 10953 • Paper Number 10953-6

Presentation Title TBD

Tuesday 19 February 2019 • 10:10 AM - 11:10 AM

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 (T1 rho), 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.

COMPUTER-AIDED DIAGNOSIS

Conference 10950 • Paper Number 10950-52

The U-net and its impact to medical imaging

Tuesday 19 February 2019 • 1:20 PM - 2:20 PM

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.

IMAGE PERCEPTION, OBSERVER PERFORMANCE, AND TECHNOLOGY ASSESSMENT

Conference 10952 • Paper Number 10952-1

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.

IMAGE PROCESSING

Conference 10949 • Paper Number 10949-26

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 conference, 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.

DIGITAL PATHOLOGY

Conference 10956 • Paper Number 10956-1

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)

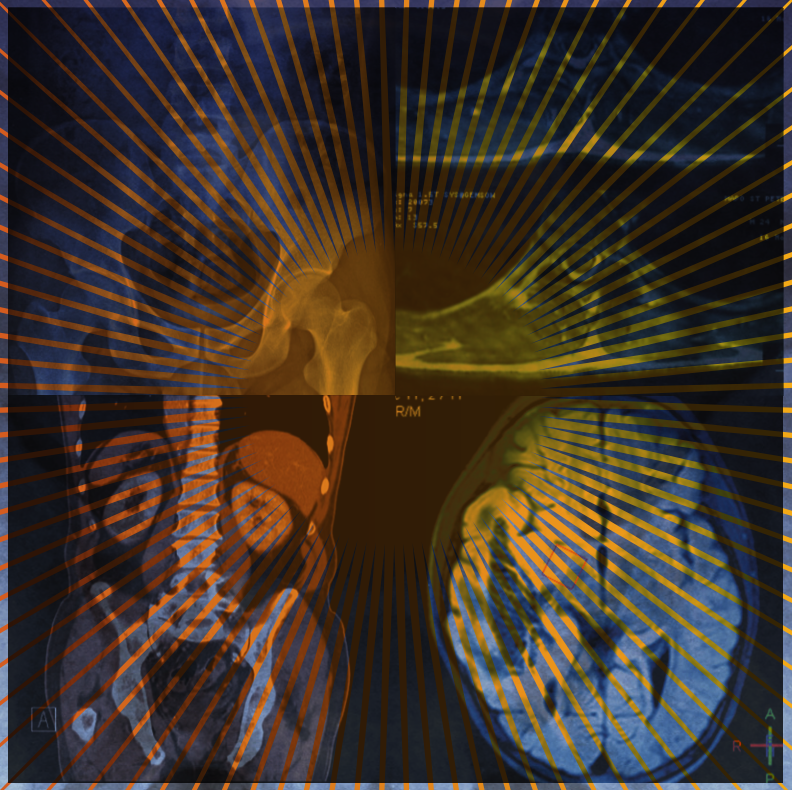
Abstract: Increased interest in medical imaging has resulted in development of a variety of image analysis systems. Many of these systems follow the 'computer-aided diagnosis' paradigm. In this paradigm, the main function of the image analysis system is to help medical professionals (e.g. radiologists, 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 Embodying 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 of 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.

Journal of Medical Imaging



MEDICAL IMAGING FOR DETECTION, DIAGNOSTICS, AND THERAPY OF DISEASE

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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.

WORKSHOP

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-Gilcrist, 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

WORKSHOP

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.

WORKSHOP

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.

WORKSHOP

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)

Slava Karolis, Univ. of Oxford (UK)

Weili 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)

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 Physicists 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*.

Visit the Challenge webpage for more information: spie.org/conferences-and-exhibitions/medical-imaging/grand-challenge-2019.

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.

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!

• NOTE •
SOME EVENTS REQUIRE TICKETS AND REGISTRATION. SEE INDIVIDUAL EVENTS FOR DETAILS.

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.

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)

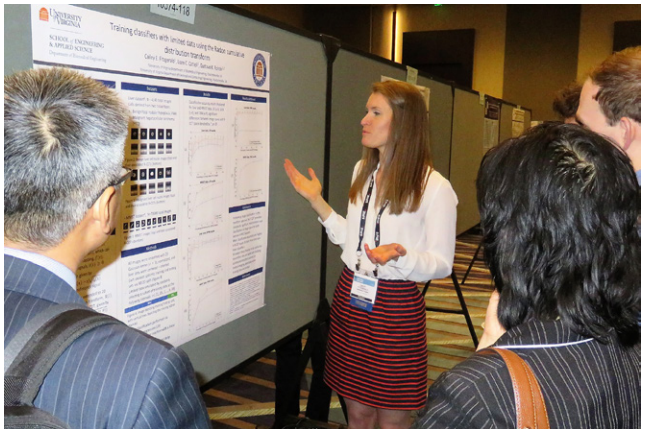
10:35 AM - 11:00 AM
Spectral Photoacoustic Imaging of Placental Function
Carolyn Bayer, Tulane Univ. (USA)

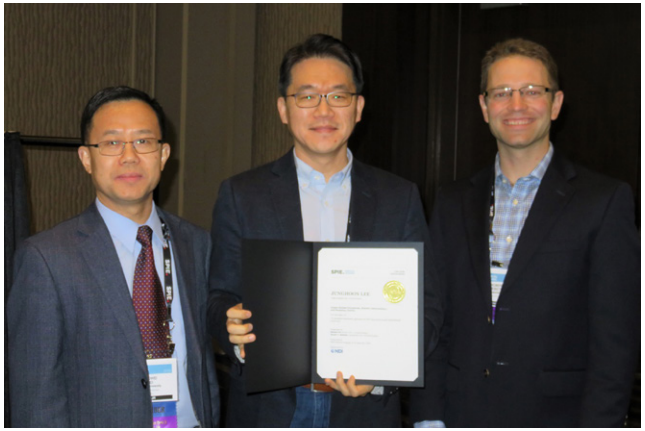
11:00 AM - 11:25 AM
Applications of Photoacoustic Imaging in Enhanced Fetal and Maternal Care
Mohammad Mehrmohammadi, Wayne State Univ. (USA)

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





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:

mips SPIE.

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.

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:

SIEMENS Healthineers

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:

INTUITIVE SURGICAL®

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

SPONSORED BY:

SIEMENS Healthineers

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

(CONFERENCE 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.

SPONSORED BY:

12sigma TECHNOLOGIES

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.

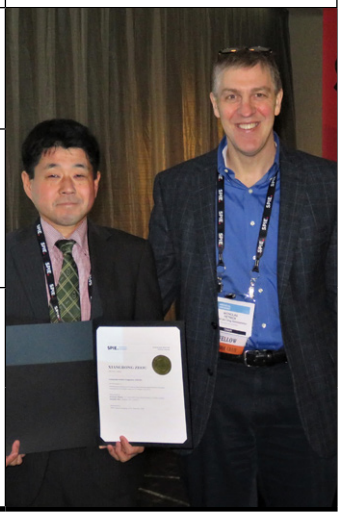
Image Processing Poster Presentation Award

SPONSORED BY:

12sigma TECHNOLOGIES

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

SATURDAY 16 February	SUNDAY 17 February	MONDAY 18 February	TUESDAY 19 February	WEDNESDAY 20 February	THURSDAY 21 February
SC086 Fundamentals of Medical Image Processing and Analysis (Deserno) 8:30 AM - 5:30 PM, p.67	**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)				**Register by 1 February 2019 and Save**
SC1235 Introduction to Medical Image Analysis using Convolutional Neural Networks (Wenzel, Meine) 8:30 AM - 5:30 PM, p.68	**SC1262 Adversarial Networks: *NEW* From Architecture to Practical Training** (Wenzel, Meine) 8:30 am to 12:30 pm, p.70		**Conference 10949: Image Processing** Chairsza: **Elsa D. Angelini,** Imperial College London (UK), Télécom ParisTech (France) and **Bennett A. Landman,** Vanderbilt Univ. (USA)		
SPIE HARRISON H. BARRETT AWARD IN MEDICAL IMAGING Join us for the inaugural presentation of the SPIE Harrison H. Barrett Award in Medical Imaging. The award is presented in recognition of outstanding accomplishments in medical imaging.	**Conference 10950: Computer-Aided Diagnosis** Chairs: **Kensaku Mori,** Nagoya Univ. (Japan) and **Horst K. Hahn,** Fraunhofer MEVIS (Germany)				**STUDENT PAPER AWARDS 2019** For submission requirements seeAwards + Student Info online at spie.org/mi19program
	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)			**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)	
	Conference 10954: Imaging Informatics for Healthcare, Research, and Applications Chairs: **Po-Hao Chen,** Cleveland Clinic (USA) and **Peter R. Bak,** McMaster Univ. (Canada)		**Conference 10953: Biomedical Applications in Molecular, Structural, and Functional Imaging** Chairs: **Barjor Gimi,** Cooper Medical School, Rowan Univ. (USA) and **Andrzej Krol,** SUNY Upstate Medical Univ. (USA)		
	Conference 10955: Ultrasonic Imaging and Tomography Chairs: **Brett C. Byram,** Vanderbilt Univ. (USA) and **Nicole V. Ruiter,** Karlsruher Institut für Technologie (Germany)		**SC1239 Virtual Clinical Trials: An In-depth Tutorial** (Maidment, Bakic, Barufaldi) 8:30 AM - 12:30 PM, p.	**Conference 10956: Digital Pathology** Chairs: **John E. Tomaszewski,** Univ. at Buffalo (USA) and **Aaron D. Ward,** The Univ. of Western Ontario (Canada)	
	**SC987 Spectral CT Imaging** (Schmidt, Flohr, Grant) 8:30 AM - 12:30 PM, p.70	KEYNOTE PRESENTATION: **World's deeptest-penetration and fastest optical cameras: photoacoustic tomography and compressed ultrafast photography** • Conf.10948, Lihong Wang, 10:10 AM - 10:50 AM, p.6	WORKSHOP **Current trends in pre-clinical photoacoustic imaging of small animals**, 8:30 AM - 12:30 PM, p.14	KEYNOTE PRESENTATION: **Visual adaptation and the perception of radiological images** • Conf.10952, Michael A. Webster, 8:00 AM - 9:00 AM, p.8	**Image Processing Student Paper and Poster Awards** • Conf. 10949, 12:10 PM - 12:15 PM, p.17
	KEYNOTE PRESENTATION: **AI research and applications in radiology: experience in China** • Conf.10954, Shiyuan Liu, 1:20 - 2:00 PM, p.6	KEYNOTE PRESENTATION: **Seismo-medical tomography** • Conf.10955, Andreas Fichtner, 1:20 PM - 2:20 PM, p.6	KEYNOTE PRESENTATION: **Bringing transcranial MR-guided focused ultrasound into focus** • Conf.10951, Kim Butts-Pauly, 8:40 AM - 9:40 AM, p.7	KEYNOTE PRESENTATION: **Deep learning for inverse imaging problems: some recent approaches** • Conf.10949, Carola-Bibiane Schönlieb, 10:10 AM - 11:10 AM, p.8	
	Sunday/Monday Poster Author Set-Up: Sunday after 12:00 PM (NOON), p.10	**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	**Tuesday/Wednesday Poster Author Set-Up:** Tuesday after 9:30 AM, p.13	KEYNOTE PRESENTATION: **Pixels to diagnosis: image analysis for digital pathology** • Conf.10956, Metin Gurcan, 1:20 PM - 2:20 PM, p.8	
		Women's Networking Lunch, 12:10 PM - 1:20 PM, p.13	KEYNOTE PRESENTATION: **Presentation title TBD** • Conf.10953, Christopher Filippi, 10:10 AM - 11:10 AM, p.7	**Tuesday/Wednesday Poster Session/ Reception,** 5:30 - 7:00 PM, p.11	
		Robert F. Wagner All-Conference Best Student Paper Award, 4:15 PM - 4:30 PM, p.15	KEYNOTE PRESENTATION: **The U-net and its impact to medical imaging** • Conf.10950, Bernardino Romera-Paredes, 1:20 PM - 2:20 PM, p.7		

SATURDAY 16 February	SUNDAY 17 February	MONDAY 18 February	TUESDAY 19 February	WEDNESDAY 20 February	THURSDAY 21 February
	**SC1183 Modern Diagnostic X-ray Sources** (Behling) 1:30 PM - 5:30 PM, p.68	**Sunday/Monday Poster Session/ Reception**, 5:30 TO 7:00 PM, p.10	**SC1239 Virtual Clinical Trials: An In-depth Tutorial** (Maidment, Bakic, Barufaldi) 8:30 am to 12:30 pm, p.69	**Physics of Medical Imaging Student Paper and Poster Awards** • Conf. 10948, 3:00 PM - 3:05 PM, p.16	
	SC1129 Photon Counting CT (Danielsson, Grönberg) 1:30 PM - 5:30 PM, p.67		**Image-Guided Procedures, Robotic Interventions, and Modeling Awards** • Conf. 10951, 3:00 PM - 3:05 PM, p.16	SPIE-AAPM-NCI BreastPathQ 2019: **Cancer Cellularity Challenge,** 3:30 PM - 5:30 PM, p.12	
	SC1236 SimpleITK Jupyter Notebooks: Biomedical Image Analysis in Python (Johnson, Lowekamp, Yaniv) 1:30 PM - 5:30 PM, p.69		WORKSHOP (CONF. 10952) **Visual search in medical image interpretation: theory and practice**, 5:00 PM - 7:00 PM, p.11	**Tuesday/Wednesday Poster Session/ Reception**, 5:30 PM - 7:00 PM, p.10	
	WORKSHOP (CONF. 10955) **USCT data challenge 2019**, 5:45 PM - 7:45 PM, p.10		WORKSHOP (CONF. 10949) **Understanding brain development using connectomics**, 5:00 PM - 7:00 PM, p.11	**Dessert with the Experts— A Student Networking Event,** 6:30 PM - 7:30 PM, p.13	
	WORKSHOP (CONF. 10948) **Detector innovations: from concept to product to clinical outcome**, 5:45 PM - 7:45 PM, p.11		WORKSHOP (CONF. 10950) **Live demonstrations**, 5:00 PM - 7:00 PM, p.12		
	WORKSHOP (CONF. 10951) **The visible human project at its 25th year anniversary**, 5:45 PM - 7:45 PM, p.11				

Daily Conference Session Schedule

TIME	CONF. 10948 Physics of Medical Imaging LOCATION: Town & Country	CONF. 10949 Image Processing LOCATION: San Diego	CONF. 10950 Computer-Aided Diagnosis LOCATION: Golden West	CONF. 10951 Image-Guided Procedures, Robotic Interventions, and Modeling LOCATION: California	CONF. 10952 Image Perception, Observer Performance, and Technology Assessment LOCATION: California	CONF. 10953 Biomedical Applications in Molecular, Structural, and Functional Imaging LOCATION: Pacific Salon 2	CONF. 10954 Imaging Informatics for Healthcare, Research, and Applications LOCATION: San Diego	CONF. 10955 Ultrasonic Imaging and Tomography LOCATION: Pacific Salon 2	CONF. 10956 Digital Pathology LOCATION: Golden Ballroom
SUNDAY 17 FEBRUARY									
8:00 AM - 9:40 AM	SESSION 1 **X-ray Imaging** Hee-Joung Kim, Anders Tingberg, p.28		SESSION 1 **Breast I**, p.28	SESSION 1 **Image-guided Technologies for Neurological and Spinal Surgery** Jeffrey H. Siewerdsen, Andrew D. Wiles, p.28			SESSION 1 **PACS and Clinical Multimedia Data for Non-radiology Images** Thomas M. Deserno, p.28	SESSION 1 **Blood Flow**, p.28	
9:40 AM - 10:10 AM	**COFFEE BREAK**								
10:10 AM - 12:10 PM	SESSION 2 **Tomosynthesis Imaging** Stephen J. Glick, Ioannis Sechopoulos, p.29		SESSION 2 **Brain**, p.29	SESSION 2 **Motion Compensation and Tracking Techniques** David R. Holmes III, Elvis C. Chen, p.29			SESSION 2 **3-D Printing, Augmented Reality, and Virtual Reality for Medical Applications** Brian Park M.D., Darryl H. Hwang, p.29	SESSION 2 **US Tomography I**, p.29	
12:00 PM - 9:00 PM	Sunday/Monday Poster Viewing			Sunday/Monday Poster Viewing			Sunday/Monday Poster Viewing	Sunday/Monday Poster Viewing	
12:10 PM - 1:20 PM	**LUNCH BREAK**								
1:20 PM - 3:00 PM	SESSION 3 **Detector Physics I** Karim S. S. Karim, Arundhuti Ganguly, p.31		SESSION 3 **Breast II**, p.31	SESSION 3 **Multimodality Imaging and Modeling for Cardiac Applications** Maryam E. Rettmann, Ivo Wolf, p.31			SESSION 3 **Artificial Intelligence and Deep Learning I** Shandong Wu, p.31	SESSION 3 **Elastography, Tissue Classification and Doppler**, p.31	
3:00 PM - 3:30 PM	**COFFEE BREAK**								
3:30 PM - 5:30 PM	SESSION 4 **Quantitative Image Quality Assessment** Joseph Y. Lo, Frédéric Noo, p.32		SESSION 4 **Breast III and Heart**, p.32	SESSION 4 **Robotic, Endoscopic, and Needle Guidance Technologies and Devices** Robert J. Webster III, Gabor Fichtinger, p.32			SESSION 4 **Artificial Intelligence and Deep Learning II** Tessa S. Cook M.D., p.32	SESSION 4 **Beamforming and Image Formation**, p.32	
5:45 PM - 7:45 PM	WORKSHOP **Detector Innovations: From Concept to Product to Clinical Outcome**, p.11			WORKSHOP **The Visible Human Project at its 25th Year Anniversary**, p.11				WORKSHOP **USCT Data Challenge 2019**, p.10	

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MONDAY 18 FEBRUARY									
8:00 AM - 9:40 AM	SESSION 5 **Machine Learning I** Jinyi Qi, Kirsten Boedeker, p.34		SESSION 5 **Lung I**, p.34	SESSION 5 **Deep Learning** Satish E. Viswanath, David R. Haynor, p.34			SESSION 5 **Economics, Regulations, and Practice Innovation in Medical Imaging** Steven C. Horii M.D., p.34	SESSION 5 **US Tomography II**, p.34	
9:40 AM - 9:45 AM							AWARD ANNOUNCEMENTS		
9:40 AM - 10:10 AM	**COFFEE BREAK**								
10:10 AM - 12:10 PM	SESSION 6 **Imaging Physics: Pushing the Boundary** Taly Gilat Schmidt, Guang-Hong Chen, p.35		SESSION 6 **Abdomen**, p.35	SESSION 6 **Ultrasound Imaging and Guidance Technologies** Purang Abolmaesumi, David M. Kwartowitz, p.35			SESSION 6 **Applied Big Data and Cloud-based Technologies** Po-Hao Chen M.D., p.35	SESSION 6 **Image Processing and Analysis**, p.35	
12:10 PM - 1:20 PM	**LUNCH BREAK**								
1:20 PM - 3:40 PM	SESSION 7 **Image Reconstruction** Joseph W. Stayman, Michael Grass, p.36		SESSION 7 **Multiorgan and Colon**, p.36	SESSION 7 **Augmented Reality, Virtual Reality, and Advanced Visualization** Ziv R. Yaniv, Frank Sauer, p.36			SESSION 7 **Precision Medicine, Correlative Analytics, and Translational Research** Peter R. Bak, p.36	SESSION 7 **Keynote and New Applications**, p.36	
2:15 PM - 2:20 PM								AWARD ANNOUNCEMENTS	
3:40 PM - 4:10 PM	**COFFEE BREAK**								
4:10 PM - 5:30 PM	**PLENARY AND AWARDS SESSION**, Thomas J. Fuchs, p.5								
5:30 PM - 7:00 PM	**MONDAY POSTER SESSION**, p.38			**MONDAY POSTER SESSION**, p.41			**MONDAY POSTER SESSION**, p.42	**MONDAY POSTER SESSION**, p.43	

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Daily Conference Session Schedule

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TUESDAY 19 FEBRUARY									
8:00 AM - 9:40 AM	SESSION 8 **Detector Physics II** Wei Zhao, Shiva Abbaszadeh, p.44	SESSION 1 **Image Reconstruction and Synthesis** Jerry L. Prince, Marius Staring, p.44	SESSION 8 **Lung II**, p.44	SESSION 8 **Keynote and Novel MRI-Guided Technologies** Baowei Fei, Cristian A. Linte, p.44		SESSION 1 **Novel Imaging Techniques and Applications I** Andrzej Krol, Armando Manduca, p.44			
9:40 AM - 10:10 AM	**COFFEE BREAK**								
10:10 AM - 12:10 PM	SESSION 9 **Spectral Imaging** Lifeng Yu, Adam M. Alessio, p.45	SESSION 2 **Deep Learning: Segmentation** Tomaž Vrtovec, Punam Kumar Saha, p.45	SESSION 9 **Radiomics I**, p.45	SESSION 9 **Optical Imaging and Guidance Technologies** Pierre Jannin, Amber L. Simpson, p.45		SESSION 2 **Keynote and Optical/ Vascular I** Barjor Gimi, Andrzej Krol, p.45			
12:00 PM TO 9:00 PM		**TUESDAY/WEDNESDAY POSTER VIEWING**	**TUESDAY/WEDNESDAY POSTER VIEWING**		**TUESDAY/WEDNESDAY POSTER VIEWING**	**TUESDAY/WEDNESDAY POSTER VIEWING**			**TUESDAY/WEDNESDAY POSTER VIEWING**
12:10 PM - 1:20 PM	**LUNCH BREAK**								
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3:00 PM - 3:05 PM				**AWARD ANNOUNCEMENTS**					
3:00 PM - 3:30 PM	**COFFEE BREAK**								
3:30 PM - 4:50 PM	SESSION 11 **Cone Beam CT** Marc Kachelrieß, John Yorkston, p.48	SESSION 4 **Brain: Shapes and Biomarkers** Kenji Suzuki M.D., David R. Haynor, p.48	SESSION 11 **Lung III**, p.48	SESSION 11 **Image Segmentation and Classification** Jack H. Noble Sr., William E. Higgins, p.48		SESSION 4 **Pulmonary** Andrzej Krol, Armando Manduca, p.48			
5:00 PM - 7:00 PM		WORKSHOP **Understanding Brain Development using Connectomics**, p.11	WORKSHOP **Live Demonstrations**, p.12		WORKSHOP **Visual Search in Medical Image Interpretation: Theory and Practice**, p.11				

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WEDNESDAY 20 FEBRUARY									
8:00 AM - 9:40 AM	SESSION 12 **X-ray Phase Contrast Imaging** Mini Das, Peter B. Noël, p.49	SESSION 5 **fMRI and DTI** Martin A. Styner, David R. Haynor, p.49	SESSION 12 **Vascular and Radiomics II**, p.49		SESSION 1 **Image Perception** Frank W. Samuelson, Robert M. Nishikawa, p.49	SESSION 5 **Innovations in Image Processing I** Vikram D. Kodibagkar, Nicholas J. Tustison, p.49			
9:40 AM - 9:45 AM	AWARD ANNOUNCEMENTS								
9:40 AM - 10:10 AM	**COFFEE BREAK**								
10:10 AM - 12:10 PM	SESSION 13 **Photon Counting Imaging** Mats Danielsson, Rebecca Fahrig, p.50	SESSION 6 **Keynote and Highlights** Tomaž Vrtovec, Hayit Greenspan, p.50	SESSION 13 **Eyes and New Approaches**, p.50		SESSION 2 **Model Observers I** Howard C. Gifford, François O. Bochud, p. 50	SESSION 6 **Innovations in Image Processing II** Vikram D. Kodibagkar, Nicholas J. Tustison, p.50			
12:10 PM - 1:20 PM	**LUNCH BREAK**								
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3:00 PM - 3:30 PM	**COFFEE BREAK**								
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5:30 PM - 7:00 PM		WEDNESDAY POSTER SESSION, p.54	WEDNESDAY POSTER SESSION, p.55		WEDNESDAY POSTER SESSION, p.57	WEDNESDAY POSTER SESSION, p.58			WEDNESDAY POSTER SESSION, p.58

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THURSDAY 21 FEBRUARY									
8:00 AM - 9:40 AM		SESSION 9 **Cardiac Imaging** Punam Kumar Saha, Hayit Greenspan, p.60			SESSION 5 **Deep Learning Applications** Maciej A. Mazurowski, Pontus Timberg, p.60	SESSION 9 **Bone** Andrzej Krol, Baohong Yuan, p.60			SESSION 3 **Diagnosis, Prognosis, Predictive Analysis**, p.60
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9:40 AM - 10:10 AM	**COFFEE BREAK**								
10:10 AM - 12:10 PM		SESSION 10 **Registration and Motion** Murray H. Loew, Olivier Colliot, p.61			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			SESSION 4 **Precision Medicine and Grading**, p.61
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12:10 PM - 1:20 PM	**LUNCH BREAK**								
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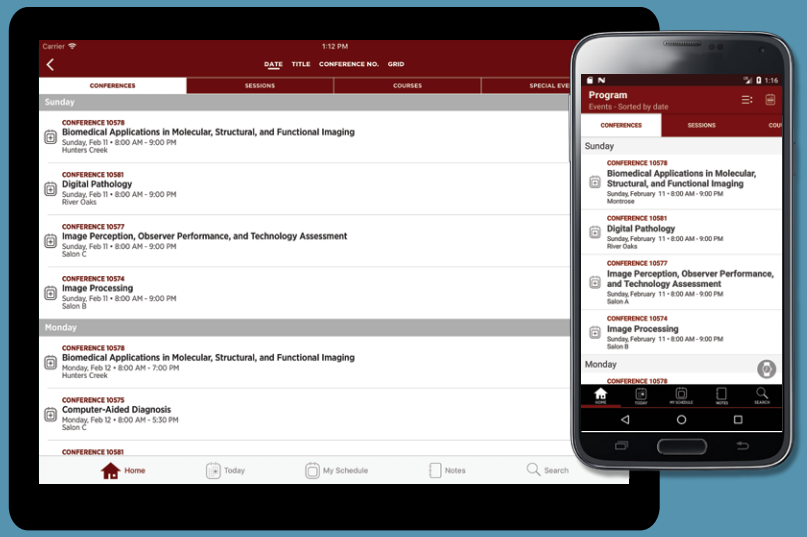

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CONFERENCE 10948

ROOM: TOWN & COUNTRY

Sunday - Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10948

Physics of Medical Imaging

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CONFERENCE 10949

ROOM: SAN DIEGO

Tuesday - Thursday 19–21 Feb. 2019
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Image Processing

Conference Chairs: **Elsa D. Angelini,** Imperial College London (UK), Télécom ParisTech (France); **Bennett A. Landman,** Vanderbilt Univ. (USA)

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CONFERENCE 10950

ROOM: GOLDEN WEST

Sunday - Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10950

Computer-Aided Diagnosis

Conference Chairs: **Kensaku Mori,** Nagoya Univ. (Japan); **Horst K. Hahn,** Fraunhofer MEVIS (Germany)

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CONFERENCE 10951

ROOM: CALIFORNIA

Sunday - Tuesday 17–19 Feb. 2019
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Image-Guided Procedures, Robotic Interventions, and Modeling

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

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CONFERENCE 10952

ROOM: CALIFORNIA

Wednesday - Thursday 20–21 Feb. 2019
Proceedings of SPIE Vol. 10952

Image Perception, Observer Performance, and Technology Assessment

Conference Chairs: **Robert M. Nishikawa,** Univ. of Pittsburgh (USA); **Frank W. Samuelson,** U.S. Food and Drug Administration (USA)

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TECHNICAL CONFERENCES

CONFERENCE 10953

ROOM: PACIFIC SALON 2

Tuesday - Thursday 19–21 Feb. 2019
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Biomedical Applications in Molecular, Structural, and Functional Imaging

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

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CONFERENCE 10954

ROOM: SAN DIEGO

Sunday - Monday 17–18 Feb. 2019
Proceedings of SPIE Vol. 10954

Imaging Informatics for Healthcare, Research, and Applications

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

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CONFERENCE 10955

ROOM: PACIFIC SALON 2

Sunday - Monday 17–18 Feb. 2019
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Ultrasonic Imaging and Tomography

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

Program Committee: **Mark A. Anastasio,** Washington Univ. in St. Louis (USA); **Jeffrey C. Bamber,** The Royal Marsden NHS Foundation Trust (UK); **Johan G. Bosch,** Erasmus Univ. Rotterdam (Netherlands); **Jan D'hooge,** Univ. of Leuven (Belgium); **Marvin M. Doyley,** Univ. of Rochester (USA); **Neb Duric,** Delphinus Medical Technologies, Inc. (USA); **Stanislav Y. Emelianov,** The Univ. of Texas at Austin (USA); **Mostafa Fatemi,** Mayo Clinic College of Medicine (USA); **Aaron Fenster,** Robarts Research Institute (Canada); **Jérémie Fromageau,** The Institute of Cancer Research (UK); **James F. Greenleaf,** Mayo Clinic (USA); **Emma J. Harris,** The Institute of Cancer Research (UK); **Michael Jaeger,** Univ. Bern (Switzerland); **Jørgen Arendt Jensen,** Technical Univ. of Denmark (Denmark); **David H. Kim,** Pohang Univ. of Science and Technology (Korea, Republic of); **Roman G. Maev,** Univ. of Windsor (Canada); **Bilal H. Malik,** QT Ultrasound LLC (USA); **Stephen A. McAleavey,** Univ. of Rochester (USA); **Mohammad Mehrmohammadi,** Wayne State Univ. (USA); **Svetoslav I. Nikolov,** BK Medical (Denmark); **Olivier Roy,** Barbara Ann Karmanos Cancer Institute (USA); **Kai E. Thomenius,** Massachusetts Institute of Technology (USA); **François Varray,** CREATIS (France); **James W. Wiskin,** QT Ultrasound LLC (USA)

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CONFERENCE 10956

ROOM: GOLDEN BALLROOM

Wednesday - Thursday 20–21 Feb. 2019
Proceedings of SPIE Vol. 10956

Digital Pathology

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

Program Committee: **Selim Aksoy,** Bilkent Univ. (Turkey); **Ulysses J. Balis,** Univ. of Michigan Health System (USA); **Rohit Bhargava,** Univ. of Illinois at Urbana-Champaign (USA); **Ulf-Dietrich Braumann,** Hochschule für Technik, Wirtschaft und Kultur Leipzig (Germany); **Weijie Chen,** U.S. Food and Drug Administration (USA); **Wei-Chung Cheng,** U.S. Food and Drug Administration (USA); **Eric Cosatto,** NEC Labs. America, Inc. (USA); **Scott Doyle,** Rutgers, The State Univ. of New Jersey (USA); **Michael D. Feldman,** The Univ. of Pennsylvania Health System (USA); **David J. Foran,** Rutgers Cancer Institute of New Jersey (USA); **Marios A. Gavrielides,** U.S. Food and Drug Administration (USA); **April Khademi,** Ryerson Univ. (Canada); **Tom R. L. Kimpe,** Barco N.V. (Belgium); **Elizabeth A. Krupinski,** Emory Univ. School of Medicine (USA); **Richard M. Levenson,** Univ. of California, Davis (USA); **Olivier Lezoray,** Univ. de Caen Basse-Normandie (France); **Geert Litjens,** Radboud Univ. Medical Ctr. (Netherlands); **Anant Madabhushi,** Case Western Reserve Univ. (USA); **Derek R. Magee,** Univ. of Leeds (UK); **Anne L. Martel,** Sunnybrook Research Institute (Canada); **Erik Meijering,** Erasmus MC (Netherlands); **James P. Monaco,** Inspirata, Inc. (USA); **Mehdi Moradi,** IBM Research (USA); **Bahram Parvin,** Lawrence Berkeley National Lab. (USA); **Josien P. W. Pluim,** Image Sciences Institute (Netherlands); **Nasir M. Rajpoot,** The Univ. of Warwick (UK); **Berkman Sahiner,** U.S. Food and Drug Administration (USA); **Chukka Srinivas,** Ventana Medical Systems, Inc. (USA); **Darren Treanor,** Univ. of Leeds (UK); **Jeroen van der Laak,** Radboud Univ. Nijmegen Medical Ctr. (Netherlands); **Martin J. Yaffe,** Sunnybrook Research Institute (Canada); **Bülent Yener,** Rensselaer Polytechnic Institute (USA)

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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:
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

NOTE: Extended poster viewing until 9:00 PM on Sunday.

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 Tuesday.

SUNDAY 17 FEBRUARY

CONFERENCE 10948
ROOM: TOWN & COUNTRY

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10948

SESSION 1
ROOM: TOWN & COUNTRY . SUN 8:00 TO 9:40 AM

X-ray Imaging

Session Chairs: **Hee-Joung Kim,** Yonsei Univ. (Korea, Republic of); **Anders Tingberg,** Lund Univ. (Sweden)

8:00 am: **Single-exposure contrast enhanced spectral mammography**, Raul C. Torrico, Mini Das, Univ. of Houston (USA) . . . . . [10948-1]

8:20 am: **Model of malignant breast biopsies and predictions of their WAXS energy integrated signals,** Robert J. LeClair, Matthew Brunet, Laurentian Univ. (Canada) . . . . . [10948-2]

8:40 am: **Deep learning framework for digital breast tomosynthesis reconstruction**, Nikita Moriakov, Koen Michielsen, Radboud Univ. Medical Ctr. (Netherlands); Jonas Adler, KTH Royal Institute of Technology (Sweden); Ritse Mann M.D., Ioannis Sechopoulos, Jonas Teuwen, Radboud Univ. Medical Ctr. (Netherlands) . . . . . [10948-220]

9:00 am: **Initial study of the radiomics of intracranial aneurysms using Angiographic Parametric Imaging (API) to evaluate contrast flow changes**, Anusha Ramesh Chandra, Univ. at Buffalo (USA) and Canon Stroke and Vascular Research Ctr. (USA) and The State Univ. of New York (USA); Mohammad Waqas, Hussain Shallwani, Jordan Marshall, Alexander Podgorsak, Adnan H. Siddiqui, Jason M. Davies, Stephen Rudin, Ciprian N. Ionita, Univ. at Buffalo (USA) and Canon Stroke and Vascular Research Ctr. (USA) . . . . . [10948-4]

9:20 am: **Anatomically- and computationally-informed hepatic contrast perfusion simulations for use in virtual clinical trials**, Thomas J. Sauer, Ehsan Abadi, William Paul Segars, Ehsan Samei, Duke Univ. (USA). . . . . [10948-5]

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

CONF. 10948 continued page 29 ➡

CONFERENCE 10950
ROOM: GOLDEN WEST

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10950

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

Breast I

8:00 am: **Vendor-independent soft tissue lesion detection using weakly supervised and unsupervised adversarial domain adaptation**, Joris van Vugt, Elena Marchiori, Radboud Univ. Nijmegen (Netherlands); Ritse Mann M.D., Radboud Univ. Medical Ctr. (Netherlands); Albert Gubern-Mérida, ScreenPoint Medical (Netherlands); Nikita Moriakov, Jonas Teuwen, Radboud Univ. Medical Ctr. (Netherlands) . . . . . [10950-1]

8:20 am: **Detecting mammographically-occult cancer in women with dense breasts using deep convolutional neural network and Radon cumulative distribution transform**, Juhun Lee, Robert M. Nishikawa, Univ. of Pittsburgh (USA) . . . . . [10950-2]

8:40 am: **Reducing overfitting of a deep learning breast mass detection algorithm in mammography using synthetic images**, Kenny H. Cha, Nicholas Petrick, Aria Pezeshk, Christian G. Graff, Diksha Sharma, Andreu Badal, Aldo Badano, Berkman Sahiner, U.S. Food and Drug Administration (USA) . . . . . [10950-3]

9:00 am: **Deep learning for identifying breast cancer malignancy and false recalls: a robustness study**, Kadie Clancy, Lei Zhang, Aly A. Mohamed, Sarah Aboutalib, Wendie Berg M.D., Shandong Wu, Univ. of Pittsburgh (USA) . . [10950-4]

9:20 am: **Evaluating deep learning techniques for dynamic contrast-enhanced MRI in the diagnosis of breast cancer**, Rachel Anderson, Hui Li, The Univ. of Chicago Medicine (USA); Yu Ji, The Univ. of Chicago Medicine (USA) and Tianjin Medical Univ. Cancer Institute & Hospital (China); Peifang Liu, Tianjin Medical Univ. Cancer Institute & Hospital (China); Maryellen L. Giger, The Univ. of Chicago Medicine (USA) . . . . . [10950-5]

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

CONF. 10950 continued page 29 ➡

CONFERENCE 10951
ROOM: CALIFORNIA

Sunday - Tuesday 17–19 Feb. 2019
Proceedings of SPIE VOL. 10952

SESSION 1
ROOM: CALIFORNIA . . . . . SUN 8:00 TO 9:40 AM

Image-guided Technologies for Neurological and Spinal Surgery

Session Chairs: **Jeffrey H. Siewerdsen,** Johns Hopkins Univ. (USA); **Andrew D. Wiles,** Northern Digital Inc. (Canada)

8:00 am: **Automatic trajectory and instrument planning for robot-assisted spine surgery**, Rohan C. Vijayan, Tharindu S. De Silva, Runze Han, Ali Uneri, Sophia A. Doerr, Michael D. Ketcha, Johns Hopkins Univ. (USA); Alexander Perdomo-Pantoja, Nicholas Theodore M.D., The Johns Hopkins Hospital (USA); Jeffrey H. Siewerdsen, Johns Hopkins Univ. (USA) . . . . . [10951-1]

8:20 am: **Improved intraoperative imaging in spine surgery: clinical translation of known-component 3D image reconstruction on the O-arm system**, Xiaoxuan Zhang, Ali Uneri, Joseph Webster Stayman, Johns Hopkins Univ. (USA); Corinna C. Zygourakis M.D., Sheng-Fu Lo M.D., The Johns Hopkins Hospital (USA); Nicholas Theodore M.D., Johns Hopkins Hospital (USA); Jeffrey H. Siewerdsen, Johns Hopkins Univ. (USA) . . [10951-2]

8:40 am: **Automatic analysis of global spinal morphology: guidance of deformity correction and application to surgical outcomes analysis**, Sophia A. Doerr, Tharindu S. De Silva, Rohan C. Vijayan, Runze Han, Ali Uneri, Xiaoxuan Zhang, Corinna C. Zygourakis, Nicholas Theodore M.D., Jeffrey H. Siewerdsen, Johns Hopkins Univ. (USA) . . . . . [10951-3]

9:00 am: **A comprehensive model-assisted brain shift correction approach in image-guided neurosurgery: a case study in brain swelling and subsequent sag after craniotomy**, Ma Luo, Vanderbilt Univ. (USA); Sarah F. Frisken, Brigham and Women's Hospital (USA); Saramati Narasimhan, Logan W. Clements, Vanderbilt Univ. (USA); Reid C. Thompson M.D., Vanderbilt Univ. Medical Ctr. (USA); Alexandra J. Golby M.D., Brigham and Women's Hospital (USA); Michael I. Miga, Vanderbilt Univ. (USA) and Vanderbilt Univ. Medical Ctr. (USA) and Vanderbilt Institute for Surgery and Engineering (USA) . . . . . [10951-4]

9:20 am: **A comparison of geometry- and feature-based sparse data extraction for model-based image updating in deep brain stimulation surgery**, Chen Li, Xiaoyao Fan, Joshua Aronson, Keith D. Paulsen, Dartmouth College (USA) [10951-5]

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

CONF. 10951 continued page 29 ➡

CONFERENCE 10954
ROOM: SAN DIEGO

Sunday–Monday 17–18 Feb. 2019
Proceedings of SPIE Vol. 10954

SESSION 1
ROOM: SAN DIEGO . . . . SUN 8:00 AM TO 9:40 AM

PACS and Clinical Multimedia Data for Non-radiology Images

Session Chair: **Thomas M. Deserno,** Technische Univ. Braunschweig (Germany)

8:00 am: **The application of deep learning framework in quantifying retinal structures on ophthalmic image in research eye-PACS**, Moye Yu, Nantong Univ. (China); Siliang Zhang, Brent J. Liu, The Univ. of Southern California (USA); Shenghui Zhao, Aimin Sang, Jiancheng Dong, Huiqun Wu, Nantong Univ. (China) . . . . . [10954-1]

8:20 am: **Automatically estimating size information for dose management systems applied in fluoroscopy and radiography**, Alexander Neissner, Petar Penchev, Ulf Mäder, Technische Hochschule Mittelhessen (Germany); Andreas Mahnken, Philipps-Univ. Marburg (Germany); Martin Fiebich, Technische Hochschule Mittelhessen (Germany). . . . . [10954-2]

8:40 am: **The development of an imaging informatics-based platform and data viewer interface to support sports performance and injury prevention in track and field athletes**, Joseph Liu, Sneha K. Verma, Jill McNitt-Gray, Ximing Wang, Brent J. Liu, The Univ. of Southern California (USA) . . . . . [10954-3]

9:00 am: **Multimedia data handling and integration for rehabilitation research**, Sneha K. Verma, Jill McNitt-Gray, Brent J. Liu, The Univ. of Southern California (USA) . . . . . [10954-4]

9:20 am: **Fundus Analysis Software Tool (FAST): development of software integrating CAD with the EHR for the longitudinal study of fundus images**, Veda Murthy, The Univ. of Southern California (USA); Manjula Shankar, Retina Institute of Karnataka (India); Sabrina Lieu, Karlsun Jennings, Justin Lin, Mayur Patel, Heaven Post, The Univ. of Southern California (USA); Hemanth Murthy, Retina Institute of Karnataka (India); Brent J. Liu, The Univ. of Southern California (USA) . . . . . [10954-5]

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

CONF. 10954 continued page 29 ➡

CONFERENCE 10955
ROOM: PACIFIC SALON 2

Sunday - Monday 17–18 Feb. 2019
Proceedings of SPIE Vol. 10955

SESSION 1
ROOM: PACIFIC SALON 2 . SUN 8:00 TO 9:40 AM

Blood Flow

8:00 am: **Deep 3D convolutional neural networks for fast super-resolution ultrasound imaging**, Katherine Brown, The Univ. of Texas at Dallas (USA) . . . . . [10955-1]

8:20 am: **Independent component analysis-based tissue clutter filtering for plane wave perfusion ultrasound imaging**, Jaime E. Tierney, Don M. Wilkes, Brett C. Byram, Vanderbilt Univ. (USA) . . . . . [10955-2]

8:40 am: **Accuracy improvement of echographic speckle tracking based on analysis of estimation error caused by acoustic pressure field**, Motochika Shimizu, Hitachi, Ltd. (Japan) . . . . . [10955-3]

9:00 am: **Morphological processing for multiscale analysis of super-resolution ultrasound images of tissue microvascular networks**, Ipek Oezdemir, Kenneth Hoyt, The Univ. of Texas at Dallas (USA) . . . . . [10955-4]

9:20 am: **A two-fold enhancement of ultrasound vessel images using a non-local based and morphological filtering**, Saba Adabi, Siavash Ghavamiroudsari, Mahdi Bayat, Mostafa Fatemi, Azra Alizad, Mayo Clinic (USA). . . . . [10955-5]

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

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SUNDAY 17 FEBRUARY

CONFERENCE 10948
ROOM: TOWN & COUNTRY

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10948

SESSION 2
ROOM: TOWN & COUNTRY . . . .SUN 10:10 AM TO 12:10 PM

Tomosynthesis Imaging

Session Chairs: **Stephen J. Glick,** U.S. Food and Drug Administration (USA); **Ioannis Sechopoulos,** Radboud Univ. Medical Ctr. (Netherlands)

10:10 am: **Generating synthetic mammograms for stationary 3D mammography**, Connor Puett, Christina Inscoe, Jianping Lu, Yueh Lee M.D., Otto Zhou, The Univ. of North Carolina at Chapel Hill (USA) . . . . . [10948-6]

10:30 am: **Adaptively-weighted total-variation (AwTV) in a prototype 4D digital tomosynthesis system for fast and low-dose target localization**, Sunghoon Choi, Yonsei Univ. (Korea, Republic of); Sooyeul Lee, Electronics and Telecommunications Research Institute (Korea, Republic of); Young-Nam Kang, Seoul St. Mary's Hospital (Korea, Republic of); Scott Hsieh, Univ. of California, Los Angeles (USA); Hee-Joung Kim, Yonsei Univ. (Korea, Republic of). . . . . [10948-7]

10:50 am: **Metal artifact correction based on combination of 2D and 3D region growing for x-ray tomosynthesis**, Keisuke Yamakawa, Keiko Takahashi, Tadashi Nakamura, Hitachi, Ltd. (Japan) . . . . . [10948-8]

11:10 am: **Verification of the accuracy of a partial breast imaging simulation framework**, Liesbeth Vancoillie, Nicholas W. Marshall, KU Leuven (Belgium); Lesley Cockmartin, UZ Leuven (Belgium); Hilde Bosmans, KU Leuven (Belgium) . . . . [10948-9]

11:30 am: **Personalization of x-ray tube motion in digital breast tomosynthesis using virtual Defrise phantoms**, Raymond J. Acciavatti, Bruno Barufaldi, Trevor L. Vent, E. Paul Wileyto, Andrew D. A. Maidment, Univ. of Pennsylvania (USA) . . .[10948-10]

11:50 am: **Noise measurements from reconstructed digital breast tomosynthesis**, Rodrigo de Barros Vimieiro, Lucas Rodrigues Borges, Univ. de São Paulo (Brazil); Renato França Caron, Hospital de Câncer de Barretos (Brazil); Bruno Barufaldi, Predrag R. Bakic, Andrew D. A. Maidment, Univ. of Pennsylvania (USA); Marcelo A. C. Vieira, Univ. de São Paulo (Brazil) . . . . . [10948-11]

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CONFERENCE 10950
ROOM: GOLDEN WEST

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10950

SESSION 2
ROOM: GOLDEN WEST . . . . . .SUN 10:10 AM TO 12:10 PM

Brain

10:10 am: **Registration based detection and quantification of intracranial aneurysm growth**, Ziga Bizjak, Tim Jerman, Boštjan Likar, Franjo Pernuš, Univ. of Ljubljana (Slovenia); Aichi Chien, Univ. of California, Los Angeles (United States); Ziga Spiclin, Univ. of Ljubljana (Slovenia) . . . . . [10950-6]

10:30 am: **Reliability of computer-aided diagnosis tools with multicenter MR datasets: impact of training protocol**, Mariana P. Bento, Roberto M. Souza, Marina Salluzzi, Richard Frayne, Univ. of Calgary (Canada) . . . . . [10950-7]

10:50 am: **Automatic multi-modality segmentation of gross tumor volume for head and neck cancer radiotherapy using 3D U-Net**, Zhe Guo, Massachusetts General Hospital (USA) and Beijing Institute of Technology (China); Ning Guo, Kuang Gong, Quanzheng Li, Massachusetts General Hospital (USA). . . . . [10950-8]

11:10 am: **Automatic strategy for extraction of anthropometric measurements for the diagnostic and evaluation of deformational plagiocephaly from infant's head models**, Bruno Oliveira, Helena R. Torres, Pedro Morais, Instituto Politécnico do Cávado e do Ave (Portugal); Fernando Veloso, Instituto Politécnico do Cávado e do Ave (Portugal); Estela Vilhena, João L. Vilaça, Instituto Politécnico do Cávado e do Ave (Portugal) . . . . . [10950-9]

11:30 am: **Radiomics of the lesion habitat on pre-treatment MRI to predict response to chemo-radiation therapy in Glioblastoma**, Ruchika Verma, Ramon Correa, Virginia Hil, Niha G. Beig, Abdelkar Mahammedi, Anant Madabhushi, Pallavi Tiwari, Case Western Reserve Univ. (USA). . . . . [10950-10]

11:50 am: **Modeling normal brain asymmetry in MR images applied to anomaly detection without segmentation and data annotation**, Samuel B. Martins, Barbara C. Benato, Bruna F. Silva, Clarissa L Yasuda, Alexandre X. Falcão, UNICAMP (Brazil) . . . . . [10950-11]

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

CONF. 10950 continued page 30 ➡

CONFERENCE 10951
ROOM: CALIFORNIA

Sunday - Tuesday 17–19 Feb. 2019
Proceedings of SPIE VOL. 10952

SESSION 2
ROOM: CALIFORNIA SUN 10:10 AM TO 12:10 PM

Motion Compensation and Tracking Techniques

Session Chairs: **David R. Holmes III,** Mayo Clinic (USA); **Elvis C. Chen,** Robarts Research Institute (Canada)

10:10 am: **Feasibility of a markerless tracking system based on optical coherence tomography**, Matthias Schlüter, Christoph Otte, Thore Saathoff, Nils Gessert, Alexander Schlaefer, Technische Univ. Hamburg-Harburg (Germany) . . . . . [10951-6]

10:30 am: **Two-path 3D CNNs for calibration of system parameters for OCT-based motion compensation**, Nils Gessert, Martin Gromniak, Matthias Schlüter, Alexander Schlaefer, Technische Univ. Hamburg-Harburg (Germany) . . . . . [10951-7]

10:50 am: **Patient specific 4D monte carlo dose accumulation using correspondence model based motion prediction**, Thilo Sentker, Frederic Madesta, René Werner, Universitätsklinikum Hamburg-Eppendorf (Germany). . . . . [10951-8]

11:10 am: **Visual SLAM for bronchoscope tracking and bronchus reconstruction in bronchoscopic navigation**, Wang Cheng, kensaku Mori, Masahiro Oda, Yuichiro Hayashi, Nagoya Univ. (Japan); Takayuki Kitasaka, Graduate School of Information Science, Aichi Institute of Technology (Japan); Hirotoshi Honma, Sapporo-Kosei General Hospital (Japan); Hirotsugu Takabatake, Sapporo-Minami-Sanjo Hospital (Japan); Masaki Mori, Sapporo-Kosei General Hospital (Japan); Hiroshi Natori, Keiwakai Nishioka Hospital (Japan) . . . . . [10951-9]

11:30 am: **Automatic marker-free target positioning and tracking for image-guided radiotherapy and interventions**, Wei Zhao, Liyue Shen, Yan Wu, Bin Han, Yong Yang, Lei Xing, Stanford Univ. (USA) . . . . . [10951-10]

11:50 am: **Optimal intermittent measurements for tumor tracking in x-ray guided radiotherapy**, Antoine Aspeel, Benoît Macq, Raphaël Jungers, Damien Dasnoy, Univ. Catholique de Louvain (Belgium) . . . . . [10951-11]

CONF. 10951 continued page 30 ➡

CONFERENCE 10954
ROOM: SAN DIEGO

Sunday–Monday 17–18 Feb. 2019
Proceedings of SPIE Vol. 10954

SESSION 2
ROOM: SAN DIEGO . . SUN 10:10 AM TO 12:10 PM

3-D Printing, Augmented Reality, and Virtual Reality for Medical Applications

Session Chairs: **Brian Park M.D.,** The Univ. of Pennsylvania Health System (USA); **Darryl H. Hwang,** The Univ. of Southern California (USA)

10:10 am: **Fast selective antialiasing for direct volume rendering**, Sergey Y. Belyaev, Saint-Petersburg State Polytechnical Univ. (Russian Federation) and EPAM Systems, Inc. (Russian Federation); Natalia D. Smirnova, EPAM Systems, Inc. (Russian Federation); Pavel O. Smirnov, Daniil A. Savchuk, Saint-Petersburg State Polytechnical Univ. (Russian Federation) and EPAM Systems, Inc. (Russian Federation) . . . . . [10954-6]

10:30 am: **The wearable augmented reality (AR) approach to support mammographic training: Hololens for screener training**, Qiang Tang, Gerald Schaefer, Alastair Gale, Yan Chen, Loughborough Univ. (UK) . . . . . [10954-7]

10:50 am: **Medical image based bio 3D printing of variable tissue compositions**, Rohit Shinde, Dietrich James P. Nigh, Sylvia S. Rhodes, Chamith S. Rajapakse, Jayaram K. Udupa, Univ. of Pennsylvania (USA) . . . . . [10954-8]

11:10 am: **A comparison of open source libraries ready for 3D reconstruction of wounds**, Syamantak Kumar, Dhruv Jaglan, Indian Institute of Technology Bombay (India); Nagarajan Ganapathy, Indian Institute of Technology Madras (India); Thomas Martin Deserno, Technische Univ. Braunschweig (Germany) . . . . . [10954-9]

11:30 am: **Improved functional asssessment of ischemic severity using 3D printed models**, Kranthi K. Kolli, Weill Cornell Medicine (USA); Shalmli Joshi, Univ. of Connecticut School of Medicine (USA); Eva Romito, Alexandre Caprio, Amir Ali Amiri Moghadam, Seyedhamidreza Alaie, Weill Cornell Medicine (USA); Patricia Xu, Robert Shepherd, Cornell Univ. (USA); Bobak Mosadegh, James K. Min, Simon Dunham, Weill Cornell Medicine (USA) . . . . . [10954-10]

11:50 am: **Controlled compliancy of 3D printed vascular patient specific phantoms,** Ariana B. Allman, Kelsey M. Sommer, Ryan A. Rava, Ciprian N. Ionita, Univ. at Buffalo (USA) . . . . . [10954-11]

CONF. 10954 continued page 30 ➡

CONFERENCE 10955
ROOM: PACIFIC SALON 2

Sunday - Monday 17–18 Feb. 2019
Proceedings of SPIE Vol. 10955

SESSION 2
ROOM: PACIFIC SALON 2 . . . . .SUN 10:10 AM TO 12:10 PM

US Tomography I

10:10 am: **Compensation of 3D-2D model mismatch in ultrasound computed tomography with the aid of convolutional neural networks**, Joemini Poudel, Luca A. Forte, Mark A. Anastasio, Washington Univ. in St. Louis (USA) . . . . . [10955-6]

10:30 am: **Open-source Gauss-Newton-based method for refraction-corrected ultrasound computed tomography using resolution-filling gradients**, Rehman Ali, Stanford Univ. (USA); Scott Hsieh, Univ. of California, Los Angeles (USA); Jeremy Dahl, Stanford Univ. (USA). . . . . [10955-7]

10:50 am: **Employing methods with generalized singular value decomposition for regularization in ultrasound tomography**, Anita Carević, Univ. of Split (Croatia); Ahmed Abdou, The Pennsylvania State Univ. (USA); Ivan Slapni´ar, Univ. of Split (Croatia); Mohamed Almekkawy, The Pennsylvania State Univ. (USA) . . . . . [10955-8]

11:10 am: **Full waveform inversion for ultrasound computed tomography with high-sensitivity scan method**, Atsuro Suzuki, Yushi Tsubota, Wenjing Wu, Kazuhiro Yamanaka, Kenichi Kawabata, Hitachi, Ltd. (Japan) . . . . . [10955-9]

11:30 am: **Accelerating image reconstruction in ultrasound transmission tomography using L-BFGS algorithm**, Hongjian Wang, Ruprecht-Karls-Univ. Heidelberg (Germany); Hartmut Gemmeke, Torsten Hopp, Karlsruher Institut für Technologie (Germany); Jürgen Hesser, Ruprecht-Karls-Univ. Heidelberg (Germany) . . . . . [10955-10]

11:50 am: **Experimental analysis of ray-based sound speed reconstruction algorithms for phase aberration corrected USCT SAFT imaging**, Torsten Hopp, Karlsruher Institut für Technologie (Germany). . . . . [10955-11]

CONF. 10955 continued page 30 ➡

SUNDAY 17 FEBRUARY

CONFERENCE 10948
ROOM: TOWN & COUNTRY

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10948

SUNDAY/MONDAY POSTER VIEWING
ROOM: GRAND HALL . . . . . 12:00 PM TO 9:00 PM

Posters will be on display Sunday and Monday with extended viewing until 9:00 pm on Sunday. The poster session with authors in attendance will be Monday 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 . . . . . Sun 12:10 pm to 1:20 pm

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CONFERENCE 10950
ROOM: GOLDEN WEST

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10950

CONF. 10950 continued page 31 ➡

CONFERENCE 10951
ROOM: CALIFORNIA

Sunday - Tuesday 17–19 Feb. 2019
Proceedings of SPIE VOL. 10952

SUNDAY/MONDAY POSTER VIEWING
ROOM: GRAND HALL . . . . . 12:00 PM TO 9:00 PM

Posters will be on display Sunday and Monday with extended viewing until 9:00 pm on Sunday. The poster session with authors in attendance will be Monday 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 . . . . . Sun 12:10 pm to 1:20 pm

CONF. 10951 continued page 31 ➡

CONFERENCE 10954
ROOM: SAN DIEGO

Sunday–Monday 17–18 Feb. 2019
Proceedings of SPIE Vol. 10954

SUNDAY/MONDAY POSTER VIEWING
Room: Grand Hall . . . . . 12:00 pm to 9:00 pm

Posters will be on display Sunday and Monday with extended viewing until 9:00 pm on Sunday. The poster session with authors in attendance will be Monday 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 . . . . . Sun 12:10 pm to 1:20 pm

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CONFERENCE 10955
ROOM: PACIFIC SALON 2

Sunday - Monday 17–18 Feb. 2019
Proceedings of SPIE Vol. 10955

SUNDAY/MONDAY POSTER VIEWING
Room: Grand Hall . . . . . 12:00 pm to 9:00 pm

Posters will be on display Sunday and Monday with extended viewing until 9:00 pm on Sunday. The poster session with authors in attendance will be Monday 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 . . . . . Sun 12:10 pm to 1:20 pm

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SUNDAY 17 FEBRUARY

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 Stierstorfer, Martin Hupfer, Niko Köster, Siemens Healthineers (Germany). . . . . [10948-12]

1:40 pm: **Quantitative comparison of Hi-Def and FPD zoom modes in an innovative detector using Relative Object Detectability (ROD) metrics**, Jordan M. Krebs, Alok Shankar, Swetadri Vasan Setlur Nagesh, Daniel R. Bednarek, Steven Rudin, Canon Stroke and Vascular Research Ctr. (USA) . . . . . [10948-13]

2:00 pm: **Optimizing overall system performance based on detector performance and tuning per the required imaging task**, Isaias D. Job, Arun Ganguly, Rick Colbeth, Carlo Tognina, Jin Zhang, Varex Imaging Corp. (USA) . . . [10948-14]

2:20 pm: **First results developing time-of-flight proton radiography for proton therapy applications**, William A. Worstell, Bernhard 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, Hsiao-Ming Lu, Harald Paganetti, Massachusetts General Hospital (USA) . . . . . [10948-15]

2:40 pm: **A new experimental method for direct DQE(k) measurement at k=0**, Xu Ji, Mang Feng, Guang-Hong Chen, Ke Li, Univ. of Wisconsin-Madison (USA) . . . . . [10948-16]

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

CONF. 10948 continued page 32 ➡

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. Kuijf, Ivana Išgum, Kenneth G. A. Gilhuijs, 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); Lars J. Grimm, Jeffrey R. Marks, Duke Univ. School of Medicine (USA); Joseph Y. Lo, Carl E. Ravin Advanced Imaging Labs. (USA). . . . . [10950-13]

2:00 pm: **A deep learning method for volumetric breast density estimation from processed full field digital mammograms**, Doiriel Vanegas Camargo, Mahlet Birhanu, Univ. de Girona (Spain); Nico Karssemeijer, Albert Gubern-Mérida, Michiel Kallenberg, ScreenPoint Medical (Netherlands) . . . . . [10950-14]

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

CONF. 10950 continued page 32 ➡

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 Hohmann, Hiroki Konishi, Songyun Wang, Jon Kruse, Laura Newman, Kay Parker, Michael Herman M.D., Douglas Packer, Mayo Clinic (USA) . . . . . [10951-12]

1:40 pm: **LV systolic point-cloud model to quantify accuracy of CT derived regional strain (SQUEEZ)**, Ashish Manohar, Gabrielle Colvert, Andrew Schluchter, Francisco Contijoch, Elliot R. McVeigh, Univ. of California, San Diego (USA) . . . . . [10951-13]

2:00 pm: **Designing lightweight deep learning models for echocardiography view classification**, Hooman Vaseli, Zhibin Liao, Amir Hossein Abdi, The Univ. of British Columbia (Canada); Delaram Behnami, The Univ. of British Columbia (Canada); Hany Girgis, Vancouver Coastal Health (Canada); Christina Luong, Vancouver Coastal Health (Canada); Fatemeh Taheri Dezaki, 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]

2:20 pm: **A dynamic neonatal heart phantom for new "ultrafast" echocardiography evaluation**, Nora Boone, Robarts Research Institute (Canada); Olivia Ginty, Robarts Research Institute (Canada); Xin Yue Wang, Western Univ. (Canada); John Moore, Terry M. Peters, Robarts Research Institute (Canada); James C. Lacefield, Robarts Research Institute (Canada); Tamie Poepping, Western Univ. (Canada); Daniel Bainbridge M.D., Schulich School of Medicine & Dentistry, Western Univ. (Canada) . . . . [10951-15]

2:40 pm: **A dynamic mitral valve simulator for surgical training and patient specific preoperative planning,** Nora Boone, John Moore, Olivia Ginty, Robarts Research Institute (Canada); Daniel Bainbridge M.D., Schulich School of Medicine & Dentistry, Western Univ. (Canada); Terry M. Peters, Robarts Research Institute (Canada) . . . . [10951-16]

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

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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

Artificial Intelligence and Deep Learning I

Session Chair: **Shandong Wu,** Univ. of Pittsburgh (USA)

1:20 pm: **AI research and applications in radiology: experience in China** *(Keynote Presentation)*, Shiyuan Liu, Changzheng Hospital (China) . . . . . [10954-12]

2:00 pm: **Impact of imprinted labels on deep learning classification of AP and PA thoracic radiographs**, Jennie Crosby, Thomas Rhines, Clara Duan, Feng Li, Heber MacMahon, Maryellen Giger, The Univ. of Chicago (USA) . . . . . [10954-13]

2:20 pm: **Deep-learning method for tumor segmentation in breast DCE-MRI**, Lei Zhang, Ruimei Chai, Dooman Arefan, Jules Sumkin, Shandong Wu, Univ. of Pittsburgh (USA) . [10954-14]

2:40 pm: **A decision support system for skin cancer recognition with deep feature and multi response linear regression (MLR)-based meta learning**, Md. Mahmudur Rahman, Morgan State Univ. (USA) . . . . . [10954-15]

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

CONF. 10954 continued page 32 ➡

CONFERENCE 10955
ROOM: PACIFIC SALON 2

Sunday - Monday 17–18 Feb. 2019
Proceedings of SPIE Vol. 10955

SESSION 3
Room: Pacific 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**, Murad Hossain, The Univ. of North Carolina at Chapel Hill (USA) and North Carolina State Univ. (USA); Caterina M. Gallippi, The Univ. of North Carolina at Chapel Hill (USA) . . . . . [10955-12]

1:40 pm: **Axially-segmented cylindrical array for intravascular shear wave imaging**, Arsenii Telichko, Carl Herickhoff, Jeremy Dahl, Stanford Univ. (USA) . . . . . [10955-13]

2:00 pm: **Classification of cardiac adipose tissue using spectral analysis of ultrasound radiofrequency backscatter**, Akhila Karlapalem, Miranda R. Fulton, Amy H. Givan, Maria Fernandez-del-Valle, Jon D. Klingensmith, Southern Illinois Univ. Edwardsville (USA) . . . . . [10955-14]

2:20 pm: **Tracking blood flow changes in the brains of neonates using angular-coherence-based power doppler**, Marko Jakovljevic, Stanford Univ. School of Medicine (USA); Byung Yoon, Massachusetts General Hospital (USA); Lotfi Abou-Elkacem, Erika Rubesova, Jeremy Dahl, Stanford Univ. School of Medicine (USA) . [10955-15]

2:40 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

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SUNDAY 17 FEBRUARY

CONFERENCE 10948
ROOM: TOWN & COUNTRY

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10948

SESSION 4
ROOM: TOWN & COUNTRY SUN 3:30 TO 5:30 PM

Quantitative Image Quality Assessment

Session Chairs: **Joseph Y. Lo,** Carl E. Ravin Advanced Imaging Labs. (USA); **Frédéric Noo,** The Univ. of Utah (USA)

3:30 pm: **Patient-specific noise power spectrum measurement via generative adversarial networks**, Chengzhu Zhang, Daniel Gomez-Cardona, Yinsheng Li, Juan Montoya, Guang-Hong Chen, Univ. of Wisconsin-Madison (USA) . . . . . [10948-17]

3:50 pm: **A case study on the impact of a reduction in MTF on test object detectability score in mammography**, Kristina Tri Wigati, KU Leuven (Belgium) and Univ. of Indonesia (Indonesia); Hilde Bosmans, Lesley Cockmartin, KU Leuven (Belgium) and UZ Leuven (Belgium); Guozhi Zhang, UZ Leuven (Belgium); Liesbeth Vancoillie, Dimitar Petrov, KU Leuven (Belgium) and UZ Leuven (Belgium); Dirk A. N. Vandenbroucke, Agfa Healthcare N.V. (Belgium); Djarwani S. Soejoko, Univ. of Indonesia (Indonesia); Nicholas W. Marshall, KU Leuven (Belgium) and UZ Leuven (Belgium) . . . . . [10948-18]

4:10 pm: **Evaluating the imaging performance of a next-generation digital breast tomosynthesis prototype**, Trevor L. Vent, Univ. of Pennsylvania (USA); Brianna L. Lepore, Bucknell Univ. (USA); Andrew D. A. Maidment, Univ. of Pennsylvania (USA) . . . . . [10948-19]

4:30 pm: **Generalized prediction framework for reconstructed image properties using neural networks**, Grace J. Gang, Kailun Cheng, Joseph W. Stayman, Johns Hopkins Univ. (USA). . . . [10948-20]

4:50 pm: **Simulation and experimental validation of high-resolution test objects for next-generation digital breast tomosynthesis**, Trevor L. Vent, Bruno Barufaldi, Andrew D. A. Maidment, Univ. of Pennsylvania (USA) . . [10948-21]

5:10 pm: **Multiple-reader, multiple-case ROC analysis for determining the limit of calcification detection in tomosynthesis,** Bruno Barufaldi, Predrag R. Bakic, Andrew D. A. Maidment, Univ. of Pennsylvania (USA) . . . . . [10948-22]

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CONFERENCE 10950
ROOM: GOLDEN WEST

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10950

SESSION 4
ROOM: GOLDEN WEST . . . .SUN 3:30 TO 5:30 PM

Breast III and Heart

3:30 pm: **Association of computer-aided detection results and breast cancer risk,** Seyedeh-Nafiseh Mirnia-harikandehei, Morteza Heidari, Gopichandh Danala, The Univ. of Oklahoma (USA); Wei Qian, The Univ. of Texas at El Paso (USA); Yuchen Qiu, Bin Zheng, The Univ. of Oklahoma (USA). . . . [10950-17]

3:50 pm: **Breast parenchyma analysis and classification for breast masses detection using texture feature descriptors and neural networks in dedicated breast CT images**, Marco Caballo, Jonas Teuwen, Ritse Mann, Ioannis Sechopoulos, Radboud Univ. Medical Ctr. (Netherlands) [10950-18]

4:10 pm: **Visual evidence for interpreting diagnostic decision of deep neural network in computer-aided diagnosis**, Seong Tae Kim, Jae-Hyeok Lee, Yong Man Ro, KAIST (Korea, Republic of) . . . . . [10950-19]

4:30 pm: **Automated measurement of fetal right-myocardial performance index from pulsed wave Doppler spectrum**, Rahul Suresh, Srinivasan Sivanandan, Nitin Singhal, Samsung R&D Institute India - Bangalore (India); Jinyong Lee, SAMSUNG Medison Co., Ltd. (Korea, Republic of); Mi-Young Lee, Hye-Sung Won, Asan Medical Ctr. (Korea, Republic of) . . . . . [10950-20]

4:50 pm: **U-Net inspired architecture ensembles for left atrial segmentation**, Christopher Wang, Carleton Univ. (Canada); Eranga Ukwatta, Carleton Univ. (Canada) and Univ. of Guelph (Canada); Martin Rajchl, Imperial College London (UK). . . . [10950-21]

5:10 pm: **A deep learning approach to classify atherosclerosis using intracoronary optical coherence tomography,** Lambros S. Athanasiou, Institute for Medical Engineering & Science (USA) and Brigham and Women's Hospital (USA); Max L. Olender, Institute for Medical Engineering & Science (USA); José M. de la Torre Hernandez, Unidad de Cardiologia Intervencionista (Spain); Eyal Ben-Assa, Massachusetts General Hospital, Harvard Medical School (USA); Elazer R. Edelman, Institute for Medical Engineering & Science (USA) and Brigham and Women's Hospital (USA) . . . . . [10950-22]

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CONFERENCE 10951
ROOM: CALIFORNIA

Sunday - Tuesday 17–19 Feb. 2019
Proceedings of SPIE VOL. 10952

SESSION 4
ROOM: CALIFORNIA . . . . . SUN 3:30 TO 5:30 PM

Robotic, Endoscopic, and Needle Guidance Technologies and Devices

Session Chairs: **Robert J. Webster III,** Vanderbilt Univ. (USA); **Gabor Fichtinger,** Lab. for Percutaneous Surgery (Canada)

3:30 pm: **A new approach to homing and tool changes in needle-like surgical robots**, Stephanie Amack, Margaret F. Rox, Maxwell Emerson, Robert J. Webster III, Vanderbilt Univ. (USA); Jason Mitchell, Vanderbilt Univ. (USA); Ron Alterovitz, The Univ. of North Carolina at Chapel Hill (USA); Alan Kuntz, The Univ. of North Carolina at Chapel Hill (USA). . . . . [10951-17]

3:50 pm: **A new manual insertion tool for minimally invasive, image-guided cochlear implant surgery**, Katherine E. Riojas, Vanderbilt Univ. (USA); Narendran Narasimhan, Duke Univ. (USA); William G. Morrel, Vanderbilt Univ. Medical Ctr. (USA); Robert J. Webster III, Robert F. Labadie M.D., Vanderbilt Univ. (USA) . . . . . [10951-18]

4:10 pm: **EpiGuide 2D: visibility assessment of a novel multi-channel out-of-plane needle guide for 2D point of care ultrasound**, Simon Honigmann, Yi Cheng Zhu, Rohit Singla, Purang Abolmaesumi, The Univ. of British Columbia (Canada); Anthony Chau, BC Women's Hospital and Health Ctr. (Canada); Robert Rohling, The Univ. of British Columbia (Canada) . . . . . [10951-19]

4:30 pm: **Validation of a low-cost adjustable, handheld needle guide for spine interventions**, Julia Wiercigroch, Zachary M. C. Baum, Tamas Ungi M.D., Lab. for Percutaneous Surgery, Queen's Univ. (Canada); Jan Fritz, Johns Hopkins Univ. (USA); Gabor Fichtinger, Lab. for Percutaneous Surgery, Queen's Univ. (Canada). . . . . [10951-20]

4:50 pm: **Endoscopic guidance system for stimulation of the laryngeal adductor reflex by droplet impact**, Jacob F. Fast, Adrian K. Rüppel, Leibniz Univ. Hannover (Germany); Martin Ptok, Medizinische Hochschule Hannover (Germany); Tobias Ortmaier, Leibniz Univ. Hannover (Germany); Michael Jungheim, Medizinische Hochschule Hannover (Germany); Lüder Alexander Kahrs, Leibniz Univ. Hannover (Germany). . . . . [10951-21]

5:10 pm: **MRI robot for prostate focal laser ablation: a phantom study,** Reza Seifabadi, National Institutes of Health Clinical Ctr. (USA); Ming Li M.D., Sheng Xu, Ayele Negussie, National Institutes of Health (USA); Zion Tsz Ho Tse, The Univ. of Georgia (USA); Bradford J. Wood M.D., National Institutes of Health (USA) . . . . . [10951-22]

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CONFERENCE 10954
ROOM: SAN DIEGO

Sunday–Monday 17–18 Feb. 2019
Proceedings of SPIE Vol. 10954

SESSION 4
ROOM: SAN DIEGO . . . . . SUN 3:30 TO 5:30 PM

Artificial Intelligence and Deep Learning II

Session Chair: **Tessa S. Cook M.D.,** Penn Medicine (USA)

3:30 pm: **Optic disc segmentation in fundus images using deep learning**, Jongwoo Kim, Loc Tran, U.S. National Library of Medicine (USA); Emily Y. Chew, National Eye Institute (USA); George R. Thoma, U.S. National Library of Medicine (USA) . . . . . [10954-16]

3:50 pm: **Learning cross-protocol radiomics and deep feature standardization from CT images of texture phantoms**, Vincent Andrearczyk, HES-SO Valais-Wallis (Switzerland); Adrien Depeursinge, HES-SO Valais-Wallis (Switzerland) and Ctr. Hospitalier Univ. Vaudois (Switzerland); Hennig Mueller, HES-SO Valais-Wallis (Switzerland) and Univ. de Genève (Switzerland). . . . . [10954-17]

4:10 pm: **Context-based bidirectional-LSTM model for sequence labeling in clinical reports**, Henghui Zhu, Ioannis Paschalidis, Boston Univ. (USA); Amir Tahmasebi, Philips Research North America (USA) . . . . . [10954-18]

4:30 pm: **A novel image augmentation method for skin disease classification**, Huiping Li, Eugene Borovikov, Intelligent Automation, Inc. (USA) . . . . . [10954-19]

4:50 pm: **Multi-space enabled deep learning of breast tumors improves prediction of distant recurrence**, Dooman Arefan, Bingjie Zheng, David Dabbs, Rohit Bhargava, Shandong Wu, Univ. of Pittsburgh (USA) . . . . . [10954-20]

5:10 pm: **A data interpretation approach for deep learning-based prediction models**, Saba Dadsetan, Shandong Wu, Univ. of Pittsburgh (USA) . [10954-21]

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CONFERENCE 10955
ROOM: PACIFIC SALON 2

Sunday - Monday 17–18 Feb. 2019
Proceedings of SPIE Vol. 10955

SESSION 4
ROOM: PACIFIC SALON 2 . SUN 3:30 TO 5:30 PM

Beamforming and Image Formation

3:30 pm: **Coherent multi-transducer US imaging in the presence of aberration,** Laura Peralta, Alberto Gomez, Joseph Hajnal, Robert Eckersley, King's College London (UK) . . . . . [10955-17]

3:50 pm: **Multi-focal intravascular ultrasound imaging in peripheral artery disease**, Graham C. Collins, Brooks D. Lindsey, Georgia Institute of Technology & Emory Univ. School of Medicine (USA) . . . . . [10955-18]

4:10 pm: **High dynamic range ultrasound beamforming using deep neural networks**, Adam Luchies, Brett C. Byram, Vanderbilt Univ. (USA) . . . . . [10955-19]

4:30 pm: **Row-column beamforming with dynamic apodizations on a GPU**, Matthias Bo Stuart, Mikkel Schou, Jørgen Arendt Jensen, Technical Univ. of Denmark (Denmark) . . [10955-20]

4:50 pm: **Estimating signal and structured noise in ultrasound data using prediction error filters**, Joseph Jennings, Stanford Univ. (USA); Marko Jakovljevic, Stanford Univ. School of Medicine (USA); Ettore Biondi, Stanford Univ. (USA); Jeremy Dahl, Stanford Univ. School of Medicine (USA); Biondo Biondi, Stanford Univ. (USA) . . . . . [10955-21]

5:10 pm: **The impact of mid lag spatial coherence parameters on coherent target detection**, Rebecca Jones, Siegried Schlunk, Jaime E. Tierney, Ryan Hsi, Brett C. Byram, Vanderbilt Univ. (USA). . . [10955-22]

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SUNDAY 17 FEBRUARY

CONFERENCE 10948
ROOM: TOWN & COUNTRY

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10948

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.

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CONFERENCE 10950
ROOM: GOLDEN WEST

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10950

CONF. 10950 continued page 34 ➡

CONFERENCE 10951
ROOM: CALIFORNIA

Sunday - Tuesday 17–19 Feb. 2019
Proceedings of SPIE VOL. 10952

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.

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CONFERENCE 10954
ROOM: SAN DIEGO

Sunday–Monday 17–18 Feb. 2019
Proceedings of SPIE Vol. 10954

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CONFERENCE 10955
ROOM: PACIFIC SALON 2

Sunday - Monday 17–18 Feb. 2019
Proceedings of SPIE Vol. 10955

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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MONDAY 18 FEBRUARY

CONFERENCE 10948
ROOM: TOWN & COUNTRY

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10948

SESSION 5
ROOM: TOWN & COUNTRY MON 8:00 TO 9:40 AM

Machine Learning I

Session Chairs: **Jinyi Qi,** Univ. of California, Davis (USA); **Kirsten Boedeker,** Canon Medical Research USA, Inc. (USA)

8:00 am: **Virtual clinical trial for task-based evaluation of a deep learning synthetic mammography algorithm**, Andreu Badal, Kenny H. Cha, U.S. Food and Drug Administration (USA); Sarah Divel, Stanford Univ. (USA); Christian G. Graff, Rongping Zeng, Aldo Badano, U.S. Food and Drug Administration (USA). . . . . [10948-23]

8:20 am: **Forward and cross-scatter estimation in dual source CT using a deep convolutional neural network**, Tim Vöth, Joscha Maier, Marc Kachelrieß, Deutsches Krebsforschungszentrum (Germany) and Ruprecht-Karls-Univ. Heidelberg (Germany). . . . . [10948-24]

8:40 am: **Focal spot deconvolution using convolutional neural networks**, Jan Kuntz, Joscha Maier, Marc Kachelrieß, Stefan Sawall, Deutsches Krebsforschungszentrum (Germany) . . . . . [10948-25]

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, Canon Medical Research USA, Inc. (USA); Kuang Gong, Gordon Ctr. for Medical Imaging (USA) and Univ. of California, Davis (USA); Jinyi Qi, Univ. of California, Davis (USA) . . . . . [10948-26]

9:20 am: **Image reconstruction from fully-truncated and sparsely-sampled line integrals using iCT-Net**, Yinsheng Li, Ke Li, Chengzhu Zhang, Juan Montoya, Guang-Hong Chen, Univ. of Wisconsin-Madison (USA). . . . . [10948-27]

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

CONF. 10948 continued page 35 ➡

CONFERENCE 10950
ROOM: GOLDEN WEST

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10950

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 Chettrit, Orna Bregman Amitai, Amir Bar, Zebra Medical Vision, Inc. (Israel); Itamar Alfred Tamir M.D., Clalit Health Services (Israel); Eldad Elnekave M.D., Zebra Medical Vision, Inc. (Israel) . . . . . [10950-23]

8:20 am: **Identifying disease-free chest x-ray images with deep transfer learning**, Ken C. L. Wong, Mehdi Moradi, Joy T. Wu, Tanveer Syeda-Mahmood, IBM Research - Almaden (USA) . . . . . [10950-24]

8:40 am: **Analysis of deep convolutional features for detection of lung nodules in computed tomography**, Ravi K. Samala, Heang-Ping Chan, Caleb Richter, Lubomir M. Hadjiiski, Chuan Zhou, Jun Wei, Univ. of Michigan (USA) . . . . . [10950-25]

9:00 am: **A combination of intra- and peritumoral features on baseline CT scans is associated with overall survival in non-small cell lung cancer patients treated with nivolumab**, Mohammadhadi Khorrami, Mehdi Alilou, Prateek Prasanna, Pingfu Fu, Case Western Reserve Univ. (USA); Vamsidhar Velcheti, Cleveland Clinic (USA); Anant Madabhushi, Case Western Reserve Univ. (USA) . . . . . [10950-26]

9:20 am: **Visualizing and explaining deep learning predictions for pneumonia detection in pediatric chest radiographs**, Sivaramakrishnan Rajaraman, Sema Candemir, George Thoma, Sameer Antani, U.S. National Library of Medicine (USA) . . . . . [10950-27]

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

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CONFERENCE 10951
ROOM: CALIFORNIA

Sunday - Tuesday 17–19 Feb. 2019
Proceedings of SPIE VOL. 10952

SESSION 5
ROOM: CALIFORNIA . . . . . .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, Qiangqiang Zhou, Chengcheng Rong, Yiqiang J. Zhan, Xiang S. Zhou, Yaozong Gao, United Imaging (China) . . . . . [10951-23]

8:20 am: **StreoScenNet: surgical stereo robotic scene segmentation**, Ahmed Mohammed, Sule Yildirim, Ivar Farup, Marius Pedersen, Norwegian Univ. of Science and Technology (Norway). . . . . [10951-24]

8:40 am: **Colonoscope tracking method based on shape estimation network**, Masahiro Oda, Holger R. Roth, Nagoya Univ. (Japan); Takayuki Kitasaka, Aichi Institute of Technology (Japan); Kazuhiro Furukawa M.D., Nagoya Univ. Hospital (Japan); Ryoji Miyahara M.D., Nagoya Univ. (Japan); Yoshiki Hirooka M.D., Nagoya Univ. Hospital (Japan); Nassir Navab, Technische Univ. München (Germany); Kensaku Mori M.D., Nagoya Univ. (Japan). . . . . [10951-25]

9:00 am: **Deep learning based 2.5D flow field estimation for maximum intensity projections of 4D optical coherence tomography**, Max-Heinrich Laves, Lüder Alexander Kahrs, Tobias Ortmaier, Leibniz Univ. Hannover (Germany). . . . . [10951-26]

9:20 am: **Automatic vertebrae localization in spine CT: a deep-learning approach for image guidance and surgical data science**, Marc Levine, Tharindu S. De Silva, Rohan C. Vijayan, Sophia A. Doerr, Ali Uneri, Sathyanarayana Vedula, Nicholas Theodore M.D., Jeffrey H. Siewerdsen, Johns Hopkins Univ. (USA) . . . . . [10951-27]

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

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CONFERENCE 10954
ROOM: SAN DIEGO

Sunday–Monday 17–18 Feb. 2019
Proceedings of SPIE Vol. 10954

SESSION 5
ROOM: SAN DIEGO . . . . . .MON 8:00 TO 9:40 AM

Economics, Regulations, and Practice Innovation in Medical Imaging

Session Chair: **Steven C. Horii M.D.,** Penn Medicine (USA)

8:00 am: **Automatic assessment of the quality of patient positioning and field of view of head CT scans**, Thomas Buelow, Stewart Young, Tim Harder, Philips Research (Germany); Isabelle Frischmuth, Jan-Hendrik Buhk, Universitätsklinikum Hamburg-Eppendorf (Germany) . . . . . [10954-22]

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, Univ. of Colorado at Colorado Springs (USA) . . . . . [10954-23]

8:40 am: **On the feasibility of Epic electronic medical record system for tracking patient radiation doses following interventional fluoroscopy procedures**, Richard Poeng, Nour Cheikhali, Melissa McGrory, Jaydev K. Dave, Jefferson Health (USA) . . . . . [10954-24]

9:00 am: **Framework for guiding artificial intelligence research in combat casualty care**, Kenneth H. Wong, Virginia Polytechnic Institute and State Univ. (USA). . . . . [10954-25]

9:20 am: **Joint Gaussian copula model for mixed data with application to imaging epigenetics study of schizophrenia**, Aiying Zhang, Tulane Univ. (USA) . . . . . [10954-26]

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

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CONFERENCE 10955
ROOM: PACIFIC SALON 2

Sunday - Monday 17–18 Feb. 2019
Proceedings of SPIE Vol. 10955

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 Tsubota, Atsuro Suzuki, Kazuhiro Yamanaka, Takahide Terada, Kenichi Kawabata, Hitachi, Ltd. (Japan); Hiroko Yamashita, Fumi Kato, Mutsumi Nishida, Megumi Satoh, Hokkaido Univ. Hospital (Japan) . . . . . [10955-23]

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, Ayele Negussie, Ivane Bakhutashvili, Murali Cherukuri, Peter Choyke, Peter Pinto, National Institutes of Health (USA); Arman Rahmim, The Univ. of British Columbia (Canada); Emad M. Boctor, Johns Hopkins Univ. (USA); Maria Merino, National Institutes of Health (USA); Mark Lenox, QT Ultrasound LLC (USA); Baris Turkbey, Bradford Wood, National Institutes of Health (USA) . . . . . [10955-24]

8:40 am: **3D full inverse scattering ultrasound tomography of the human knee**, James W. Wiskin, Bilal Malik, Rajni Natesan M.D., Nasser Pirshafiey, John Klock M.D., Mark Lenox, QT Ultrasound LLC (USA) . . . . . [10955-25]

9:00 am: **A high throughout, extensible and flexible ultrasonic excitation and acquisition system for ultrasound imaging**, Qiude Zhang, Junjie Song, Liang Zhou, Huazhong Univ. of Science and Technology (China); Yang Peng, ZTE Corp. (China); Quan Zhou, Shanshan Wang, Xia Sun, Mingyue Ding, Ming Yuchi, Huazhong Univ. of Science and Technology (China) . . . . . [10955-26]

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); Fereshteh Aalamifar, Johns Hopkins Univ. (USA); Bradford Wood, National Institutes of Health (USA); Arman Rahmim, The Univ. of British Columbia (Canada); Emad M. Boctor, Johns Hopkins Univ. (USA) . . . . . [10955-27]

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

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MONDAY 18 FEBRUARY

CONFERENCE 10948

ROOM: TOWN & COUNTRY

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10948

SESSION 6

ROOM: TOWN & COUNTRY . . . MON 10:10 AM TO 12:10 PM

Imaging Physics: Pushing the Boundary

Session Chairs: **Taly Gilat Schmidt,** Marquette Univ. (USA); **Guang-Hong Chen,** Univ. of Wisconsin-Madison (USA)

10:10 am: **World's deepest-penetration and fastest optical cameras: photoacoustic tomography and compressed ultrafast photography** *(Keynote Presentation)*, Lihong V. Wang, Caltech (USA) . . . . . [10948-28]

10:50 am: **Multi-source array x-ray tube for stationary tomosynthesis or multi-cone angle cone beam CT**, John M. Boone, UC Davis Medical Ctr. (USA); Amy E. Becker, Andrew M. Hernandez, Univ. of California, Davis (USA); Paul Schwoebelc, The Univ. of New Mexico (USA) . . . . . [10948-29]

11:10 am: **Dose-independent near-ideal DQE of a 75 µm pixel GaAs photon counting spectral detector for breast imaging**, Spyridon Gkoumas, Pietro Zambon, Thomas Thuering, Alfonso G. Taboada, Arne Jensen, Michael Rissi, Christian Brönnimann, DECTRIS Ltd. (Switzerland). [10948-30]

11:30 am: **Novel hybrid organic-inorganic perovskite detector designs based on multilayered and folded device architectures: simulation, design, and prototyping**, Henning Mescher, Fabian Schackmar, Helge Eggers, Ulrich W. Paetzold, Uli Lemmer, Karlsruher Institut für Technologie (Germany) . . . . . [10948-31]

11:50 am: **Human-compatible multi-contrast mammographic prototype system**, Ran Zhang, Ke Li, John W. Garrett, Guang-Hong Chen, Univ. of Wisconsin School of Medicine and Public Health (USA) . . . . . [10948-32]

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

CONF. 10948 continued page 36 ➡

CONFERENCE 10950

ROOM: GOLDEN WEST

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10950

SESSION 6

ROOM: GOLDEN WEST . . . . . MON 10:10 AM TO 12:10 PM

Abdomen

10:10 am: **Artifact-driven sampling schemes for robust female pelvis CBCT segmentation using deep learning**, Annika Hänsch, Volker Dicken, Jan Klein, Fraunhofer MEVIS (Germany); Tomasz Morgas, Varian Medical Systems, Inc. (USA); Benjamin Haas, Varian Medical Systems Imaging Lab. GmbH (Switzerland); Horst K. Hahn, Fraunhofer MEVIS (Germany) [10950-28]

10:30 am: **A probabilistic approach for interpretable deep learning in the diagnosis of liver lesions**, Clinton J. Wang, Yale School of Medicine (USA); Charlie A. Hamm, Yale School of Medicine (USA) and Charité Universitätsmedizin Berlin (Germany); Brian S. Letzen, Yale School of Medicine (USA); James S. Duncan, Yale School of Medicine (USA) and Yale Univ. (USA) . . . . [10950-29]

10:50 am: **Combining deep learning methods and human knowledge to identify abnormalities in computed tomography (CT) reports**, Matias Benitez, Duke Clinical Research Institute (USA); James Tian, Mark Kelly, Vignesh Selvakumaran, Duke Univ. School of Medicine (USA); Matthew Phelan, Duke Clinical Research Institute (USA); Maciej A. Mazurowski, Duke Univ. (USA); Joseph Y. Lo, Geoffrey Rubin, Duke Univ. School of Medicine (USA); Ricardo Henao, Duke Clinical Research Institute (USA) . . . . . [10950-30]

11:10 am: **Bladder cancer staging in CT urography: estimation and validation of decision thresholds for a radiomics-based decision support system**, Dhanuj Gandikota, Lubomir M. Hadjiiski, Heang-Ping Chan, Univ. of Michigan (USA); Kenny H. Cha, U.S. Food and Drug Administration (USA); Ravi K. Samala, Elaine M. Caoili, Richard H. Cohan, Alon Z. Weizer, Ajjai Alva, Chintana Paramagul, Jun Wei, Chuan Zhou, Univ. of Michigan (USA) . . . . . .[10950-31]

11:30 am: **Automatic MR kidney segmentation for autosomal dominant polycystic kidney disease**, Guangrui Mu, Southern Medical Univ. (China) and United Imaging (China); Yiyi Ma, Shanghai Changzheng Hospital (China); Miaofei Han, Yiqiang Zhan, Xiang Zhou, Yaozong Gao, United Imaging (China)[10950-32]

11:50 am: **2D and 3D bladder segmentation using U-Net-based deep-learning,** Xiangyuan Ma, Sun Yat-Sen Univ. (China) and Univ. of Michigan (USA); Lubomir M. Hadjiiski, Jun Wei, Heang-Ping Chan, Univ. of Michigan (USA); Kenny H. Cha, U.S. Food and Drug Administration (USA); Richard H. Cohan, Elaine M. Caoili, Ravi K. Samala, Chuan Zhou, Univ. of Michigan (USA); Yao Lu, Sun Yat-Sen Univ. (China) . .[10950-33]

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

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CONFERENCE 10951

ROOM: CALIFORNIA

Sunday - Tuesday 17–19 Feb. 2019
Proceedings of SPIE VOL. 10952

SESSION 6

ROOM: CALIFORNIA MON 10:10 AM TO 12:10 PM

Ultrasound Imaging and Guidance Technologies

Session Chairs: **Purang Abolmaesumi,** The Univ. of British Columbia (Canada); **David M. Kwartowitz,** Grand Canyon Univ. (USA)

10:10 am: **3D ultrasound system for needle guidance during high-dose-rate interstitial gynecologic brachytherapy implant placement procedures**, Jessica R. Rodgers, Jeffrey Bax, Robarts Research Institute (Canada) and Western Univ. (Canada); Elina Rascevska, Univ. Twente (Netherlands); Vikram Velker M.D., Kathleen Surry, David D'Souza M.D., London Regional Cancer Program (Canada); Eric Leung M.D., Odette Cancer Ctr. (Canada); Aaron Fenster, Robarts Research Institute (Canada) and Western Univ. (Canada) . . . . . [10951-28]

10:30 am: **Needle localization in ultrasound images using signature-based analysis of ultrasound radio frequency signals**, Mohammad I. Daoud, Ayah Abuhani, German-Jordanian Univ. (Jordan); Adnan Zayadeen, Jordanian Royal Medical Services (Jordan); Rami Alazrai, German-Jordanian Univ. (Jordan) . . . . . [10951-29]

10:50 am: **Temporal enhanced ultrasound and shear wave elastography for tissue classification in cancer interventions: an experimental evaluation**, Sijia LI, Jack Barnes, Queen's Univ. (Canada); Purang Abolmaesumi, The Univ. of British Columbia (Canada); Hans-Peter Loock, Parvin Mousavi, Queen's Univ. (Canada) . . . . . [10951-30]

11:10 am: **Enabling low-cost point-of-care ultrasound imaging system using single element transducer and delta configuration actuator**, Keshuai Xu, Younsu Kim, Emad M Boctor, Haichong K. Zhang, Johns Hopkins Univ. (USA) . . . [10951-31]

11:30 am: **Ultrasound probe calibration: a robust and usable open-source implementation,** Leah Groves, Adam Rankin, Terry M. Peters, Elvis C. S. Chen, Robarts Research Institute (Canada).[10951-32]

11:50 am: **Mechanically assisted 3D ultrasound with geometrically variable imaging for minimally invasive focal liver tumor therapy**, Derek J. Gillies, Robarts Research Institute (Canada) and Western Univ. (Canada); Jeffrey Bax, Kevin Barker, Lori Gardi, David Tessier, Robarts Research Institute (Canada); Nirmal Kakani, Manchester Royal Infirmary (UK); Aaron Fenster, Robarts Research Institute (Canada) and Western Univ. (Canada) . . . . . [10951-33]

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

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CONFERENCE 10954

ROOM: SAN DIEGO

Sunday–Monday 17–18 Feb. 2019
Proceedings of SPIE Vol. 10954

SESSION 6

ROOM: SAN DIEGO . . MON 10:10 AM TO 12:10 PM

Applied Big Data and Cloud-based Technologies

Session Chair: **Po-Hao Chen M.D.,** Cleveland Clinic (USA)

10:10 am: **An RF-BFE algorithm for feature selection in radiomics analysis**, Rong Yuan, Peking Univ. Shenzhen Hospital (China); Lin Tian, Ruijia Technology, Inc. (China); Junhui Chen, Peking Univ. Shenzhen Hospital (China) . . . . . [10954-27]

10:30 am: **Expanding the initial retinal fundus images for glaucoma analysis (RIGA): RIGA2 dataset**, Ahmed Almazroa, Univ. of Michigan-Kellogg Eye Ctr. (USA) and King Abdullah International Medical Research Ctr. (Saudi Arabia); Maria Woodward, Paula Anne Newman-Casey, Manjool Shah, Angela Elam, Shivani Kamat, Univ. of Michigan-Kellogg Eye Ctr. (USA); Carrie Karvonen-Gutierrez, Univ. of Michigan (USA); Sarah Wood, Suja Kumar, Sayoko Moroi, Univ. of Michigan-Kellogg Eye Ctr. (USA) . . . . . [10954-28]

10:50 am: **A new medical imaging sharing service network based on professional medical imaging center**, Yuanyuan Yang, Yipin Gu, Mingqing Wang, Tonghui Ling Sr., Shanghai Institute of Technical Physics (China); Zhiwei Huang, South China Univ. of Technology (China); Xiaowei Li, Huyun Medical Imaging Diagnosis Ctr. (China); Xinhua Wei, The First People's Hospital of Guangzhou (China) . [10954-29]

11:10 am: **Automatic radiotherapy plan emulation for 3D dose reconstruction to enable big data analysis for historically treated patients**, Ziyuan Wang, Amsterdam UMC (Netherlands); Marco Virgolin, Peter Bosman, Ctr. Wiskunde & Informatica (Netherlands); Brian Balgobind, Arjan Bel, Tanja Alderliesten, Amsterdam UMC (Netherlands) . . . . . [10954-30]

11:30 am: **Using imaging biomarkers to predict radiation induced xerostomia in head and neck cancer**, Khadija Sheikh, Johns Hopkins Univ. (USA) . . . . . [10954-31]

11:50 am: **Application of deep learning techniques to characterization of 3D radiological datasets: a pilot study for detection of intravenous contrast in breast MRI**, Krishna Nand Keshavamurthy, Pierre Elnajjar, Amin El-Rowmeim, Hao-Hsin Shih, Memorial Sloan-Kettering Cancer Ctr. (USA); Ian Pan, Brown Univ. (USA); Kinh Gian Do, Krishna Juluru, Memorial Sloan-Kettering Cancer Ctr. (USA) . . . . . [10954-32]

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

CONF. 10954 continued page 36 ➡

CONFERENCE 10955

ROOM: PACIFIC SALON 2

Sunday - Monday 17–18 Feb. 2019
Proceedings of SPIE Vol. 10955

SESSION 6

ROOM: PACIFIC SALON 2 . . . . MON 10:10 AM TO 12:10 PM

Image Processing and Analysis

10:10 am: **Left ventricular ejection fraction assessment: unraveling the bias between area- and volume-based estimates**, Dawei Liu, Rochester Institute of Technology (USA); Isabelle Peck, Rensselaer Polytechnic Institute (USA); Shusil Dangi, Rochester Institute of Technology (USA); Karl Q. Schwarz, Univ. of Rochester Medical Ctr. (USA); Cristian A. Linte, Rochester Institute of Technology (USA) . . . . . [10955-28]

10:30 am: **3D ultrasound biomicroscope (3D-UBM) imaging and automated 3D assessment of the iridoconeal angle for glaucoma patients**, Hao Wu, Rich Helms, Taocheng Yu, Case Western Reserve Univ. (USA); Faruk Orge M.D., Univ. Hospitals Rainbow Babies & Children's Hospital (USA); David L. Wilson, Case Western Reserve Univ. (USA) . . . . . [10955-29]

10:50 am: **Ultrasound prostate segmentation based on 3D V-Net with deep supervision**, Yang Lei, Tonghe Wang, Bo Wang, Xiuxiu He, Sibo Tian, Ashesh B. Jani, Hui Mao, Walter J. Curran, Pretesh Patel, Tian Liu, Xiaofeng Yang, Emory Univ. (USA) . . . . . [10955-30]

11:10 am: **High contrast, high resolution ultrasound imaging of the variation of speckle brightness**, Bowen Jing, Brooks D. Lindsey, Georgia Institute of Technology (USA) . . . [10955-31]

11:30 am: **Three-dimensional color Doppler ultrasound simulation to mimic paravalvular regurgitation**, Pedro Morais, Sandro Queirós, Life and Health Sciences Research Institute (Portugal); Hang Gao, KU Leuven (Belgium); Gianluca De Santis, FEops NV (Belgium); Alexandros Papachristidis, King's College Hospital (UK) and National Health Service (England) (UK); Jaime C. Fonseca, Univ. do Minho (Portugal); João L. Vilaça, Instituto Politécnico do Cávado e do Ave (Portugal); Jan D'hooge, KU Leuven (Belgium) . . . . . [10955-32]

11:50 am: **Deep learning techniques for bone surface delineation in ultrasound**, Matija Ciganovic, Firat Özdemir, ETH Zurich (Switzerland); Mazda Farshad, Balgrist Univ. Hospital (Switzerland); Orcun Göksel, ETH Zurich (Switzerland) . [10955-33]

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

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MONDAY 18 FEBRUARY

CONFERENCE 10948
ROOM: TOWN & COUNTRY

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10948

SESSION 7
ROOM: TOWN & COUNTRY MON 1:20 TO 3:40 PM

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, Jospeh 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, Zhejiang Univ. (China) and Massachusetts General Hospital (USA); Kuang Gong, Ning Guo, Kyungsang Kim, Gordon Ctr. for Medical Imaging (USA) and Massachusetts General Hospital (USA); Huafeng Liu, Zhejiang Univ. (China); Quanzheng Li, Massachusetts General Hospital (USA) and Gordon Ctr. for Medical Imaging (USA). . . . . [10948-34]

2:00 pm: **Radon inversion via deep learning**, Ji He, Jianhua Ma Sr., Southern Medical Univ. (China) . . . . . [10948-35]

2:20 pm: **Accelerating coordinate descent in iterative reconstruction**, Scott S. Hsieh, John M. Hoffman, Univ. of California, Los Angeles (USA); Frédéric Noo, The Univ. of Utah (USA) . . . [10948-36]

2:40 pm: **Ultra-low dose PET reconstruction using generative adversarial network with feature matching**, Jiahong Ouyang, Carnegie Mellon Univ. (USA) . . . . . [10948-37]

3:00 pm: **Patient evaluation of breast shape-corrected tomosynthesis reconstruction**, Koen Michielsen, Tsvetanka Rangelova, Radboud Univ. Medical Ctr. (Netherlands); Ioannis Sechopoulos, Radboud Univ. Medical Ctr. (Netherlands) and LRCB (Netherlands) . . [10948-38]

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 Foos, Xiaohui Wang, Carestream Health, Inc. (USA); Nafi Aygun M.D., Robert Stevens M.D., Jeffrey H. Siewerdsen, Johns Hopkins Univ. (USA) . . . . . [10948-39]

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

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CONFERENCE 10950
ROOM: GOLDEN WEST

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10950

SESSION 7
ROOM: GOLDEN WEST . . . . MON 1:20 TO 3:40 PM

Multiorgan and Colon

1:20 pm: **Automatic anatomy partitioning of the torso region on CT images by using a deep convolutional network with a majority voting**, Xiangrong Zhou, Gifu Univ. School of Medicine (Japan); Takuya Kojima, Gifu Univ. (Japan); Song Wang, Univ. of South Carolina (USA); Xinxin Zhou, Nagoya Bunri Univ. (Japan); Takeshi Hara, Gifu Univ. (Japan); Taiki Nozaki, St. Luke's International Hospital (Japan); Masaki Matsusako, St. Luke's International Hospital (Japan); Hiroshi Fujita, Gifu Univ. (Japan). . . . . [10950-34]

1:40 pm: **Automatic multi-organ segmentation in thorax CT images using U-Net-GAN,** Yang Lei, Yingzi Liu, Sibo Tian, Xiaojun Jiang, Kristin Higgins, Jonathan J. Beitler, David S. Yu, Tian Liu, Walter J. Curran, Emory Univ. (USA); Yi Fang, New York Univ. (USA); Xiaofeng Yang, Emory Univ. (USA). [10950-35]

2:00 pm: **Polyp segmentation and classification using predicted depth from monocular endoscopy**, Faisal Mahmood, Ziyun Yang, Richard Chen, Daniel Borders, Wenhao Xu, Nicholas J. Durr, Johns Hopkins Univ. (USA) . . . . . [10950-36]

2:20 pm: **Computer-aided classification of colorectal polyps using blue-light and linked-color imaging**, Thom Scheeve, Technische Univ. Eindhoven (Netherlands); Ramon-Michel Schreuder M.D., Catharina Hospital (Netherlands); Fons van der Sommen, Technische Univ. Eindhoven (Netherlands); Joep E. G. IJspeert M.D., Evelien Dekker M.D., Amsterdam UMC (Netherlands) and Univ. van Amsterdam (Netherlands); Erik J. Schoon M.D., Catharina Hospital (Netherlands); Peter H. N. De With, Technische Univ. Eindhoven (Netherlands). . . . . [10950-37]

2:40 pm: **Ensemble 3D residual network (E3D-ResNet) for reduction of false-positive polyp detections in CT colonography**, Tomoki Uemura, Kyushu Institute of Technology (Japan) and Massachusetts General Hospital (USA) and Harvard Medical School (USA); Janne J. Näppi, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Huimin Lu, Hyoungseop Kim, Kyushu Institute of Technology (Japan); Rie Tachibana, National Institute of Technology, Oshima College (Japan); Toru Hironaka, Hiroyuki Yoshida, Massachusetts General Hospital (USA) and Harvard Medical School (USA) . . . . . [10950-38]

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CONFERENCE 10951
ROOM: CALIFORNIA

Sunday - Tuesday 17–19 Feb. 2019
Proceedings of SPIE VOL. 10952

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

Augmented Reality, Virtual Reality, and Advanced Visualization

Session Chairs: **Ziv R. Yaniv,** National Library of Medicine (USA); **Frank Sauer,** Siemens Healthineers (USA)

1:20 pm: **Smartglasses/smartphone needle guidance AR system for transperineal prostate procedure**, Ming Li, Sheng Xu, Dumitru Mazilu, Baris Turkbey M.D., Bradford J. Wood M.D., National Institutes of Health (USA) . . . . . [10951-34]

1:40 pm: **Surgical aid visualization system for glioblastoma tumor identification based on deep learning techniques using in-vivo human brain hyperspectral images**, Himar Fabelo, The Univ. of Texas at Dallas (USA) and Univ. of Las Palmas de Gran Canaria (Spain); Martin Halicek, The Univ. of Texas at Dallas (USA) and Georgia Institute of Technology & Emory Univ. School of Medicine (USA); Samuel Ortega, Univ. de Las Palmas de Gran Canaria (Spain); Adam Szolna, Jesus Morera, Hospital Univ de Gran Canaria Doctor Negrin (Spain); Gustavo M. Callicó, Univ. de Las Palmas de Gran Canaria (Spain); Baowei Fei, The Univ. of Texas at Dallas (USA) and The Univ. of Texas Southwestern Medical Ctr. (USA) . . . . . [10951-35]

2:00 pm: **Development and evaluation of an immersive virtual reality system for medical imaging of the ear**, Haley Adams, Vanderbilt Univ. (USA); Justin Shinn, William G. Morrel, Vanderbilt Univ. Medical Ctr. (USA); Jack H. Noble Sr., Robert Bodenheimer, Vanderbilt Univ. (USA). . . . [10951-36]

2:20 pm: **Shared visualizations and guided procedure simulation in augmented reality with Microsoft HoloLens**, Lawrence Huang, Brown Univ. (USA); Scott A. Collins, Leo Kobayashi, Derek Merck, Rhode Island Hospital (USA); Thomas Sgouros, Brown Univ. (USA) . . . . . [10951-37]

2:40 pm: **Virtual reality for immersive medical visualization in 3D Slicer**, Saleh Choueib, Csaba Pinter, Andras Lasso, Lab. for Percutaneous Surgery, Queen's Univ. (Canada); Jean-Christophe Fillion Robin, Ken Martin, Kitware, Inc. (USA); Gabor Fichtinger, Lab. for Percutaneous Surgery, Queen's Univ. (Canada) . . . . . [10951-38]

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CONFERENCE 10954
ROOM: SAN DIEGO

Sunday–Monday 17–18 Feb. 2019
Proceedings of SPIE Vol. 10954

SESSION 7
ROOM: SAN DIEGO . . . . . MON 1:20 TO 3:40 PM

Precision Medicine, Correlative Analytics, and Translational Research

Session Chair: **Peter R. Bak,** McMaster Univ. (Canada)

1:20 pm: **Head and neck cancer radiation therapy decision support**, Trent Benedick, Veda Murthy, Sabrina Lieu, Siliang Zhang, Maying Shi, The Univ. of Southern California (USA); Benjamin Yao, Anh Le, Roswell Park Comprehensive Cancer Ctr., Univ. at Buffalo (USA); Brent J. Liu, The Univ. of Southern California (USA). . . . . [10954-33]

1:40 pm: **Case based image retrieval and clinical analysis of tumor and cyst**, Swarnambiga Ayyachamy, Ganapathy Krishnamurthi, Indian Institute of Technology Madras (India). . . [10954-34]

2:00 pm: **Medical image retrieval using Resnet-18 for clinical diagnosis**, Swarnambiga Ayyachamy, Varghese Alex, Mahendra Khened, Ganapathy Krishnamurthi, Indian Institute of Technology Madras (India) . . . . . [10954-35]

2:20 pm: **Analysis of DCE-MRI features in tumor for prediction of the prognosis in breast cancer**, Bin Liu, Ming Fan, Shuo Zheng, Lihua Li, Hangzhou Dianzi Univ. (China). . . . . [10954-36]

2:40 pm: **Fabrication of vibroacoustic system with coaxially embedded transducer-detector for intraoperative quantitative viscoelasticity measurements**, Gregory Suematsu, Nikan Namiri, Peter Pellionisz, Yong Hu, Nathan C. Francis, George N. Saddik, Maie A. St. John, Warren S. Grundfest, Univ. of California, Los Angeles (USA) . . . [10954-37]

3:00 pm: **Analysis of mammographic density as a predictor for breast cancer occurrence**, Annika Zdon, Mark A. Helvie, Alex Tsodikov, Heang-Ping Chan, Jun Wei, Univ. of Michigan (USA) . [10954-38]

3:20 pm: **3D convolution neural networks for molecular subtype prediction in glioblastoma multiforme**, Mahendra Khened, Gagan Acharya, Indian Institute of Technology Madras (India); Nameeta Shah, Mazumdar Shaw Ctr. for Translational Research (India); Ganapathy Krishnamurthi, Indian Institute of Technology Madras (India) . . . . . [10954-39]

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

END OF 10951 CONFERENCE

CONFERENCE 10955
ROOM: PACIFIC SALON 2

Sunday - Monday 17–18 Feb. 2019
Proceedings of SPIE Vol. 10955

SESSION 7
ROOM: PACIFIC SALON 2 . MON 1:20 TO 3:40 PM

Keynote and New Applications

1:20 pm: **Seismo-medical tomography** *(Keynote Presentation)*, Andreas Fichtner, E TH Zurich (Switzerland) . . . . . [10955-34]

2:20 pm: **3D ultrasound full-waveform inversion of the brain**, Carlos Cueto, Oscar Calderon Agudo, Mengxing Tang, Imperial College London (UK); Parashkev Nachev, Univ. College London (UK); Michael Warner, Lluis Guasch, Imperial College London (UK) . . . . . [10955-35]

2:40 pm: **3D inverse scattering in wholebody ultrasound applications**, Mark Lenox, John Klock M.D., QT Ultrasound LLC (USA); Cathy Ruoff D.V.M., Texas A&M Univ. (USA); Nasser Pirshaifey, Robin Terry, Bilal Malik, James W. Wiskin, QT Ultrasound LLC (USA) . . . . . [10955-36]

3:00 pm: **Ultrasound backscattered tensor imaging of the brain: an ex vivo feasibility study**, Sijia Li, Parvin Mousavi, Queen's Univ. (Canada); Phillip Jason White, Brigham and Women's Hospital (USA) . . . . . [10955-37]

3:20 pm: **Electroacoustic tomography (EAT): linear scanning with a single element transducer**, Ali Zarafshani, John A. Merrill, Siqi Wang, Mengxiao Wang, Bin Zheng, Liangzhong Xiang, The Univ. of Oklahoma (USA) . . . . . [10955-38]

AWARD ANNOUNCEMENTS
ROOM: PACIFIC SALON 2 . . 2:15 PM TO 2:20 PM

The Ultrasonic Imaging and Tomography conference RFW runners up and poster award recipients will be recognized and certificates distributed.

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

END OF 10955 CONFERENCE

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
Proceedings of SPIE Vol. 10950

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 Mori M.D., Masashi Misawa M.D., Showa Univ. Northern Yokohama Hospital (Japan); Masahiro Oda, Nagoya Univ. (Japan); Shin-Ei Kudo M.D., Showa Univ. Northern Yokohama Hospital (Japan); Kensaku Mori, Nagoya Univ. (Japan). . . . . [10950-40]

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

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CONFERENCE 10951
ROOM: CALIFORNIA

Sunday - Tuesday 17–19 Feb. 2019
Proceedings of SPIE VOL. 10952

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 Klompenhower M.D., Nikie Hoetjes, Jasper Nijkamp, Theo J. M. Ruers M.D., The Netherlands Cancer Institute (Netherlands). . . . . [10951-40]

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

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SUNDAY/MONDAY POSTER SESSION

LOCATION: GRAND HALL

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)

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.

See Poster Presentation Guidelines for additional information.

CONFERENCE 10948

Physics of Medical Imaging

Improved wedge scatter correction for multi-slice CT system, Yang Wang, Siemens Shanghai Medical Equipment Ltd. (China); Karl Stierstorfer, Martin Petersilka, Siemens Healthineers (Germany); Yi Tian, Siemens Shanghai Medical Equipment Ltd. (China) . . . . . [10948-82]

A TV-based ring artifact reduction method for CT reconstruction, Morteza Salehjahromi, Qian Wang, Univ. of Massachusetts Lowell (USA); Lars A. Gjesteby, Dan Harrison, Ge Wang, Rensselaer Polytechnic Institute (USA); Hengyong Yu, Univ. of Massachusetts Lowell (USA) . . . . . [10948-83]

Simulation pipeline for virtual clinical trials of dermatology images, Varun Vasudev, Barco N.V. (Belgium) and TELIN-IPI, Ghent Univ. (Belgium); Bastian Piepers, Tom Kimpe, Barco N.V. (Belgium); Andrew D. A. Maidment, Univ. of Pennsylvania (USA); Ljiljana Platisa, Wilfried Philips, TELIN-IPI, imec research group at Ghent University (Belgium); Predrag R. Bakic, Univ. of Pennsylvania (USA) . . . . . [10948-84]

Validation of modelling tools for simulating wide-angle DBT systems, Premkumar Elangovan, Alistair Mackenzie, David R. Dance, The Royal Surrey County Hospital NHS Trust (UK); Kevin Wells, Univ. of Surrey (UK); Oliver Diaz, Univ. de Girona (Spain) and Univ. of Surrey (UK); Lucy M. Warren, Kenneth C. Young, The Royal Surrey County Hospital NHS Trust (UK) . . . . . [10948-85]

POSTERS — MONDAY

A method to modify mammography images to a appear as if acquired using different radiographic factors, Alistair Mackenzie, The Royal Surrey County Hospital NHS Trust (UK); Hannah L. Dunn, Univ. of Surrey (UK) and The Royal Surrey County Hospital NHS Trust (UK); Joana Boita, Radboud Univ. Medical Ctr. (Netherlands); David R. Dance, Kenneth C. Young, The Royal Surrey County Hospital NHS Trust (UK) and Univ. of Surrey (UK) . . . . . [10948-86]

Consideration of cerebrospinal fluid intensity variation in diffusion weighted MRI, Colin B. Hansen, Vishwesh Nath, Allison E. Hainline, Kurt G. Schilling, Prasanna Parvathaneni, Roza G. Bayrak, Justin A. Blaber, Vanderbilt Univ. (USA); Owen Williams, Susan Resnick, Lori Beason-Held, National Institutes of Health (USA); Okan Irfanoglu, 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 Kilian-Meneghin, Chao Guo, Stephen Rudin, Daniel R. Bednarek, Univ. at Buffalo (USA) and Canon Stroke and Vascular Research Ctr. (USA) . . . . . [10948-88]

Incorporating biomechanical modeling and deep learning into a deformation-driven liver CBCT reconstruction technique, You Zhang, Liyuan Chen, Bin Li, Michael Folkert, Xun Jia, Xuejun Gu, Jing Wang, The Univ. of Texas Southwestern Medical Ctr. at Dallas (USA) . . . . . [10948-89]

Self-geometric calibration of circular cone beam CT based on epipolar geometry consistency, Liang Zheng, Shouhua Luo, Lujie Chen, Southeast Univ. (China); Shuang Luo, NVIDIA Semiconductor Technology (Shanghai) Co., Ltd. (China) . [10948-90]

Using one test bolus to monitor bolus arriving at two locations in CT angiography runoff scans: a feasibility simulation study, Hongfeng Ma, Marquette Univ. (USA); Mingye Wu, GE Global Research (USA); Christine Hammond, GE Healthcare (USA); Taly Gilat Schmidt, Marquette Univ. (USA) . . . . . [10948-91]

Refined locally linear transform based spectral-domain gradient sparsity and its applications in spectral CT reconstruction, Qian Wang, Morteza Salehjahromi, Hengyong Yu, Univ. of Massachusetts Lowell (USA) . . . . . [10948-92]

An automatic dynamic optimal phase reconstruction for coronary CT, Yi Wang, Shanghai United Imaging Healthcare Co., Ltd. (China); Zabic Stanislav, Shanghai United Imaging Healthcare Co., Ltd. (USA); Xiaoming Wu, Guotao Quan, Shanghai United Imaging Healthcare Co., Ltd. (China) . . . . . [10948-93]

Comparison of different denoising algorithm in anthropomorphic phantom image with computed tomography: a simulation study, Jina Shim, Korea Univ. (Korea, Republic of); Youngjin Lee, Gachon Univ. (Korea, Republic of); Myonggeun Yoon, Korea Univ. (Korea, Republic of); Yoonkuk Kim, Soonkyu Park, Gangnam Severance Hospital (Korea, Republic of). . . . . [10948-94]

Sinogram completion in limited angle computed tomography with a GAN-based neural network, Swapnil Vekhande, Xu Dong, Guohua Cao, Virginia Polytechnic Institute and State Univ. (USA) . . . . . [10948-95]

Revisit FBP: analyze the tensor data after view-by-view backprojection, Xi Tao, Yongbo Wang, Gang Yan, Hua Zhang, Wufan Chen, Jianhua Ma Sr., Southern Medical Univ. (China) . . . . . [10948-96]

Optimization-based reconstruction for correcting nonlinear partial volume artifacts in CT, Xin Liu, Shenzhen Univ. (China) and The Univ. of Chicago (USA); Buxin Chen, Zheng Zhang, Dan Xia, Emil Y. Sidky, Xiaochuan Pan, The Univ. of Chicago (USA) . . . . . [10948-97]

Trade-off between spatial details, motion artifact, and organ dose in multi-detector CT: a virtual clinical trial with 4D textured human models, Ehsan Abadi, William Paul Segars, Brian Harrawood, Shobhit Sharma, Thomas J. Sauer, Anuj Kapadia, Ehsan Samei, 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 for spectral CT, Nathaniel R. Fredette, Stefano Vespucci, Mini Das, Univ. of Houston (USA). . . . . [10948-100]

Image-based noise reduction for material decomposition in dual or multi energy computed tomography, Mahmut Özdemir, Sabrina Dorn, Francesco Pisana, Monika Uhrig, Heinz-Peter Schlemmer M.D., Marc Kachelrieß, Deutsches Krebsforschungszentrum (Germany) . . . [10948-101]

A comprehensive GPU-based framework for scatter estimation in single source, dual source and photon-counting CT, Shobhit Sharma, Ehsan Abadi, Anuj Kapadia, William Paul Segars, Ehsan Samei, Duke Univ. (USA). . . . . [10948-102]

Demonstration of phase-assisted material decomposition using a single x-ray tube potential, Elisabeth R. Shanblatt, Brandon J. Nelson, Shengzhen Tao, Shuai Leng, Cynthia H. McCollough, Mayo Clinic (USA) . . . . . [10948-103]

Sparse sampling computed tomography for pulmonary imaging, Felix K. Kopp, Kai Mei, Ernst J. Rummeny, Klinikum rechts der Isar der Technischen Univ. München (Germany); Peter B. Noël, Klinikum rechts der Isar der Technischen Univ. München (Germany) and Univ. of Pennsylvania (USA) . . . . . [10948-104]

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

Effects of loss functions and network architectures on streak artifact reduction in sparse CT via deep convolutional neural network, Namshin Lee, Byeongjoon Kim, Jongduk Baek, Yonsei Univ. (Korea, Republic of); Jintae Kim, Sujin Kang, Sunjung Kim, OSSTEM IMPLANT Co., Ltd. (Korea, Republic of) . . . . . [10948-106]

Quantitative low-dose CT: potential value of low signal correction methods, Juan Pablo Cruz Bastida, Ran Zhang, Daniel Gomez Cardona, Guang-Hong Chen, Univ. of Wisconsin-Madison (USA) . . . . . [10948-107]

Pediatric abdominal computed tomography radiation dose and image quality optimization using self-produced PMMA phantoms, Hye Ran Choi, Eulji Univ. (Korea, Republic of); Myung Seok Yoo, Seoul National Univ. Hospital (Korea, Republic of); Youngjin Lee, Gachon Univ. (Korea, Republic of) . . . . . [10948-108]

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

Low-dose CT image restoration based on adaptive priori feature matching and nonlocal means, Lu Cheng, Qufu Normal Univ. (China); Yuanke Zhang, Southern Medical Univ. (China) and Fourth Military Medical Univ. (China); Dong Zeng, Southern Medical Univ. (China); Hao Zhang, Stony Brook Univ. (USA); Junyan Rong, Fourth Military Medical Univ. (China); Yuxiang Xing, Tsinghua Univ. (China); Zhengrong Liang, Stony Brook Univ. (USA); Jianhua Ma, Southern Medical Univ. (China); Hongbing Lu, Fourth Military Medical Univ. (China) . . . . . [10948-110]

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

A three-dimensional registration method in dental cone-beam computed tomography using an iterative closest-point algorithm, Chulkyu Park, Hyosung Cho, Dongyeon Lee, Yonsei Univ. (Korea, Republic of) . . . . . [10948-112]

Wasserstein generative adversarial networks for motion artifact removal in dental CT imaging, Zhanli Hu, Shenzhen Institutes of Advanced Technology (China) . . . . . [10948-113]

Multidimensional noise reduction in C-arm cone-beam CT via 2D-based Landweber iteration and 3D-based deep neural networks, Juhee Kim, Dahim Choi, Ewha Womans Univ. (Korea, Republic of); Seung-Hoon Chae, Electronics and Telecommunications Research Institute (Korea, Republic of); Byeongjoon Kim, Jongduk Baek, Yonsei Univ. (Korea, Republic of); Andreas Maier, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Rebecca Fahrig, Siemens Healthineers (Germany); Hyun-Seok Park, Jang-Hwan Choi, Ewha Womans Univ. (Korea, Republic of) . . . . . [10948-114]

Three dimensional evaluation of impacted canines: comparison of 2 CBCT acquisition protocols, Ayesha Ejaz, Univ. of Connecticut (USA) . . . . . [10948-115]

Assessment of measurement deviations: length-extended x-ray imaging for orthopedic applications, Christoph Luckner, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Magdalena Herbst, Ludwig Ritschl, Siemens Healthineers (Germany); Andreas Maier, Friedrich-Alexander-Univ. 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 Sajja, Sunnybrook Research Institute (Canada); Masoud Hashemi, Royal Bank of Canada (Canada); Christopher Huynh, Univ. of Toronto (Canada); James G. Mainprize, Sunnybrook Research Institute (Canada); Markus Eriksson, Elekta AB (Sweden); Young Lee, Sunnybrook Research Institute (Canada); Hakan Nordstrom, Elekta AB (Sweden); Anula Nico, Arjun Sahgal, Mark Ruschin, Sunnybrook Research Institute (Canada) . . . . . [10948-117]

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

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

Temporal Imaging CeBr3 Compton camera : first imaging results and perspectives in medical imaging, Christian Tata Zafiarifety, Alain Iltis, Damavan Imaging (France); Hichem Snoussi, Mohamed Zied Hmissi, Univ. de Technologie Troyes (France); Ghislain Zeufack Tadonkeng, Luc Rodrigues, Marius Lopez, Damavan Imaging (France); Christian Morel, Ctr. de physique des particules de Marseille (France) and Institut National de Physique Nucléaire et de Physique des Particules, CNRS (France) . . . . . [10948-120]

Investigation of spatial-frequency-dependent noise in columnar CsI:Tl using depth-localized single x-ray imaging, Adrian F. Howansky, A. R. Lubinsky, Wei Zhao, Stony Brook Univ. (USA) . . . . . [10948-121]

Flat panel design and performance of a new a-Si mammography imaging system, Steve Wettstein, Isaias D. Job, Carlo Tognina, Varex Imaging Corp. (USA) . . . . . [10948-122]

Advances in structured scintillators for imaging, Vivek V. Nagarkar, Matthew S. Marshall, Harish B. Bhandari, Bipin Singh, Stuart Miller, Megan Wart, Charles Brecher, Radiation Monitoring Devices, Inc. (USA) . . . . . [10948-123]

Experimental study of a side-by-side phoswich PET detector configuration for providing high spatial resolution of <0.4 mm, Jingyu Yang, Jihoon Kang, Chonnam National Univ. (Korea, Republic of) . . . . . [10948-124]

Dynamic chest radiography for pulmonary function diagnosis: a validation study using 4D extended cardiac-torso (XCAT) phantom, Rie Tanaka, Kanazawa Univ. (Japan); Ehsan Samei, William Paul Segars, Ehsan Abadi, Duke Univ. (USA); Holger Roth, Kensaku Mori, Hirohisa Oda, Nagoya Univ. (Japan). . . . . [10948-125]

Effect of surface dose of both eyes depending on detector type in the diagnostic radiography, Su Chul Han, Seungwoo Park, Korea Institute of Radiological & Medical Sciences (Korea, Republic of) . . . . . [10948-127]

Oral cone beam computed tomography relative absorbed dose distributions calculated by Monte Carlo simulation, Shumei Jia, Hewei Gao, Li Zhang, YuXiang Xing, Tsinghua Univ. (China); JunZheng Zheng, Chinese Ctr. for Disease Control and Prevention (China) . . . . . [10948-128]

Comparisons of 6 fps volume-rendered x-ray digital tomosynthesis TumoTrak(TM)-guided to 2D MRI-guided radiotherapy of lung cancer, Larry Partain, Douglas Boyd, Samuel Song, Vitaliy Ziskin, Austin Ely, Imatrex (USA); Micheal Weil, Sirius Medicine, LLC (USA); Megan Daly, Stanley Benedict, John M. Boone, UC Davis Medical Ctr. (USA) . . . . . [10948-129]

Integrating quantitative imaging and computational modeling to predict the spatiotemporal distribution of 186Re nanoliposomes for recurrent glioblastoma treatment, Ryan T. Woodall, The Univ. of Texas at Austin (USA); David A. Hormuth II, The University of Texas at Austin (USA); Michael R. A. Abdelmalik, The Univ. of Texas at Austin (USA) and Technische Univ. Eindhoven (Netherlands); Chengyue Wu, Xinzeng Feng, The Univ. of Texas at Austin (USA); William T. Phillips, The Univ. of Texas Health Science Ctr. at San Antonio (USA); Ande Bao, Univ. Hospitals Cleveland Medical Ctr. (USA); Thomas J. R. Hughes, The Univ. of Texas at Austin (USA); Andrew J. Brenner, The Univ. of Texas Health Science Ctr. at San Antonio (USA); Thomas E. Yankeelov, The Univ. of Texas at Austin (USA) . . . . . [10948-130]

Evaluation of skin-dose contribution from a new high-definition image receptor mode during neuro-interventional procedures using the Dose Tracking System, Jonathan Troville, Stephen Rudin, Daniel R. Bednarek, Univ. at Buffalo (USA) and Canon Stroke and Vascular Research Ctr. (USA)[10948-131]

Simulation study of sinogram reconstruction based on inpainting method with decomposed sinusoid-like curve using total variation denoising algorithm in computed tomography imaging system, Youngjin Lee, Gachon Univ. (Korea, Republic of); Seong-Hyeon Kang, Eulji Univ. (Korea, Republic of) . . . . . [10948-132]

Transrectal plane-wave ultrasound-waveform tomography: phantom imaging results, Lianjie Huang, Benxin Chi, Yunsong Huang, Kai Gao, Los Alamos National Lab. (USA). . . . . [10948-133]

Automated lung cancer detection based on multimodal features extracting strategy using machine learning techniques, Lal Hussain, The Univ. of Azad Jammu & Kashmir (Pakistan); Saima Rathore, Univ. of Pennsylvania (USA); Adeel Ahmed Abbasi, Sharjil Saeed, The Univ. of Azad Jammu & Kashmir (Pakistan) . . . . . [10948-134]

3D x-ray-induced acoustic computed tomography (XACT), Siqi Wang, Pratik Samant, Shanshan Tang, Elijah Robertson, Liangzhong Xiang, The Univ. of Oklahoma (USA) . . . . . [10948-135]

Real-time thermoacoustic imaging and thermometry during RF heating using a linear ultrasound array, Chandra Karunakaran, The Univ. of Arizona (USA) . . . . . [10948-136]

Multiband terahertz imaging of in skin using freezing to enhance penetration depth, Zoltan Vilagosh M.D., Alireza Lajeverdiour, Andrew Wood, Swinburne Univ. of Technology (Australia) . . . . . [10948-137]

Digital optical microscope (housing inside biosafety cabinet): a promising imaging technology for micro- and cell-biology, and histopathology, Mayanglambam Suheshkumar Singh, Rinsa Salahudeen, Anamika Elizabeth Kujur, Indian Institute of Science Education and Research Thiruvananthapuram (India) . . . . . [10948-138]

A study for feasibility of total variation noise reduction algorithm in self-produced AAPM computed tomography phantom image by using 3D-printer, Seong-Hyeon Kang, Eulji Univ. (Korea, Republic of); Youngjin Lee, Gachon Univ. (Korea, Republic of) . . . . . [10948-139]

Feasibility study of silicon photomultiplier-based frequency domain diffuse optical tomography, Min Wang, Yulong Bai, Xu Cao, Xueli Chen, Shouping Zhu, Xidian Univ. (China). . . . . [10948-140]

Improve the resolution and SNR using synthetic aperture in 3-D anorectal ultrasound image, Hyukjin Seon, Jaejin Lee, Tai Kyong Song, Sogang Univ. (Korea, Republic of) . . . . . [10948-141]

Artifact reduction in simultaneous tomosynthesis and mechanical imaging of the breast, Predrag R. Bakic, Penn Medicine (USA); Magnus Dustler, Daniel Förnvik, Pontus Timberg, Lund Univ. (Sweden); Susan Ng, Real-Time Tomography, LLC (USA); Andrew D. A. Maidment, Penn Medicine (USA); Sophia Zackrisson, Anders Tingberg, Lund Univ. (Sweden) . . . . . [10948-142]

A new test method to assess the representation of spiculated mass like targets in breast tomosynthesis, Elisabeth Salomon, Friedrich Semturs, Michael Figl, Medizinische Univ. Wien (Austria); Hilde Bosmans, KU Leuven (Belgium); Johann Hummel, Medizinische Univ. Wien (Austria) . . . . . [10948-143]

Digital tomosynthesis computer simulation framework for flexible imaging configurations optimization, Frank Smith, Ada Chen, Southern Illinois Univ. Carbondale (USA) . . . . . [10948-144]

Characterization of fibroglandular tissue distribution in compressed breasts, Christian Fedon, Marco Caballo, Radboud Univ. Medical Ctr. (Netherlands); Oliver Diaz, Univ. de Girona (Spain); Ioannis Sechopoulos, Radboud Univ. Medical Ctr. (Netherlands) . . . . . [10948-145]

Effects of angular range on lesion margin assessment in contrast-enhanced digital breast tomosynthesis, Hailiang Huang, David A. Scaduto, Kim Rinaldi, Jingxuan Liu, Stony Brook Medicine (USA); Julia Wicklein, Mathias Hoernig, Thomas Mertelmeier, Siemens Healthineers (Germany); Paul R. Fisher, Wei Zhao, Stony Brook Medicine (USA) . . . . . [10948-146]

Influence of background trends on noise power spectrum at zero frequency in radiography imaging, Eunae Lee, Dong Sik Kim, Hankuk Univ. of Foreign Studies (Korea, Republic of) . . . [10948-147]

System detective quantum efficiency (DQEsys) as an index of performance for a chest radiography system (bucky and bedside) at four patient equivalent thicknesses, Sunay Rodríguez Pérez, KU Leuven (Belgium) and SCK CEN (Belgium); Philippe Moussalli, SCK CEN (Belgium) and Lodz Univ. of Technology (Poland); Hilde Bosmans, KU Leuven (Belgium) and UZ Leuven (Belgium); Lara Struelens, SCK CEN (Belgium); Nicholas W. Marshall, KU Leuven (Belgium) and UZ Leuven (Belgium) . . . [10948-148]

MRI-based pseudo CT generation using classification and regression random forest, Yang Lei, Tonghe Wang, Ghazal Shafai-Erfani, Sibo Tian, Kristin Higgins, Hui-Kuo Shu, Hyunsuk Shim, Hui Mao, Walter J. Curran, Tian Liu, Xiaofeng Yang, Emory Univ. (USA). . . . . [10948-149]

Deep learning based guidewire segmentation in x-ray images, Martin G. Wagner, Paul Laeseke, Michael A. Speidel, Univ. of Wisconsin-Madison (USA) . . . . . [10948-150]

Estimation of attenuator mask from region of interest (ROI) dose-reduced images for brightness equalization using convolutional neural networks, Swetadri Vasan Setlur Nagesh, Daniel R Bednarek, Stephen Rudin, Univ. at Buffalo (USA) . . . . . [10948-151]

Combined low-dose simulation and deep learning for CT denoising: application of ultra-low-dose cardiac CTA, Chul Kyun Ahn, Hyeongmin Jin, Changyong Heo, Jong Hyo Kim, Seoul National Univ. (Korea, Republic of) . . . . . [10948-152]

Learning from our neighbours: a novel approach on sinogram completion using bin-sharing and deep learning to reconstruct high quality 4DCBCT, Joel Beaudry, Univ. of Toronto (Canada) and Lakeridge Health Foundation (Canada) and R.S. McLaughlin Durham Regional Cancer Ctr. (Canada); Pedro Esquinas, The Univ. of British Columbia (Canada). . . . . [10948-153]

Investigation on slice direction dependent denoising performance of convolutional neural network in cone beam CT images, Eunhyeok Lee, Byeongjoon Kim, Jongduk Baek, Yonsei Univ. (Korea, Republic of) . . . . . [10948-154]

Performance comparison of convolutional neural network based denoising in low dose CT images for various loss functions, Byeongjoon Kim, Minah Han, Hyunjung Shim, Jongduk Baek, Yonsei Univ. (Korea, Republic of) . . . . . [10948-155]

Comparison of deep learning approaches to low dose computed tomography using low intensity and sparse view data, Thomas Humphries, Dong Si, Sean Coulter, Matthew Simms, Ruiwen Xing, Univ. of Washington Bothell (USA) . . . . . [10948-156]

CT kernel conversions with progressive learning among smooth and sharp kernels for super-resolution of convolutional neural net and simplified squeeze-and-excitation blocks, Dain Eun, Asan Medical Ctr. (Korea, Republic of) . . . . . [10948-157]

Deep learning-based artifact detection for diagnostic CT images, Prakhar Prakash, Sandeep Dutta, GE Healthcare (USA) . . . . . [10948-158]

Multi-modal MRI segmentation of sarcoma tumors using convolutional neural networks, Matthew Holbrook, Stephanie Blocker, Yvonne M. Mowery M.D., Cristian T. Badea, Duke Univ. School of Medicine (USA) . . . . . [10948-159]

A machine learning algorithm for detecting abnormal respiratory cycles in thoracic dynamic MR image acquisitions, Jayaram K. Udupa, Univ. of Pennsylvania (USA); Changjian Sun, Jilin Univ. (China) and Univ. of Pennsylvania (USA); Yubing Tong, Caiyun Wu, Univ. of Pennsylvania (USA); Shuxu Guo, Jilin Univ. (China); Drew A. Torigian, Univ. of Pennsylvania (USA); Robert M. Campbell Jr., The Children's Hospital of Philadelphia (USA) . . . . . [10948-160]

A framework for realistic virtual clinical trials in photon counting computed tomography, Ehsan Abadi, Brian Harrawood, Jayasai Rajagopal, Shobhit Sharma, Anuj Kapadia, Duke Univ. (USA); Martin Sedlmair, Juan Carlos Ramirez-Giraldo, Karl Stierstorfer, Siemens Healthineers (Germany); William Paul Segars, Ehsan Samei, Duke Univ. (USA) [10948-161]

Semiconductor detector modeling and evaluation for photon counting computed tomography, Xiaochun Lai, Liang Cai, Kevin C. Zimmerman, Yi Qiang, Canon Medical Research USA, Inc. (USA); Mattew Veale, STFC Rutherford Appleton Lab. (UK); Thompson Richard, Canon Medical Research USA, Inc. (USA) . . . . . [10948-162]

Photon-counting detector simulation: Monte-Carlo energy deposition, physics-based charge transport and current induction, and SPICE electronics, Kevin C. Zimmerman, Marquette Univ. (USA) and Canon Medical Research USA, Inc. (USA); Xiaochun Lai, Liang Cai, Xiaohui Zhan, Richard Thompson, Canon Medical Research USA, Inc. (USA) . . . . . [10948-163]

Optimal acquisition setting for dual-contrast imaging with gadolinium and iodine on a research whole-body photon-counting-detector (PCD) CT, Shengzhen Tao, Yizhong Wu, Kishore Rajendran, Cynthia H. McCollough, Shuai Leng, Mayo Clinic (USA). . . . . [10948-164]

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Analyzing the curvature of the colon in different patient positions, Jacob Laframboise, Queen's Univ. (Canada); Tamas Ungi M.D., Andras Lasso, Mark Asselin, Matthew S. Holden, Lab. for Percutaneous Surgery, Queen's Univ. (Canada); Pearl Tan M.D., Lawrence Hookey M.D., Queen's Univ. (Canada); Gabor Fichtinger, Lab. for Percutaneous Surgery, Queen's Univ. (Canada). . . . . [10951-87]

Three-dimensional reconstruction internal fascicles of human peripheral nerve, Shouliang Liu, Sun Yat-Sen Univ. (China); Yanhui Guo, Univ. of Illinois at Springfield (USA); Liwei Yan, The First Affiliated Hospital of Sun Yat-Sen Univ. (China); Yao Lu, Sun Yat-Sen Univ. (China). . . . . [10951-88]

Heuristic based optimal path planning for neurosurgical tumor ablation, Ajeet Wankhede, Likhita Madiraju, Dipam Patel, Univ. of Maryland, College Park (USA); Reza Monfaredi, Kevin Cleary, Sheikh Zayed Institute for Pediatric Surgical Innovation (USA) and Children's National Health System (USA); Chima Oluigbo, Children's National Health System (USA). . . . . [10951-89]

Bronchoscopic procedure planning for systematic lymph node analysis, William E. Higgins, Trevor K. Kuhlengel, The Pennsylvania State Univ. (USA) . . . . . [10951-59]

The effect of different variables on indocyanine green (ICG) in image-guided treatments, Ain Kim, Univ. of Toronto (Canada); Seung Hee Han, Univ. Health Network (Canada); Chang Yong Yang, York Univ. (Canada) . . . . . [10951-90]

A semiautomatic approach for prostate segmentation in MR images using local texture classification and statistical shape modeling, Maysam Shahedi, The Univ. of Texas at Dallas (USA); Martin Halicek, The Univ. of Texas at Dallas (USA) and Georgia Institute of Technology (USA); Qinmei Li, The Univ. of Texas at Dallas (USA) and Guangzhou Medical Univ. (China); Lizhi Liu M.D., Sun Yat-Sen Univ. Cancer Ctr. (China); Zhenfeng Zhang, Guangzhou Medical Univ. (China); David M. Schuster, Emory Univ. (USA); Baowei Fei, The Univ. of Texas at Dallas (USA) and The Univ. of Texas Southwestern Medical Ctr. (USA). . . . . [10951-91]

Molecular chemical imaging endoscope (MCI-E) for real-time visualization and detection of anatomic structures in vivo, Shona D. Stewart, Heather Gomer, Aaron Smith, Arash Samiei, Charles Gardner, Jihang Wang, ChemImage Corp. (USA); James Post, Jeffrey Cohen, John Lyne, Allegheny Health Network (USA); Patrick Treado, ChemImage Corp. (USA) . . . . . [10951-92]

Automated tumor assessment of squamous cell carcinoma on tongue cancer patients with hyperspectral imaging, Francesca Manni, Fons van der Sommen, Sveta Zinger, Technische Univ. Eindhoven (Netherlands); Esther Kho, The Netherlands Cancer Institute (Netherlands); Susan G. Brouwer de Koning, The Netherlands Cancer Institute (Netherlands); Theo J. M. Ruers M.D., The Netherlands Cancer Institute (Netherlands); Caifeng Shan, Philips Research (Netherlands); Jean Schleipen, Philips Research (Netherlands); Peter H. N. de With, Technische Univ. Eindhoven (Netherlands) . . . . . [10951-93]

Super-mask-based object localization for auto-contouring in head and neck radiation therapy planning, Yubing Tong, Jayaram K. Udupa, Drew A. Torigian, Univ. of Pennsylvania (USA) . . . [10951-94]

Numerical simulation for prediction of radiofrequency ablation based on post-ablation CT images of patients with hepatocellular carcinoma, Jinhee Kwon, Asan Medical Ctr. (Korea, Republic of) and Asan Medical Institute of Convergence Science and Technology (Korea, Republic of) and Univ. of Ulsan College of Medicine (Korea, Republic of); So Jung Lee, Namkug Kim, Asan Medical Ctr. (Korea, Republic of) . . [10951-95]

Advantages of intraoperative cortical perfusion imaging by time-resolved thermography in neurosurgery, Juliane Müller, Valentin Schreiter, Elisa Boehl, Jens Müller, Matthias Kirsch M.D., Stephan B. Sobottka, 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, Karlsruher Institut für Technologie (Germany). . . . . [10951-97]

An enhanced hybrid MRI thermometry technique for monitoring microwave thermal therapy, Alaleh Alivar, Pegah Faridi, Punit Prakash, Balasubramaniam 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 Chittajallu, Arslan Basharat, Paul Tunison, Kitware, Inc. (USA); Katerina O. Wells, Steven G. Leeds, James W. Fleshman, Ganesh Sankaranarayanan, Baylor Univ. Medical Ctr. (USA); Andinet Enquobahrie, Kitware, Inc. (USA) . . . . . [10951-99]

Integrating radiomic features from T2-weighted and contrast-enhanced MRI to evaluate tumor regression in rectal cancers after chemoradiation, Siddhartha Nanda, Jacob T. Antunes, Amrish Selvam, Kaustav Bera M.D., Case Western Reserve Univ. (USA); Justin T. Brady M.D., Joseph E. Willis M.D., Raj M. Paspulati M.D., Jayakrishna Gollamudi M.D., Univ. Hospitals Cleveland Medical Ctr. (USA); Anant Madabhushi, Satish Viswanath, Case Western Reserve Univ. (USA) . . . . . [10951-100]

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

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

Multimodal image registration of pre-and intra-interventional data for surgical planning of a transarterial chemoembolisation, Barbara Waldkirch, Mannheim Univ. of Applied Sciences (Germany); Frank G. Zöllner, Universitätsmedizin Mannheim (Germany) and Univ. Heidelberg (Germany); Lothar R. Schad, Universitätsmedizin 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, Derek J. Doss, Jon S. Heiselman, Ma Luo, Logan W Clements, Michael I. Miga, Vanderbilt Univ. (USA); Daniel Brown M.D., Filip Banovac M.D., Vanderbilt Univ. Medical Ctr. (USA) . . . . . [10951-105]

Electromagnetically tracked partial nephrectomy navigation: demonstration of concept, Hillary Lia, Zachary M. C. Baum, Thomas Vaughan, Tamas Ungi M.D., Lab. for Percutaneous Surgery, Queen's Univ. (Canada); Thomas McGregor, Queen's Univ. (Canada); Gabor Fichtinger, Lab. for Percutaneous Surgery, Queen's Univ. (Canada). . . . . [10951-106]

Modeling the capture of magnetic nanoparticles from the aorta and coronary sinus 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]

Intraventricular ultrasound: can we design a minimally invasive image-guided therapeutic probe to fit within the cerebral ventricular space for ablative neuro-oncology purposes?, Nao J. Gamo, Johns Hopkins Univ. (USA); Kyle Morrison, Sonic Concepts, Inc. (USA); Stephen Restaino, Maryland Development Ctr. (USA); Christina Holmes, Alexander Perdomo-Pantoja, Noah Gorelick, Betty Tyler, Johns Hopkins Univ. (USA); Mari Groves, Univ. of Maryland, Baltimore (USA); Amir Manbachi, Johns Hopkins Univ. (USA) . . . . . [10951-108]

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

Heatmap generation for emergency medical procedure identification, Richard A. Paris Jr., Paul Sullivan, Jamison Heard, Diedre Scully, Candace McNaughton, Jesse M. Ehrenfeld, Julie A. Adams, Joseph Coco, Daniel Fabbri, Robert Bodenheimer, Vanderbilt Univ. (USA). . . . . [10951-110]

Power Doppler ultrasound imaging with mechanical perturbation for improved intraoperative needle tip identification during prostate brachytherapy, Nathan Orlando, Western Univ. (Canada); Jonatan Snir, London Regional Cancer Program (Canada); Kevin Barker, Douglas Hoover, Aaron Fenster, Western Univ. (Canada). . . . . [10951-111]

Computer vision-based spatial co-registration of spectroscopic measurements for tumour margin delineation, Conor C. Horgan, Mads S. Bergholt, Isaac J. Pence, Anika Nagelkerke, Molly M. Stevens, Imperial College London (UK) . . . . . [10951-112]

Tissue classification in patient-derived xenograft images for in-situ micro dosage of cancer drugs and response assessment, Lucas Ewing, Brigham and Women's Hospital (USA) and Concord Academy (USA); Sebastian Ahn, Brigham and Women's Hospital (USA); Oliver Jonas, Brigham and Women's Hospital (USA); Nobuhiko Hata, Brigham and Women's Hospital (USA) . . . . . [10951-113]

Integrating tissue-specific radiomic features with convolutional neural networks for automated localization of the rectal wall on post-chemoradiation T2w MRI, Thomas DeSilvio, Prathyush Chirra, Jacob T. Antunes, Kaustav Bera M.D., Case Western Reserve Univ. (USA); Jayakrishna Gollamudi, Raj M. Paspulati M.D., Univ. Hospitals Cleveland Medical Ctr. (USA); Satish E. Viswanath, Case Western Reserve Univ. (USA) . . . . [10951-114]

Toward a framework for navigational guidance during surgical access, Michael Kokko, Dartmouth College (USA); John D. Seigne M.D., Dartmouth Hitchcock Medical Ctr. (USA); Douglas W. Van Citters, Ryan J. Halter, Dartmouth College (USA) [10951-115]

Tissue classification with light scanner data using machine learning for intraoperative registration: 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); Parvin Mousavi, Manuela Kunz, Queen's Univ. (Canada). . . . . [10951-116]

Accuracy of electromagnetic-navigated bone resection in mandibular tumor surgery, Susan G. Brouwer de Koning, F. Geldof, L. H. E. Karssemakers M.D., W. H. Schreuder M.D., R. Dirven M.D., Robert van Veen, Jasper Nijkamp, The Netherlands Cancer Institute-Antoni van Leeuwenhoek Hospital (Netherlands); Theo J. M. Ruers M.D., The Netherlands Cancer Institute-Antoni van Leeuwenhoek Hospital (Netherlands) and MIRA Institute, Univ. of Twente (Netherlands); M. Baris Karakullukcu M.D., The Netherlands Cancer Institute-Antoni van Leeuwenhoek Hospital (Netherlands) . . . . . [10951-117]

Quantitative analysis of 4D MR volume reconstruction methods from dynamic slice acquisitions, Liset Vázquez Romaguera, Ecole Polytechnique de Montréal (Canada); Rosalie Plantefève, Ctr. de Recherche du Ctr. Hospitalier de l'Univ. de Montréal (Canada); Samuel Kadoury, Ecole Polytechnique de Montréal (Canada) and Ctr. de Recherche du Ctr. Hospitalier de l'Univ. de Montréal (Canada). . . . . [10951-118]

CONFERENCE 10954

Imaging Informatics for Healthcare, Research, and Applications

3-D Printing for Medical Applications

3D-printable lung substitutes for particle therapy on the base of high-resolution CTs for mimicking Bragg peak degradation, Kilian Baumann, Philipps-Univ. Marburg (Germany); Ulrich Weber, GSI Helmholtzzentrum für Schwerionenforschung GmbH (Germany); Martin Fiebich, Klemens Zink, Ulf Mäder, Technische Hochschule Mittelhessen (Germany). . . . . [10954-40]

A 3D printing-based realistic anthropomorphic dental phantom and its imaging evaluation, Do Lee, Zepa Yang, Jong Hyo Kim, Seoul National Univ. (Korea, Republic of) . . . . . [10954-41]

Artificial Intelligence and Deep Learning

Correlative hierarchical clustering-based low-rank dimensionality reduction of radiomics-driven phenotype in non-small cell lung cancer, Bardia Yousefi, Nariman Jahani, Eric Cohen, Meng-Kang Hsieh, Jose Marcio Luna, Sharyn I. Katz M.D., Despina Kontos, Univ. of Pennsylvania (USA) . . . . . [10954-42]

A cloud-based medical image processing system for automated organ localization and segmentation, Baoquan Xu, Tonghui Ling, Yuanyuan Yang, Shanghai Institute of Technical Physics (China) . . . . . [10954-43]

A knowledge-based question answering system to provide cognitive assistance to radiologists, Anup Pillai, Amin Katouzian, Ashutosh Jadhav, Marina Bendersky, Karina Kanjaria, Chaitanya Shivade, Vandana Mukherjee, 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, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Se Hyung Kim, Seoul National Univ. Hospital (Korea, Republic of); Hiroyuki Yoshida, Massachusetts General Hospital (USA) and Harvard Medical School (USA) . . . . . [10954-45]

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

Preliminary study of automatic nodule detection system in lung CT images using deep learning, Yangfan Ni, Dezhong Zheng, Yuanyuan Yang, Shanghai Institute of Technical Physics (China) . . . . .[10954-47]

Using generative adversarial networks and transfer learning for breast cancer detection by convolutional neural networks, Shuyue Guan, Murray Loew, The George Washington Univ. (USA) . . . . . [10954-48]

Deep learning of 3D CT images for organ segmentation using 2D multi-channel SegNet model, Yingzhou Liu, Wanyi 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 Mazurowski, 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 Matsuhiro, Tokushima Univ. (Japan) and Massachusetts General Hospital (USA); Chinatsu Watari, Janne Näppi, Radin Nasirudin, Toru Hironaka, Massachusetts General Hospital (USA); Yoshiki Kawata, Noboru Niki, Tokushima Univ. (Japan); Hiroyuki Yoshida, Massachusetts General Hospital (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); Seyedehnafiseh Mirniaharikandehei, Gopichandh 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, Qingmei Chen, Ming Fan, Peng Zhang, Hangzhou Dianzi Univ. (China); Maosheng Xu, Zhejiang Provincial Hospital of Traditional Chinese Medicine (China); Lihua Li, Hangzhou Dianzi Univ. (China). . . . . [10954-53]

Prediction of histological grading in breast cancer by combining DCE-MRI and DWI features, Wenrui Zhao, Ming Fan, Hangzhou Dianzi Univ. (China); Maosheng Xu, Zhejiang Provincial Hospital of Traditional Chinese Medicine (China); Lihua 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 Elhadj Youssef, Mohsen Machhout, Monastir Univ. (Tunisia); Philippe Petit, "Timone" Children-Hospital, Assistance Publique Hôpitaux de Marseille (France); Cécile Baron, Régine Guillermin, Philippe Lasaygues, Aix-Marseille Univ. (France) and CNRS (France) . . . . . [10955-39]

Study on acceleration schemes in Fresnel volume tomography for sound speed reconstruction, Xiaoyue Fang, Yun Wu, Junjie Song, Liang Zhou, Qiude Zhang, Quan Zhou, Zhaohui Quan, 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); Anita Carević, Univ. of Split (Croatia); Ahmed Abdou, Jiayu He, Mohamed Almekkawy, 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); Younsu Kim, Johns Hopkins Univ. (USA); Emran Mohammad Abu Anas, 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, Chisako Muramatsu, Shunichi Higuchi, Gifu Univ. (Japan); Takako Morita, Mikinao Oiwa, 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 Cardona Cardenas, Sergio Shiguemi Furuie, 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 Klock M.D., Mark Lenox, QT 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-harikandehei, The Univ. of Oklahoma (USA); Joshua Vanosdol, Oklahoma State Univ. (USA); Gopichandh Danala, Morteza Heidari, The Univ. of Oklahoma (USA); Ashish Ranjan, Oklahoma State Univ. (USA); Bin 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, Xiaoqing Li, Wenjie Deng, Mingyue Ding, Huazhong Univ. of Science and Technology (China). [10955-50]

Cancer tissue detection based on photoacoustic imaging using deep 3D neural network, Kamal Jnawali, Rochester Institute of Technology (USA); Bhargava Chinni, Vikram Dogra, Univ. of Rochester (USA); Navalgund Rao, Rochester Institute of Technology (USA) . . . . . [10955-51]

TUESDAY 19 FEBRUARY

CONFERENCE 10948
ROOM: TOWN & COUNTRY

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10948

SESSION 8
ROOM: TOWN & COUNTRY TUE 8:00 TO 9:40 AM

Detector Physics II

Session Chairs: **Wei Zhao,** Stony Brook Medicine (USA); **Shiva Abbaszadeh,** Univ. of Illinois (USA)

8:00 am: **Dual energy imaging with a dual-layer flat panel detector**, Minghui Lu, Jin Zhang, Joachim Steiger, Varex Imaging Corp. (USA) . . . . . [10948-40]

8:20 am: **Performance evaluation of a Se/CMOS prototype x-ray detector with the Apodized Aperture Pixel (AAP) design**, Tomi F. Nano, Robarts Research Institute (Canada) and Western Univ. (Canada); Christopher C. Scott, Yunzhi Li, Celal Con, Karim S. Karim, Univ. of Waterloo (Canada); Ian A. Cunningham, The Univ. of Western Ontario (Canada) . . . . . [10948-41]

8:40 am: **Towards large-area photon-counting detectors for spectral x-ray imaging**, Thomas Thuering, Spyridon Gkoumas, Pietro Zambon, Peter Trueb, Michael Rissi, Flavio Di Prima, Tilman Donath, Christian Brönnimann, DECTRIS Ltd. (Switzerland). . . . . [10948-42]

9:00 am: **Novel direct conversion imaging detector without selenium or semiconductor conversion layer**, Denny L. Lee, Direct X Ray Digital Imaging Technology LLC (USA); Andrew D. A. Maidment, Ali Kassaee, Heather Petroccia, Taoran Li, Lei Dong, Univ. of Pennsylvania (USA); Kang Heo, Hyunsuk Jang, Vieworks Co., Ltd. (Korea, Republic of). . . . . [10948-43]

9:20 am: **Theoretical count rate capabilities of polycrystalline silicon photon counting imagers for kV CBCT**, Albert K. Liang, Youcef El-Mohri, Qihua Zhao, Martin Koniczek, Larry E. Antonuk, Univ. of Michigan (USA) . . . . . [10948-44]

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

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CONFERENCE 10949
ROOM: SAN DIEGO

Tuesday - Thursday 19–21 Feb. 2019
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The Chinese Univ. of Hong Kong (China); **Marius Staring,** Leiden Univ. Medical Ctr. (Netherlands); **Martin A. Styner,** The Univ. of North Carolina at Chapel Hill (USA); **Kenji Suzuki,** Illinois Institute of Technology (USA); **Raphael Sznitman,** Univ. Bern (Switzerland); **Jayaram K. Udupa,** Univ. of Pennsylvania (USA); **Koen Van Leemput,** Harvard Medical School (USA), Massachusetts General Hospital (USA); **Tom K. Vercauteren,** King's College London (UK); **Tomaž Vrtovec,** Univ. of Ljubljana (Slovenia); **Wolfgang Wein,** ImFusion GmbH (Germany)

SESSION 1
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 Madesta, Tobias Gauer, Thilo Sentker, René Werner, Universitätsklinikum Hamburg-Eppendorf (Germany). . . . . [10949-1]

8:20 am: **Image-domain multi-material decomposition for dual energy CT with non-convex sparsity regularization**, Qihui 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) . . . . [10949-2]

8:40 am: **Non-learning based deep parallel MRI reconstruction (NLDpMRI)**, Ali Pour Yazdanpanah, Harvard Medical School (USA) and Boston Children's Hospital (USA). . . . . [10949-3]

9:00 am: **Unpaired MRI to CT synthesis with multi-view adversarial learning**, Yunhao Ge, Robotics Institute of Shanghai Jiao Tong Univ. (China) and Shanghai United Imaging Intelligence Co., Ltd. (China); Zhong Xue, Yiqiang Zhan, Xiang Zhou, Shanghai United Imaging Intelligence Co., Ltd. (China) . . . . . [10949-4]

9:20 am: **Iterative reconstruction for low dose CT using Plug-and-Play ADMM framework**, Qihui Lyu, Dan Ruan, John Marian Hoffman, Ryan Neph, Michael McNitt-Gray, Ke Sheng, Univ. of California, Los Angeles (USA). . . . . [10949-5]

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

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CONFERENCE 10950
ROOM: GOLDEN WEST

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10950

SESSION 8
ROOM: GOLDEN WEST . . . . TUE 8:00 TO 9:40 AM

Lung II

8:00 am: **Handling label noise through model confidence and uncertainty: application to chest radiograph classification**, Erdi Calli, Diagnostic Image Analysis Group (Netherlands) . . . . [10950-41]

8:20 am: **Classification of chest CT using case-level weak supervision**, Ruixiang Tang, Songyue Han, Rui Hou, Geoffrey D. Rubin, Joseph Y. Lo, Duke Univ. (USA) . . . . . [10950-42]

8:40 am: **Deep adversarial one-class learning for normal and abnormal chest radiograph classification**, Yuxing Tang, National Institutes of Health Clinical Ctr. (USA); Youbao Tang, National Institutes of Health (USA); Mei Han, Ping An Technology, US Research Lab (USA); Jing Xiao, Ping An Technology Co., Ltd. (China); Ronald M. Summers, National Institutes of Health (USA) . . . . . [10950-43]

9:00 am: **Image biomarkers for quantitative analysis of idiopathic interstitial pneumonia**, Young-Wouk Kim, Télécom SudParis (France) and Avicenne Hospital (France); Sebastián Roberto Tarando, Télécom SudParis (France); Pierre-Yves Brillet, Univ. Paris 13 (France) and Avicenne Hospital (France); Catalin Fetita, Télécom SudParis (France) . . . . . [10950-44]

9:20 am: **Patient-specific outcome simulation after surgical correction of pectus excavatum: a preliminary study**, Mafalda Couto, João Gomes-Fonseca, Instituto de Investigação em Ciências da Vida e da Saúde, Univ. do Minho (Portugal); Tiago Henriques-Coelho, Univ. do Porto (Portugal); Jaime C. Fonseca, António C. M. Pinho, Univ. do Minho (Portugal); Jorge Correia-Pinto, Instituto de Investigação em Ciências da Vida e da Saúde, Univ. do Minho (Portugal); João L. Vilaça, Instituto Politécnico do Cávado e do Ave (Portugal) . . . . . [10950-45]

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

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CONFERENCE 10951
ROOM: CALIFORNIA

Sunday - Tuesday 17–19 Feb. 2019
Proceedings of SPIE VOL. 10952

SESSION 8
ROOM: CALIFORNIA . . . . . TUE 8:00 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 Medical Ctr. (USA); **Cristian A. Linte,** Rochester Institute of Technology (USA)

8:00 am: **Automatic applicator digitization for MRI-based cervical cancer brachytherapy planning using two surface models**, William T. Hrinivich, Marc Morcos, Akila Viswanathan, Todd McNutt, Junghoon Lee, Johns Hopkins Univ. (USA) . . . . . [10951-41]

8:20 am: **An integrated MR imaging coil and body-mounted robot for MR-guided pediatric arthrography: SNR and phantom study**, Reza Monfaredi, Children's National Health System (USA); Wolfgang Loew, Christopher Ireland, Cincinnati Children's Hospital Medical Ctr. (USA); Viktoriya Beskin, Children's National Health System (USA); Ronald Pratt, Randy Giaquinto, Charles Dumoulin, Cincinnati Children's Hospital Medical Ctr. (USA); Kevin Cleary, Karun Sharma, Children's National Health System (USA). . . . . [10951-42]

8:40 am: **Bringing transcranial MR-guided focused ultrasound into focus** *(Keynote Presentation)*, Kim Butts-Pauly, Stanford Univ. (USA) . . . . . [10951-43]

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

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CONFERENCE 10953
ROOM: PACIFIC SALON 2

Tuesday - Thursday 19–21 Feb. 2019
Proceedings of SPIE Vol. 10953

SESSION 1
ROOM: PACIFIC SALON 2 . TUE 8:00 TO 9:40 AM

Novel Imaging Techniques and Applications I

Session Chairs: **Andrzej Krol,** SUNY Upstate Medical Univ. (USA); **Armando Manduca,** 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**, Alok Shankar, Canon Stroke and Vascular Research Ctr. (USA) and Univ. at Buffalo (USA); Jordan M. Krebs, Alexander R. Podgorsak, Ciprian N. Ionita, Daniel R. Bednarek, Stephen Rudin, Canon Stroke and Vascular Research Ctr. (USA) . . . . . [10953-1]

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 Schmidtlein, Memorial Sloan-Kettering Cancer Ctr. (USA); James N. Turner, Binghamton Univ. (USA); Andrzej Krol, SUNY Upstate Medical Univ. (USA) . . . . . [10953-2]

8:40 am: **Design, fabrication and evaluation of non-imaging, label-free pre-screening tool using quantified bio-electrical tissue profile**, Ali Zarafshani, Seyedehnafiseh Mirniaharikandehei, Faranak Aghaei, Morteza Heidari, Yunzhi Wang, Bin Zheng, The Univ. of Oklahoma (USA). . . . . [10953-3]

9:00 am: **Radiologic-pathologic validation of transmission ultrasound tomography using microscopy with UV surface excitation (MUSE)**, Bilal H. Malik, QT Ultrasound LLC (USA); Austin Todd, UC Davis Medical Ctr. (USA); Alyson Terry, QT Ultrasound LLC (USA); Farzad Fereidouni, UC Davis Medical Ctr. (USA); Rajni Natesan M.D., John Klock, QT Ultrasound LLC (USA); Richard M. Levenson, UC Davis Medical Ctr. (USA) . . . . . [10953-4]

9:20 am: **Investigation of Pockels effect in optical property modulation-based radiation detection method for positron emission tomography**, Yuli Wang, Huazhong Univ. of Science and Technology (China) . . . . . [10953-5]

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

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TUESDAY 19 FEBRUARY

CONFERENCE 10948
ROOM: TOWN & COUNTRY

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10948

SESSION 9
ROOM: TOWN & COUNTRY . . . . TUE 10:10 AM TO 12:10 PM

Spectral Imaging
Session Chairs: **Lifeng Yu,** Mayo Clinic (USA); **Adam M. Alessio,** Univ. of Washington (USA)

10:10 am: **Physical modeling and performance of spatial-spectral filters for CT material decomposition**, Matthew Tivnan, Steven Tilley II, Joseph W. Stayman, Johns Hopkins Univ. (USA) . . . . . [10948-45]

10:30 am: **Multi-energy CT with triple x-ray beams and photon-counting-detector CT for simultaneous imaging of two contrast agents: an experimental comparison**, Liqiang Ren, Cynthia H. McCollough, Lifeng Yu, Mayo Clinic (USA) [10948-46]

10:50 am: **Spectrum optimization in photon counting detector based iodine K-edge CT imaging**, Mang Feng, Xu Ji, Kevin Treb, Ran Zhang, Guang-Hong Chen, Ke Li, Univ. of Wisconsin-Madison (USA) . . . . . [10948-47]

11:10 am: **Theoretical feasibility of dual-energy functional x-ray imaging of respiratory disease**, Jesse Tanguay, Miranda Kirby, Ryerson Univ. (Canada) . . . . . [10948-48]

11:30 am: **Comparison study of dual-energy techniques in chest radiography**, Minjae Lee, Donghoon Lee, Hyemi Kim, Sunghoon Choi, Dohyeon Kim, Hee-Joung Kim, Yonsei Univ. (Korea, Republic of). . . . . [10948-49]

11:50 am: **Spectral data completion for dual-source x-ray CT**, Darin P. Clark, Duke Univ. Medical Ctr. (USA); Cristian T. Badea, Duke Univ. School of Medicine (USA) . . . . . [10948-50]

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

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CONFERENCE 10949
ROOM: SAN DIEGO

Tuesday - Thursday 19–21 Feb. 2019
Proceedings of SPIE Vol. 10949

SESSION 2
ROOM: SAN DIEGO . . . TUE 10:10 AM TO 12:10 PM

Deep Learning: Segmentation
Session Chairs: **Tomaž Vrtovec,** Univ. of Ljubljana (Slovenia); **Punam Kumar Saha,** The Univ. of Iowa (USA)

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, Yiyuan Zhao, Jack H. Noble, Benoit M. Dawant, Vanderbilt Univ. (USA) . . . . . [10949-6]

10:30 am: **Improving splenomegaly segmentation by learning from heterogeneous multi-source labels,** Yucheng Tang, Yuankai Huo, Yunxi Xiong, Hyeonsoo Moon, Vanderbilt Univ. (USA); Tamara K. Moyo, Michael R. Savona, Vanderbilt Univ. Medical Ctr. (USA); Albert Assad, Incyte Corp. (USA); Richard Abramson, Vanderbilt Univ. Medical Ctr. (USA); Bennett A. Landman, Vanderbilt Univ. (USA) . . . . . [10949-7]

10:50 am: **Simultaneous MR knee image segmentation and bias field correction using deep learning and partial convolution**, Fengkai Wan, Örjan Smedby, Chunliang Wang, KTH Royal Institute of Technology (Sweden) . . . . . [10949-8]

11:10 am: **Distributed 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 Radiology and National Institutes of Health Clinical Ctr. (USA) and Middle Tennessee State Univ. (USA); Snehashis Roy, 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 Survivorship, 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) . . . . . [10949-9]

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CONFERENCE 10950
ROOM: GOLDEN WEST

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10950

SESSION 9
ROOM: GOLDEN WEST . . . . . TUE 10:10 AM TO 12:10 PM

Radiomics I
10:10 am: **Effect of diversity of patient population and acquisition systems on the use of radiomics and machine learning for classification of 2,861 breast lesions**, Heather M. Whitney, Wheaton College (USA) and The Univ. of Chicago (USA); Yu Ji, 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); Maryellen L. Giger, The Univ. of Chicago (USA) . . . . . [10950-46]

10:30 am: **Radiogenomic characterization of response to chemo-radiation therapy in Glioblastoma is associated with PI3K/AKT/mTOR and apoptosis signaling pathways**, Niha G. Beig, Prateek Prasanna, Case Western Reserve Univ. (USA); Virginia Hill, Northwestern Univ. (USA); Ruchika Verma, Vinay Varadan, Anant Madabhushi, Pallavi Tiwari, Case Western Reserve Univ. (USA) . . . . . [10950-47]

10:50 am: **Identifying optimal input using multilevel radiomics for predicting pulmonary function in lung cancer patients treated with radiotherapy**, Sang Ho Lee, Peijin Han, Russell K. Hales, Khinh R. Voong, Todd R. McNutt, Junghoon Lee, Johns Hopkins Univ. School of Medicine (USA) . . . . . [10950-48]

11:10 am: **Texture-based prostate cancer classification on MRI: how does inter-class size mismatch affect measured system performance?,** Ryan Alfano, Derek Soetemans, Western Univ. (Canada); Glenn Bauman, London Health Sciences Ctr. (Canada); Mena Gaed, Western Univ. (Canada); Madeleine Moussa, José Gomez-Lemus, Joseph Chin, London Health Sciences Ctr. (Canada); Stephen Pautler, St. Joseph's Health Ctr. (Canada); Aaron Ward, Western Univ. (Canada) . . . . . [10950-49]

11:30 am: **Deformation heterogeneity radiomics to predict molecular subtypes of pediatric Medulloblastoma on routine MRI**, Sukanya Raj Iyer, Marwa Ismail, Ramon Correa, Prateek Prasanna, Niha G. Beig, Kaustav Bera, Case Western Reserve Univ. (USA); Volodymyr Statsevych, Cleveland Clinic (USA); Benita Tamrazi, Ashley Margol, Alexander Judkins, Children's Hospital Los Angeles (USA); Anant Madabhushi, Pallavi Tiwari, Case Western Reserve Univ. (USA) . . . . . [10950-50]

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CONFERENCE 10951
ROOM: CALIFORNIA

Sunday - Tuesday 17–19 Feb. 2019
Proceedings of SPIE VOL. 10952

SESSION 9
ROOM: CALIFORNIA . . TUE 10:10 AM TO 12:10 PM

Optical Imaging and Guidance Technologies
Session Chairs: **Pierre Jannin,** Univ. de Rennes 1 (France); **Amber L. Simpson,** Memorial Sloan-Kettering Cancer Ctr. (USA)

10:10 am: **Image-based measurement by instrument tip tracking for tympanoplasty using digital surgical microscopy,** Niklas Gard, Jean-Claude Rosenthal, Silvio Jurk, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany); Armin Schneider, Arnold & Richter Cine Technik GmbH & Co. Betriebs KG (Germany); Peter Eisert, 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 Fabelo, 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. of Texas Southwestern Medical Ctr. at Dallas (USA); Amy Y. Chen, Emory Univ. School of Medicine (USA); Gustavo M. Callicó, Univ. de Las Palmas de Gran Canaria (Spain); Baowei 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 intrahepatic flow display to guide liver dissection in minimally invasive surgery**, Jaepyeong Cha, Children's National Health System (USA); Gyeong Woo Cheon, GE Global Research (USA); Jung-Man Namgoong, Asan Medical Ctr. (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, Chaitanya Kolluru, Case Western Reserve Univ. (USA); Pengfei Dong, Univ. of Nebraska-Lincoln (USA); David Wilson, Case Western Reserve Univ. (USA) . . . . . [10951-47]

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CONFERENCE 10953
ROOM: PACIFIC SALON 2

Tuesday - Thursday 19–21 Feb. 2019
Proceedings of SPIE Vol. 10953

SESSION 2
ROOM: PACIFIC SALON 2 . . . . . TUE 10:10 AM TO 12:10 PM

Keynote and Optical/Vascular I
Session Chairs: **Barjor Gimi,** Rowan Univ. (USA); **Andrzej Krol,** SUNY Upstate Medical Univ. (USA)

10:10 am: **Keynote Presentation *(Keynote Presentation)***, Christopher Filippi, North Shore-Long Island Jewish Health System (USA) and Columbia Univ. (USA) . . . . . [10953-6]

11:10 am: **Deep learning based approach for fully automated segmentation of hard exudate from retinal images,** Fatemeh Zabihollahy, Aidan Lochbihler, Eranga Ukwatta, Carleton Univ. (Canada) . . . . . [10953-7]

11:30 am: **Deep convolutional network based on rank learning for OCT retinal images quality assessment**, Lei Zhang, Jia Yang Wang, Min Zhang, Jun Feng, Northwest Univ. (China) . . . . . [10953-8]

11:50 am: **Rapid sequence angiography with a 3D printed aneurysm phantom and an ultra-high frame rate imaging photon counting detector (PCD)**, Alok Shankar, Canon Stroke and Vascular Research Ctr., Univ. at Buffalo (USA); Jordan M. Krebs, Daniel R. Bednarek, Stephen Rudin, Canon Stroke and Vascular Research Ctr. (USA). [10953-83]

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

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CONFERENCE 10948
ROOM: TOWN & COUNTRY

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10948

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CONFERENCE 10949
ROOM: SAN DIEGO

Tuesday - Thursday 19–21 Feb. 2019
Proceedings of SPIE Vol. 10949

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 Milletari, 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]

11:50 am: **A fully automated CT-based airway segmentation algorithm using deep learning and topological leakage detection and branch augmentation approaches**, Syed Ahmed Nadeem, Eric A. Hoffman, Punam K. Saha, The Univ. of Iowa (USA) . . . . . [10949-11]

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

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CONFERENCE 10950
ROOM: GOLDEN WEST

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10950

SESSION 9 (CONTINUED)
ROOM: GOLDEN WEST . . . . . TUE 10:10 AM TO 12:10 PM

11:50 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, Pradnya Patil, Cleveland Clinic (USA); Mohammadhadi Khorrami, Case Western Reserve Univ. (USA); Pingfu Fu, Vamsidhar Velcheti, Cleveland Clinic (USA); Anant Madabhushi, Case Western Reserve Univ. (USA) . . . . . .[10950-51

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

CONF. 10950 continued page 47 ➡

CONFERENCE 10951
ROOM: CALIFORNIA

Sunday - Tuesday 17–19 Feb. 2019
Proceedings of SPIE VOL. 10952

SESSION 9 (CONTINUED)
ROOM: CALIFORNIA . .TUE 10:10 AM TO 12:10 PM

11:30 am: **Image fusion on endoscopic views for endo-nasal skull-base surgery**, Marco Lai, Caifeng Shan, Drazenko Babic M.D., Philips Research (Netherlands); Robert Homan, Philips Healthcare (Netherlands); Adrian Elmi Terander M.D., Erik Edstrom M.D., Oscar Persson M.D., Gustav Burstrom M.D., Karolinska Univ. Hospital (Sweden); Peter H. N. de With, Technische Univ. Eindhoven (Netherlands) . . . . . [10951-48]

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 Monfaredi, Children's National Health System (USA) . . . . . [10951-49]

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

CONF. 10951 continued page 47 ➡

CONFERENCE 10953
ROOM: PACIFIC SALON 2

Tuesday - Thursday 19–21 Feb. 2019
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CONF. 10953 continued page 47 ➡

TUESDAY 19 FEBRUARY

CONFERENCE 10948
ROOM: TOWN & COUNTRY

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10948

SESSION 10
ROOM: TOWN & COUNTRY .TUE 1:20 TO 3:00 PM

Breast Imaging
Session Chairs: **Hilde Bosmans,** KU Leuven (Belgium); **John M. Sabol,** GE Healthcare (USA)

1:20 pm: **The feasibility study for classification of breast microcalcifications based on photon counting spectral mammography**, Hyemi Kim, Dohyeon Kim, Minjae Lee, Hee-Joung Kim, Yonsei Univ. (Korea, Republic of) . . . . . [10948-51]

1:40 pm: **Cascaded systems analysis of contrast-enhanced spectral mammography using amorphous selenium photon-counting field-shaping multi-well avalanche detectors (SWADs)**, Jesse Tanguay, Ryerson Univ. (Canada); Nicholas Mantella, The Univ. of British Columbia Okanagan (Canada); Jann Stavro, Stony Brook Univ. (USA); Ian A. Cunningham, Western Univ. (Canada); Amir H. Goldan, Wei Zhao, Stony Brook Univ. (USA) . . . . . [10948-52]

2:00 pm: **Ultra-short, high-dose rate digital x-ray tube based on carbon nanotube emitters for advanced cone-beam breast computed tomography**, Jun-Tae Kang, Jin-Woo Jeong, Sora Park, Jae-Woo Kim, Ki Nam Yun, Eunsol Go D.V.M., Jeong-Woong Lee, Hyojin Jeon, Yujung Ahn, Ji-Hwan Yeon, Sunghee Kim, Yoon-Ho Song, Electronics and Telecommunications Research Institute (Korea, Republic of) . . . . . [10948-53]

2:20 pm: **Evaluation of silver sulfide nanoparticles as a contrast agent for spectral photon-counting digital mammography: a phantom study**, Kristen C. Lau, Jessica C. Hsu, Univ. of Pennsylvania (USA); Björn Cederström, Philips Digital Mammography Sweden AB (Sweden); David P. Cormode, Andrew D. A. Maidment, Univ. of Pennsylvania (USA) [10948-54]

2:40 pm: **Validation of a method to simulate the acquisition of mammographic images with different techniques**, Joana Boita, Radboud Univ. Medical Ctr. (Netherlands) and LRCB (Netherlands); Alistair Mackenzie, The Royal Surrey County Hospital NHS Trust (UK); Ioannis Sechopoulos, Radboud Univ. Medical Ctr. (Netherlands) and LRCB (Netherlands) . . . . . [10948-55]

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

CONF. 10948 continued page 48 ➡

CONFERENCE 10949
ROOM: SAN DIEGO

Tuesday - Thursday 19–21 Feb. 2019
Proceedings of SPIE Vol. 10949

SESSION 3
ROOM: SAN DIEGO . . . . . .TUE 1:20 TO 3:00 PM

Image Enhancement and Modeling
Session Chairs: **Murray H. Loew,** 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, Shijie Li, NYU Tandon School of Engineering (USA); Katharina Bermond, Universitätsklinikum Würzburg (Germany); Rainer Heintzmann, Friedrich-Schiller-Univ. Jena (Germany); Christine A. Curcio, The Univ. of Alabama at Birmingham (USA); Thomas Ach, Universitätsklinikum Würzburg (Germany); Guido Gerig, NYU Tandon School of Engineering (USA) . . . . . [10949-12]

1:40 pm: **Sharpness preserved sinogram synthesis using convolutional neural network for sparsely-view CT imaging**, Jiaxing Tan, The Graduate Ctr., CUNY (USA) and Stony Brook Univ. (USA) and The City Univ. of New York (USA); Zhengrong Liang, Yongfeng Gao, The State Univ. of New York (USA); Yumei Huo, 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) . . . . . [10949-13]

2:00 pm: **Deep residual dense U-Net for resolution enhancement in accelerated MRI acquisition**, Pak Lun Kevin Ding, Arizona State Univ. (USA); Zhiqiang Li, Barrow Neurological Institute (USA); Yuxiang Zhou, Mayo Clinic (USA); Baoxin Li, Arizona State Univ. (USA) . . . . . [10949-14]

2:20 pm: **Artificial neural network filters for enhancing 3D optical microscopy images of neurites**, Shih-Luen Wang, Seyed M. M. Kahaki, Armen Stepanyants, Northeastern Univ. (USA) . . . . . [10949-15]

2:40 pm: **Volumetric texture modeling using dominant and discriminative binary patterns**, Parmeet S. Bhatia, Siemens Healthineers (USA); Amit Kale, Bosch Corporate Research and Technology Ctr. (India); Zhigang Peng, Siemens Healthineers (USA) . . . . . [10949-16]

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

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CONFERENCE 10950
ROOM: GOLDEN WEST

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10950

SESSION 10
ROOM: GOLDEN WEST . .TUE 1:20 PM TO 3:00 PM

Keynote Session
Keynote presentation to be followed by a 40 minute panel discussion on deep learning in CAD.

1:20 pm: **The U-net and its impact to medical imaging** *(Keynote Presentation)*, Bernardino Romera-Paredes, Google DeepMind (UK) . . . . . [10950-52]

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

CONF. 10950 continued page 48 ➡

CONFERENCE 10951
ROOM: CALIFORNIA

Sunday - Tuesday 17–19 Feb. 2019
Proceedings of SPIE VOL. 10952

SESSION 10
ROOM: CALIFORNIA . . . . . .TUE 1:20 TO 3:00 PM

Image Registration and Challenge
Session Chairs: **Michael I. Miga,** Vanderbilt Univ. (USA); **David J. Hawkes,** Univ. College London (UK)

1:20 pm: **The image-to-physical liver registration sparse data challenge**, Michael I. Miga, Vanderbilt Univ. (USA) . . . . . [10951-50]

1:40 pm: **Semi-supervised image registration using deep learning**, Alireza Sedghi, Queen's Univ. (Canada); Jie Luo, Alireza Mehrtash, Brigham and Women's Hospital (USA); Steve Pieper, Brigham and Women's Hospital (USA); Clare Tempany, Tina Kapur, Brigham and Women's Hospital (USA); Parvin Mousavi, Queen's Univ. (Canada); William Wells III, Brigham and Women's Hospital (USA). . . [10951-51]

2:00 pm: **3D-2D image registration in virtual long-film imaging: application to spinal deformity correction**, Ali Uneri, Xiaoxuan Zhang, Johns Hopkins Univ. (USA); Joseph Webster Stayman, Johns Hopkins Medicine (USA); Patrick A. Helm, Medtronic, Inc. (USA); Greg M. Osgood M.D., Nicholas Theodore M.D., Johns Hopkins Medicine (USA); Jeffrey H Siewerdsen, Johns Hopkins Univ. (USA) . . . . . [10951-52]

2:20 pm: **A deformable multimodal image registration using PET/CT and TRUS for intraoperative focal prostate brachytherapy**, Sharmin Sultana, The Johns Hopkins Univ. School of Medicine (USA); Danny Y. Song, Junghoon Lee, Johns Hopkins Univ. School of Medicine (USA) . . . . . [10951-53]

2:40 pm: **Evaluation of nonrigid registration around the hippocampus for the construction of statistical maps in a multicenter dataset of epilepsy laser ablation patients**, Srijata Chakravorti, Vanderbilt Univ. (USA); Walter J. Jermakowicz, Univ. of Miami (USA); Chengyuan Wu, Thomas Jefferson Univ. Hospitals, Inc. (USA); Rui Li, Raul Wirz Gonzalez, Pierre-François D'Haese, Benoit M. Dawant, Vanderbilt Univ. (USA). . . . . [10951-54]

AWARD ANNOUNCEMENTS
ROOM: CALIFORNIA . . . . . 3:00 PM TO 3:05 PM

The Image-Guided Procedures, Robotic Interventions. and Modeling RFW runners up, Young Scientist, Best Student Paper, and poster presentation award recipients will be recognized and certificates distributed.

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

CONF. 10951 continued page 48 ➡

CONFERENCE 10953
ROOM: PACIFIC SALON 2

Tuesday - Thursday 19–21 Feb. 2019
Proceedings of SPIE Vol. 10953

SESSION 3
ROOM: PACIFIC SALON 2 . .TUE 1:20 TO 3:00 PM

Neurological Imaging I
Session Chairs: **Axel Wismüller M.D.,** Univ. of Rochester Medical Ctr. (USA); **Vikram D. Kodibagkar,** Arizona State Univ. (USA)

1:20 pm: **Investigating a quantitative radiomics approach for brain tumor classification**, Anas Z. Abidin, Irfaan Dar, Adora M. DSouza, Univ. of Rochester (USA); Edward Lin, Axel Wismüller, Univ. of Rochester Medical Ctr. (USA) . . . . . [10953-9]

1:40 pm: **Progressive degeneration of white matter functional connectivity in Alzheimer's disease**, Yurui Gao, Vanderbilt Univ. (USA); Muwei Li, Zhongliang Zu, Baxter P. Rogers, Vanderbilt Univ. Medical Ctr. (USA); Adam W. Anderson, Zhaohua Ding, Vanderbilt Univ. (USA); John C. Gore, Vanderbilt Univ. Medical Ctr. (USA) . . . . . [10953-10]

2:00 pm: **Phase fMRI reveals more sparseness and balance of rest brain functional connectivity than magnitude fMRI**, Zikuan Chen, The Mind Research Network (USA) and Yunnan Univ. (China); Qing Zhou, Yunnan Univ. (China); Vince D. Calhoun, The Mind Research Network (USA) . . . . . [10953-11]

2:20 pm: **Estimation of axonal conduction speed and the inter-hemispheric transfer time using connectivity informed maximum entropy on the mean**, Samuel Deslauriers-Gauthier, Institut National de Recherche en Informatique et en Automatique (France) and Univ. Côte d'Azur (France); Rachid Deriche, Institut National de Recherche en Informatique et en Automatique (France) [10953-12]

2:40 pm: **Quantitative assessment of dMRI-based dentate-rubro-thalamic tractography in squirrel monkey**, Yurui Gao, Vanderbilt Univ. (USA); Kurt G. Schilling, Vanderbilt Univ. Medical Ctr. (USA); Iwona Stepniewska, Vanderbilt Univ. (USA); Guozhen Luo, Vanderbilt Univ. Medical Ctr. (USA); Bennett Landman, Vanderbilt Univ. (USA); Hong Yu, Daniel Claassen, Vanderbilt Univ. Medical Ctr. (USA); Benoit Dawant, Adam W. Anderson, Vanderbilt Univ. (USA) . . . . . [10953-13]

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

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TUESDAY 19 FEBRUARY

CONFERENCE 10948
ROOM: TOWN & COUNTRY

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10948

SESSION 11
ROOM: TOWN & COUNTRY .TUE 3:30 TO 4:50 PM

Cone Beam CT

Session Chairs: **Marc Kachelrieß,** Deutsches Krebsforschungszentrum (Germany); **John Yorkston,** Carestream Health, Inc. (USA)

3:30 pm: **A robotic x-ray cone-beam CT system: trajectory optimization for 3D imaging of the weight-bearing spine**, Chumin Zhao, Johns Hopkins Univ. (USA); Magdalena Herbst, Sebastian Vogt, Ludwig Ritschl, Siemens Healthineers (Germany); Jeffrey H. Siewerdsen, Wojciech Zbijewski, Johns Hopkins Univ. (USA) . . . . . [10948-56]

3:50 pm: **Fast CBCT acquisition enabled by alignment compensation**, Magdalena Herbst, Siemens Healthineers (Germany); Christoph Luckner, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) and Siemens Healthineers (Germany); Julia Wicklein, Ludwig Ritschl, Steffen Kappler, Siemens Healthineers (Germany) . . . . . [10948-57]

4:10 pm: **Fast and robust auto-calibration by contour consistency**, Susanne Maur, Sirona Dental Systems GmbH (Germany); Dzmitry Stsepankoua, Ruprecht-Karls-Univ. Heidelberg (Germany); Jürgen Hesser, Universitätsmedizin Mannheim, Univ. Heidelberg (Germany) . . . . . [10948-58]

4:30 pm: **Image-based deformable motion compensation for interventional cone-beam CT**, Alejandro Sisniega, Sarah Capostagno, Wojciech Zbijewski, Clifford R. Weiss, Jeffrey H. Siewerdsen, Johns Hopkins Univ. (USA) . . . . . [10948-59]

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CONFERENCE 10949
ROOM: SAN DIEGO

Tuesday - Thursday 19–21 Feb. 2019
Proceedings of SPIE Vol. 10949

SESSION 4
ROOM: SAN DIEGO . . . . . .TUE 3:30 TO 4:50 PM

Brain: Shapes and Biomarkers

Session Chairs: **Kenji Suzuki M.D.,** Illinois Institute of Technology (USA); **David R. Haynor,** Univ. of Washington (USA)

3:30 pm: **Regularized topological data analysis for extraction of coherent brain regions**, Ishaan Batta, Nicolas Honnorat, Christos Davatzikos, Univ. of Pennsylvania (USA) . . . . . [10949-17]

3:50 pm: **Automatic quality control using hierarchical shape analysis**, Lianrui Zuo, Shuo Han, Aaron Carass, Chiadikaobi U. Onyike, Jerry L. Prince, Johns Hopkins Univ. (USA) . . . . . [10949-18]

4:10 pm: **Cerebellum parcellation with convolutional neural networks**, Shuo Han, Yufan He, Aaron Carass, Johns Hopkins Univ. (USA); Sarah H. Ying, The Johns Hopkins Univ. School of Medicine (USA); Jerry L. Prince, Johns Hopkins Univ. (USA) . . . . . [10949-19]

4:30 pm: **Model selection for spatiotemporal modeling of early childhood sub-cortical development**, James Fishbaugh, New York Univ. (USA); Beatriz Paniagua, Kitware, Inc. (USA); Martin Styner, John Gilmore, The Univ. of North Carolina at Chapel Hill (USA); Guido Gerig, New York Univ. (USA) . . . . . [10949-20]

WORKSHOP
ROOM: SAN DIEGO . . . . . .TUE 5:00 TO 7:00 PM

Understanding Brain Development using Connectomics

See Special Events for more information.

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CONFERENCE 10950
ROOM: GOLDEN WEST

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10950

SESSION 11
ROOM: GOLDEN WEST . . . . .TUE 3:30 TO 4:50 PM

Lung III

3:30 pm: **Weakly-supervised deep learning of interstitial lung disease types on CT images**, Chenglong Wang, Takayasu Moriya, Yuichiro Hayashi, Holger Roth, Nagoya Univ. (Japan); Le Lu, NVIDIA Corp. (USA); Masahiro Oda, Nagoya Univ. (Japan); Hirotugu Ohkubo, Nagoya City Univ. (Japan); Kensaku Mori, Nagoya Univ. (Japan). . . . [10950-53]

3:50 pm: **Efficient learning in computer-aided diagnosis through label propagation**, Samuel Berglin, Univ. of Wisconsin-Madison (USA); Eura Shin, Univ. of Kentucky (USA); Daniela Raicu, Jacob Furst, DePaul Univ. (USA) . . . . . [10950-54]

4:10 pm: **Computer-aided CT image features improving the malignant risk prediction in pulmonary nodules suspicious for lung cancer**, Yoshiki Kawata, Takeru Kageyama, Noboru Niki, Tokushima Univ. (Japan); Masahiko Kusumoto, National Cancer Ctr. Hospital East (Japan); Hironobu Ohmatsu, Medical Affairs Sec, Abashiri Prisontion (Japan); Keiju Aokage, Genichiro Ishii, Yuji Matsumoto, Takaaki Tsuchida, National Cancer Ctr. Hospital East (Japan); Kenji Eguchi, Teikyo Univ. (Japan); Masahiro Kaneko, Tokyo Health Service Association (Japan). . . . . [10950-55]

4:30 pm: **Augmenting LIDC dataset using 3D generative adversarial networks to improve lung nodule detection**, Chufan Gao, Purdue Univ. (USA); Stephen Clark, The Univ. of Tennessee at Chattanooga (USA) . . . . . [10950-56]

WORKSHOP
ROOM: GOLDEN WEST . . . . .TUE 5:00 TO 7:00 PM

Live Demonstrations

Session Chairs: **Horst K. Hahn,** Fraunhofer MEVIS (Germany); **Lubomir M. Hadjiiski,** Univ. of Michigan Health System (USA)

See Special Events for more information.

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CONFERENCE 10951
ROOM: CALIFORNIA

Sunday - Tuesday 17–19 Feb. 2019
Proceedings of SPIE VOL. 10952

SESSION 11
ROOM: CALIFORNIA . . . . . .TUE 3:30 TO 4:50 PM

Image Segmentation and Classification

Session Chairs: **Jack H. Noble Sr.,** Vanderbilt Univ. (USA); **William E. Higgins,** The Pennsylvania State Univ. (USA)

3:30 pm: **Auditory nerve fiber segmentation methods for neural activation modeling**, Ahmet Cakir, Robert F. Labadie M.D., Jack H. Noble Sr., Vanderbilt Univ. (USA) . . . . . [10951-55]

3:50 pm: **Automatic localization of the internal auditory canal for patient-specific cochlear implant modeling**, Ghassan Alduraibi, Rueben Banalagay, Robert F. Labadie M.D., Jack H Noble Sr., Vanderbilt Univ. (USA) . . . . . [10951-56]

4:10 pm: **Bladder segmentation on cone beam CT with CNNs and enhancement by planning CT data**, Eliott Brion, Jean Léger, Umair Javaid, John Lee, Christophe De Vleeschouwer, Benoît Macq, Univ. Catholique de Louvain (Belgium) . . [10951-57]

4:30 pm: **Neural-network-based automatic segmentation of cerebral ultrasound images for improving image-guided neurosurgery**, Jennifer Nitsch, Fraunhofer MEVIS (Germany) and Univ. Bremen (Germany) and Brigham and Women's Hospital (USA); Jan Klein, Jan Hendrik Moltz, Fraunhofer MEVIS (Germany); Dorothea Miller, Univ. Duisburg-Essen (Germany) and Univ. Knappschaftskrankenhaus Bochum GmbH (Germany); Ulrich Sure, Univ. Duisburg-Essen (Germany); Ron Kikinis, Fraunhofer MEVIS (Germany) and Univ. Bremen (Germany) and Brigham and Women's Hospital (USA); Hans Meine, Fraunhofer MEVIS (Germany) and Univ. Bremen (Germany). . . . . [10951-58]

END OF 10951 CONFERENCE

CONFERENCE 10952
ROOM: CALIFORNIA

WORKSHOP
ROOM: CALIFORNIA . . . TUE 5:00 PM TO 7:00 PM

Visual Search in Medical Image Interpretation: Theory and Practice

See Special Events for more information.

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CONFERENCE 10953
ROOM: PACIFIC SALON 2

Tuesday - Thursday 19–21 Feb. 2019
Proceedings of SPIE Vol. 10953

SESSION 4
ROOM: PACIFIC SALON 2 . .TUE 3:30 TO 4:50 PM

Pulmonary

Session Chairs: **Andrzej Krol,** SUNY Upstate Medical Univ. (USA); **Armando Manduca,** Mayo Clinic (USA)

3:30 pm: **Pulmonary blood vessels extraction from dual-energy CT images using a synchrotron radiation micro-CT**, Kurumi Saito, Satoru Ohnishi, Shota Fuketa, Yoshiki Kawata, Noboru Niki, Tokushima Univ. (Japan); Keiji Umetani, Japan Synchrotron Radiation Research Institute (JASRI) (Japan); Hiroaki Sakai, Hyogo Prefectural Amagasaki General Medical Ctr. (Japan); Yasutaka Nakano, Shiga Univ. of Medical Science (Japan); Toshihiro Okamoto, Heart & Vascular Institute, Cleveland Clinic (USA); Harumi Itoh, Univ. of Fukui (Japan) [10953-14]

3:50 pm: **Towards pulmonary ventilation radiomics: a pipeline for quantification and cross-validation of pulmonary ventilation abnormalities using functional MRI and thoracic CT**, Andrew R. Westcott, Robarts Research Institute, Western Univ. (Canada); David G. McCormack M.D., Western Univ. (Canada); Grace Parraga, Robarts Research Institute, Western Univ. (Canada). . . . . [10953-15]

4:10 pm: **Micro-computed tomography imaging of cigarette smoke-exposed mice to model early chronic obstructive pulmonary disease (COPD)**, Nancy L. Ford, Ian Lee, Anthony Tam, Don D. Sin, The Univ. of British Columbia (Canada) . . [10953-16]

4:30 pm: **Development and evaluation of pulmonary imaging multi-parametric response maps for deep phenotyping of chronic obstructive pulmonary disease**, Jonathan L. MacNeil, Robarts Research Institute, Western Univ. (Canada); Dante P. I. Capaldi, Stanford Univ. (USA); Rachel L. Eddy, Andrew R. Westcott, Alexander M. Matheson, Andrea L. Barker, Cathy Ong Ly, Robarts Research Institute, Western Univ. (Canada); David G. McCormack M.D., Western Univ. (Canada); Grace Parraga, Robarts Research Institute, Western Univ. (Canada) . . . . . [10953-17]3

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WEDNESDAY 20 FEBRUARY

CONFERENCE 10948
ROOM: TOWN & COUNTRY

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10948

SESSION 12
ROOM: TOWN & COUNTRY WED 8:00 TO 9:40 AM

X-ray Phase Contrast Imaging

Session Chairs: **Mini Das,** Univ. of Houston (USA); **Peter B. Noël,** Univ. of Pennsylvania (USA)

8:00 am: **Joint-reconstruction-enabled partial dithering strategy for edge-illumination x-ray phase-contrast tomography**, Yujia Chen, Washington Univ. in St. Louis (USA); Charlotte K. Hagen, Alessandro Olivo, Univ. College London (UK); Mark A. Anastasio, Washington Univ. in St. Louis (USA) . . . . . [10948-60]

8:20 am: **Is high sensitivity always good for a grating-based differential phase contrast imaging system?**, Xu Ji, Ran Zhang, Ke Li, Guang-Hong Chen, Univ. of Wisconsin-Madison (USA) . . . . . .[10948-61]

8:40 am: **Laboratory-based x-ray phase contrast CT technology for clinical intra-operative specimen imaging,** Lorenzo Massimi, Charlotte K. Hagen, Marco Endrizzi, Peter R. T. Munro, Glafcos Havariyoun, Univ. College London (UK); Sam P. M. Hawker, Bennie Smit, Alberto Astolfo, Oliver Larkin, Richard M. Waltham, Nikon Metrology UK Ltd. (UK); Zoheb Shah, Stephen W. Duffy, Rachel L. Nelan, Barts and The London School of Medicine and Dentistry, Queen Mary Univ. of London (UK); Anthony Peel, Tamara Suaris, St. Bartholomew's Hospital (UK); J. Louise Jones, Barts and The London School of Medicine and Dentistry, Queen Mary Univ. of London (UK) and St. Bartholomew's Hospital (UK); Ian G. Haig, Nikon Metrology UK Ltd. (UK); Alessandro Olivo, Univ. College London (UK) . . . . . [10948-62]

9:00 am: **3D histopathology speckle phase contrast imaging: from synchrotron to conventional sources**, Helene Labriet, Novitom (France); Sebastien Berujon, ESRF - The European Synchrotron (France); Ludovic Broche, Univ. Grenoble Alpes (France); Barbara Fayard, Novitom (France); Sylvain Bohic, Univ. Grenoble Alpes (France); Olivier Stephanov, CHU Grenoble (France); David M. Paganin, Monash Univ. (Australia); Pierre Lhuissier, Luc Salvo, Science et Ingénierie des Matériaux et Procédés (France); Sam Bayat, CHU Grenoble (France); Emmanuel Brun, Univ. Grenoble Alpes (France) . . . . . .[10948-63]

9:20 am: **Low-dose x-ray imaging with simultaneous scatter, attenuation and mesh-based phase contrast**, Rohaan Khan, Brenda Adhiambo, Univ. at Albany (USA) and The State Univ. of New York (USA). . . . . [10948-64]

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CONFERENCE 10949
ROOM: SAN DIEGO

Tuesday - Thursday 19–21 Feb. 2019
Proceedings of SPIE Vol. 10949

SESSION 5
ROOM: SAN DIEGO . . . . . WED 8:00 TO 9:40 AM

fMRI and DTI

Session Chairs: **Martin A. Styner,** 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. Abidin, Univ. of Rochester (USA); Adora M. DSouza, Axel Wismüller M.D., Univ. of Rochester Medical Ctr. (USA) . . . . . [10949-21]

8:20 am: **Brain network identification in asynchronous task fMRI data using robust and scalable tensor decomposition**, Jian Li, Jessica L. Wisnowski, Anand A. Joshi, Richard M. Leahy, The Univ. of Southern California (USA) . . . . . [10949-22]

8:40 am: **Harmonizing 1.5T/3T diffusion weighted MRI through development of deep learning stabilized microarchitecture estimators,** Vishwesh Nath, Vanderbilt Univ. (USA); Samuel Remedios, Middle Tennessee State Univ. (USA); Prasanna Parvathaneni, Colin B. Hansen, Roza G. Bayrak, Camilo Bermudez, Justin A. Blaber, Karthik Ramadass, Kurt G. Schilling, Vaibhav A. Janve, Yurui Gao, Yuankai Huo, Ilwoo Lyu, Vanderbilt Univ. (USA); Owen Williams, Lori Beason-Held, Susan Resnick, National Institutes of Health (USA); Baxter P. Rogers, Iwona Stepniewska, Adam W. Anderson, Bennett A. Landman, Vanderbilt Univ. (USA). . . . . [10949-23]

9:00 am: **Improved estimation of dynamic 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); Vince 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**, Heejong Kim, New York Univ. (USA) . . . . . [10949-25]

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

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AWARD ANNOUNCEMENTS
ROOM: TOWN & COUNTRY . 9:40 AM 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

CONFERENCE 10950
ROOM: GOLDEN WEST

Sunday–Wednesday 17–20 Feb. 2019
Proceedings of SPIE Vol. 10950

SESSION 12
ROOM: GOLDEN WEST . . . .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 iDose reconstruction levels**, Joseph J. Foy, The Univ. of Chicago (USA); Mena Shenouda, Univ. of Michigan (USA); Sahar Ramahi, Univ. of Illinois (USA); Samuel G. Armato III, Daniel Ginat, The Univ. 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 implication**, Jingwei Wei, Institute of Automation (China); Sirui Fu, Zhuhai People's Hospital (China); Shauitong Zhang, Institute of Automation (China); Jie Zhang, Zhuhai People's Hospital (China); Dongsheng Gu, Institute of Automation (China); Xiaoqun Li, Zhongshan City People's Hospital (China); Xudong Chen, Shenzhen People's Hospital (China); Xiaofeng He, Nanfang Hospital of the Southern Medical Univ. (China); Jianfeng Yan, Yangjiang People's Hospital (China); Ligong 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 Algohary, Case Western Reserve Univ. (USA) . . . . . [10950-60]

9:20 am: **Efficient detection of vascular structures using locally connected filtering**, Amele Florence Kouvahe, Catalin Fetita, Télécom SudParis (France) . . . . . [10950-61]

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

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CONFERENCE 10952
ROOM: CALIFORNIA

Wednesday - Thursday 20–21 Feb. 2019
Proceedings of SPIE Vol. 10952

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 (USA); 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-Chen Wu, Jeremy M. Wolfe, Visual Attention Lab., Harvard Univ. (USA) . [10952-3]

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

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CONFERENCE 10953
ROOM: PACIFIC SALON 2

Tuesday - Thursday 19–21 Feb. 2019
Proceedings of SPIE Vol. 10953

SESSION 5
ROOM: PACIFIC SALON 2 . WED 8:00 TO 9:40 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. Styner, 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, Hirohisa Oda, Masahiro Oda, Nagoya Univ. (Japan); Kensaku Mori, Nagoya Univ. (Japan) and National Institute of Informatics (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 ,** Gopichandh Danala, 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. Atlason, Univ. of Iceland (Iceland); Muhan Shao, Johns Hopkins Univ. (USA); Vidar Robertsson M.D., Univ. of Iceland (Iceland); Sigurdur Sigurdsson, Icelandic Heart Association (Iceland); Vilmundur Gudnason M.D., Icelandic Heart Association (Iceland) and Univ. 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 preoperative 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

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WEDNESDAY 20 FEBRUARY

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

SESSION 13
ROOM: TOWN & COUNTRY . . . WED 10:10 AM TO 12:10 PM

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)**, Toshiyuki Nishihara, Sony Semiconductor Solutions Corp. (Japan); Hiroyasu Baba, Sony Global Manufacturing & Operations Corp. (Japan); Masao Matsumura, Oichi 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**, Mats Persson, Norbert J. Pelc, 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 shaping time**, Christel Sundberg, KTH Royal Institute of Technology (Sweden); Mats Persson, Stanford Univ. (USA); Andreas Ehliar, Prismatic Sensors (Sweden); Martin Sjölin, KTH Royal Institute of Technology (Sweden); Jacob Wikner, Linköping Univ. (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, Mang Feng, Xu Ji, Ran Zhang, Guang-Hong Chen, Ke Li, Univ. of Wisconsin-Madison (USA) . . . . . [10948-70]

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

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CONFERENCE 10949
ROOM: SAN DIEGO
Tuesday - Thursday 19–21 Feb. 2019
Proceedings of SPIE Vol. 10949

SESSION 6
ROOM: SAN DIEGO . . . . . WED 10:10 AM TO 12:10 PM

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) . . . . . [10949-26]

11:10 am: **PADDIT: Probabilistic Augmentation of Data using Diffeomorphic Image Transformation**, Mauricio Orbes, Univ. of Copenhagen (Denmark) and King's College London (UK) and Biomediq (Denmark) . . . . . [10949-27]

11:30 am: **Effect of statistical mismatch between training and test images for CNN-based deformable registration**, Michael D. Ketcha, Tharindu De Silva, Runze Han, Ali Uneri, Johns Hopkins Univ. (USA); Sebastian Vogt, Gerhard Kleinszig, 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 Elsawy, Mohamed Abdel-Mottaleb, Univ. of Miami (USA); Mohamed Abou Shousha, Bascom Palmer Eye Institute (USA) . . . . . [10949-29]

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

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

SESSION 13
ROOM: GOLDEN WEST . . . . . WED 10:10 AM TO 12:10 PM

Eyes and New Approaches
10:10 am: **Deep learning for automated screening and semantic segmentation of age-related and juvenile atrophic macular degeneration**, Ziyuan Wang, SriniVas R. Sadda M.D., Zhihong Hu, Doheny Eye Institute (USA) . . . . . [10950-62]

10:30 am: **Improved interpretability for computer-aided severity assessment of retinopathy of prematurity**, Mara Graziani, HES-SO Valais-Wallis, Haute Ecole Spécialisée de Suisse Occidentale (Switzerland); James M. Brown, Athinoula A. Martinos Ctr. for Biomedical Imaging (USA); Vincent Andrearczyk, Haute Ecole Spécialisée de Suisse Occidentale (Switzerland); Veysi Yildiz, Northeastern Univ. (USA); J. Peter Campbell, Oregon Health & Science Univ. (USA); Deniz Erdogmus, Stratis Ioannidis, Northeastern Univ. (USA); Michael F. Chiang, Casey Eye Institute, Oregon Health & Science Univ. (USA); Jayashree Kalpathy-Cramer, Athinoula A. Martinos Ctr. for Biomedical Imaging (USA); Henning Müller, Haute Ecole Spécialisée de Suisse Occidentale (Switzerland) . . . . . [10950-63]

10:50 am: **Reproducibility of CT-based texture feature quantification of simulated and 3D-printed trabecular bone: influence of noise and reconstruction kernel**, Qin Li, U.S. Food and Drug Administration (USA). . . . . [10950-64]

11:10 am: **Fusing attributes predicted via conditional GANs for improved skin lesion classification**, Faisal Mahmood, Jeremiah Johnson, Ziyun Yang, Nicholas J. Durr, Johns Hopkins Univ. (USA) . . . . . [10950-65]

11:30 am: **Age prediction using a large chest x-ray dataset**, Alexandros Karargyris, Satyananda Kashyap, Joy T. Wu, Arjun Sharma, Mehdi Moradi, Tanveer Syeda-Mahmood, IBM Research - Almaden (USA) . . . . . [10950-66]

11:50 am: **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); Ruijia Sun, Beijing Cancer Hospital (China); Li Fan, Changzheng Hospital, Second Military Medical Univ. (China); Yingshi Sun, Beijing Cancer Hospital (China); Shiyuan Liu, Changzheng Hospital, Second Military Medical Univ. (China); Jie Tian, Institute of Automation (China) and Univ. of Chinese Academy of Sciences (China) . . . . . [10950-67]

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

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CONFERENCE 10952
ROOM: CALIFORNIA
Wednesday - Thursday 20–21 Feb. 2019
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SESSION 2
ROOM: CALIFORNIA . . . . WED 10:10 TO 11:50 AM

Model Observers I
Session Chairs: **Howard C. Gifford,** Univ. of Houston (USA); **François O. Bochud,** Ctr. Hospitalier Univ. Vaudois (Switzerland)

10:10 am: **Automatic strategy for CHO channel reduction under the influence of temporally variable nonstationary noise from x-ray angiography systems**, Daniel Gomez Cardona, Shuai Leng, Christopher P. Favazza, Beth A. Schueler, Kenneth A. Fetterly, Mayo Clinic (USA) . . . . . [10952-4]

10:30 am: **Template models for forced-localization tasks**, Craig K. Abbey, Univ. of California, Santa Barbara (USA); Frank W. Samuelson, Rongping Zeng, U.S. Food and Drug Administration (USA); John M. Boone, UC Davis Medical Ctr. (USA); Miguel P. Eckstein, Univ. of California, Santa Barbara (USA); Kyle J. Myers, U.S. Food and Drug Administration (USA) . . . . . [10952-5]

10:50 am: **Autoencoder embedding of task-specific information**, Jason Granstedt, Weimin Zhou, Mark A. Anastasio, Washington Univ. in St. Louis (USA). . . . . [10952-6]

11:10 am: **Learning the Hotelling observer for SKE detection tasks by use of supervised learning methods**, Weimin Zhou, Hua Li, Mark A. Anastasio, Washington Univ. in St. Louis (USA) . . . . . [10952-7]

11:30 am: **Learning the ideal observer for joint detection and localization tasks by use of convolutional neural networks**, Weimin Zhou, Mark A. Anastasio, Washington Univ. in St. Louis (USA) . . . . . [10952-8]

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

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CONFERENCE 10953
ROOM: PACIFIC SALON 2
Tuesday - Thursday 19–21 Feb. 2019
Proceedings of SPIE Vol. 10953

SESSION 6
ROOM: PACIFIC SALON 2 . . . . WED 10:10 AM TO 12:10 PM

Innovations in Image Processing II
Session Chairs: **Vikram D. Kodibagkar,** Arizona State Univ. (USA); **Nicholas J. Tustison,** Univ. of Virginia (USA)

10:10 am: **Coupled active shape models for automated segmentation and landmark localization in high-resolution CT of the foot and ankle**, Michael Brehler, Asef Islam, Johns Hopkins Univ. (USA); Levon O. Vogelsang, Dong Yang, William J. Sehnert, Carestream Health, Inc. (USA); Delaram Shakoor, Shadpour Demehri M.D., Jeffrey H. Siewerdsen, Wojciech Zbijewski, 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); Jiahua Ng, The Univ. of Sheffield (UK); Moi Hoon Yap, Manchester Metropolitan Univ. (UK) . . . . [10953-24]

10:50 am: **The effect of color constancy algorithms on semantic segmentation of skin lesions**, Jiahua Ng, The Univ. of Sheffield (UK); Manu Goyal, Moi Hoon 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); Rhodri 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); Emilio Spezi, Cardiff Univ. (UK) . . . . . [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); Marilia S. Yatabe, Antonio Carlos O. Ruellas, Marcos Ioshida, Univ. of Michigan (USA); Beatriz Paniagua, Kitware, Inc. (USA); Martin A. Styner, The Univ. of North Carolina at Chapel Hill (USA); Lucia Cevidanes, Univ. of Michigan (USA); Juan Carlos Prieto, 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, Félix Rodriguez-Cantu, Monica Rivera-Davila, Univ. de Monterrey (Mexico); José M. Celaya-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

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WEDNESDAY 20 FEBRUARY

CONFERENCE 10948

ROOM: TOWN & COUNTRY
Sun.–Wed. 17–20 Feb. 2019
Proceedings of SPIE Vol. 10948

SESSION 14

ROOM: TOWN & COUNTRY WED 1:20 TO 3:00 PM

Algorithm

Session Chairs: **Thomas Flohr,** Siemens Healthineers (Germany); **Patrick J. La Rivière,** The Univ. of Chicago (USA)

1:20 pm: **Exploring the space between smooth and non-smooth total variation for 3-D iterative CT reconstruction**, Viktor Haase, Siemens Healthineers (Germany) and Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Karl Stierstorfer, Katharina Hahn, Harald Schöndube, Siemens Healthineers (Germany); Andreas Maier, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Frédéric Noo, The Univ. of Utah (USA) . . . . . [10948-71]

1:40 pm: **Image-domain insertion of spatially correlated, locally varying noise in CT images**, Sarah E. Divel, Norbert J. Pelc, Stanford Univ. (USA) . . . . . [10948-72]

2:00 pm: **Utilizing deformable image registration to create new living human heart models for imaging simulation**, Alexander Veress, Univ. of Washington (USA); William Paul Segars, Ehsan Samei, Duke Univ. (USA) . . . . . [10948-73]

2:20 pm: **Volume-of-interest imaging using multiple aperture devices**, Wenying Wang, Grace J. Gang, Jeffrey H. Siewerdsen, Joseph W. Stayman, Johns Hopkins Univ. (USA) . . . . . [10948-74]

2:40 pm: **Optimized intensity modulation for a dynamic beam attenuator in CT**, Sascha Manuel Huck, Siemens Healthineers (Germany); George S. K. Fung, Siemens Medical Solutions USA, Inc. (USA); Katia Parodi, Ludwig-Maximilians-Univ. München (Germany); Karl Stierstorfer, Siemens Healthineers (Germany). . . . . [10948-75]

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

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CONFERENCE 10949

ROOM: SAN DIEGO
Tues. - Thurs. 19–21 Feb. 2019
Proceedings of SPIE Vol. 10949

SESSION 7

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

Machine Learning for Clinical Prediction

Session Chairs: **Marius Staring,** Leiden Univ. Medical Ctr. (Netherlands); **Olivier Colliot,** Ctr. National de la Recherche Scientifique (France)

1:20 pm: **Reproducible evaluation of methods for predicting progression to Alzheimer's disease from clinical and neuroimaging data**, Jorge Samper-Gonzalez, Ninon Burgos, Simona Bottani, Institut National de Recherche en Informatique et en Automatique (France) and Institut du Cerveau et de la Moelle Épinière (France) and Sorbonne Univ. (France); Marie-Odile Habert, Lab. d'Imagerie Biomédicale (France) and Pitié-Salpêtrière Hospital (France) and Sorbonne Univ. (France); Theodoros Evgeniou, INSEAD (France); Stephane Epelbaum, Pitié-Salpêtrière Hospital (France) and Sorbonne Univ. (France); Olivier Colliot, Institut National de Recherche en Informatique et en Automatique (France) and Institut du Cerveau et de la Moelle Épinière (France) and Pitié-Salpêtrière Hospital (France) . . . . .[10949-30]

1:40 pm: **Reduction of unnecessary thyroid biopsies using deep learning**, Zeynettin Akkus, Arunnit Boonrod, Mayo Clinic (USA); Mahfuzur R. Siddiquee, Arizona State Univ. (USA); Kenneth A. Philbrick, Marius N. Stan, Regina M. Castro, Bradley J. Erickson, Mayo Clinic (USA) . . . . . .[10949-31]

2:00 pm: **Direct prediction of cardiovascular mortality from low-dose chest CT using deep learning**, Sanne van Velzen, Majd Zreik, Nikolas Lessmann, Max A. Viergever, Pim A. de Jong, Helena M. Verkooijen, Ivana Isgum, Univ. Medical Ctr. Utrecht (Netherlands) . . . . . [10949-32]

2:20 pm: **Spatial integration of radiology and pathology images to characterize breast cancer aggressiveness on pre-surgical MRI**, Robert West, Mirabela Rusu, Bruce Daniel, Stanford Univ. (USA)[10949-33]

2:40 pm: **A computational method to aid the detection and annotation of pleural lesions in CT images of the thorax**, Azael de Melo e Sousa, Ericson Bagatin, Univ. Estadual de Campinas (Brazil); Gustavo Meirelles, Fleury Group (Brazil); Alexandre Falcão, Univ. Estadual de Campinas (Brazil) . . . . . [10949-34]

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

CONF. 10949 continued page 52 ➡

CONFERENCE 10950

ROOM: GOLDEN WEST
Sun.–Wed. 17–20 Feb. 2019
Proceedings of SPIE Vol. 10950

SESSION 14

ROOM: GOLDEN WEST . . . . WED 1:20 TO 3:00 PM

Radiomics III and Oncology

1:20 pm: **Stability of radiomic features of liver lesions from manual delineation in CT scans**, Jan H. Moltz, Fraunhofer MEVIS (Germany). . . . . [10950-68]

1:40 pm: **Use of convolutional neural networks to predict risk of masking by mammographic density**, Theo Cleland, James G. Mainprize, Olivier Alonzo-Proulx, Sunnybrook Research Institute (Canada); Jennifer A. Harvey M.D., Univ. of Virginia Health System (USA); Anne L. Martel, Martin J. Yaffe, Sunnybrook Research Institute (Canada) and Univ. of Toronto (Canada). . . . . [10950-69]

2:00 pm: **A novel clinical gland feature for detection of early Barrett's neoplasia using volumetric laser endomicroscopy**, Thom Scheeve, Technische Univ. Eindhoven (Netherlands); Maarten R. Struyvenberg M.D., Amsterdam UMC (Netherlands) and Univ. van Amsterdam (Netherlands); Wouter L. Curvers M.D., Catharina Hospital (Netherlands) and Amsterdam UMC (Netherlands) and Univ. van Amsterdam (Netherlands); Albert J. de Groof M.D., Amsterdam UMC (Netherlands) and Univ. van Amsterdam (Netherlands); Erik J. Schoon M.D., Catharina Hospital (Netherlands); Jacques J. G. H. M. Bergman M.D., Amsterdam UMC (Netherlands) and Univ. van Amsterdam (Netherlands); Fons van der Sommen, Peter H. N. de With, Technische Univ. Eindhoven (Netherlands). . . . . .[10950-70]

2:20 pm: **Radiomics analysis potentially reduces over-diagnosis of prostate cancer with prostate specific antigen levels of 4-10 ng/ml based on DWI data**, Jie Tian, Institute of Automation (China) . . . . . [10950-71]

2:40 pm: **Homogenization of breast MRI across imaging centers and feature analysis using unsupervised deep embedding**, Ravi K. Samala, Heang-Ping Chan, Lubomir M. Hadjiiski, Chintana Paramagul, Mark A. Helvie, Colleen Neal, Univ. of Michigan (USA) . . . . . [10950-72]

AWARD ANNOUNCEMENTS

ROOM: GOLDEN WEST . 3:00 TO 3:05 PM

The Computer-Aided Diagnosis conference RFW runners up and poster award recipients will be recognized and certificates distributed.

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

CONFERENCE 10952

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

SESSION 3

ROOM: CALIFORNIA . . . . . WED 1:20 TO 3:00 PM

Model Observers II

Session Chairs: **Craig K. Abbey,** Univ. of California, Santa Barbara (USA); **Ljiljana Platiša,** Univ. Gent (Belgium)

1:20 pm: **Laguerre-Gauss and sparse difference-of-Gaussians observer models for signal detection using constrained reconstruction in magnetic resonance imaging**, Angel R. Pineda, Manhattan College (USA) . . . . . [10952-9]

1:40 pm: **Tests of projection and reconstruction domain equivalence for a feature-driven model observer**, Howard C. Gifford, Zahra Karbaschi, Univ. of Houston (USA). . . . . [10952-10]

2:00 pm: **New difference of Gaussian channel-sets for the channelized Hotelling observer?**, Christiana Balta, Radboud Univ. Medical Ctr. (Netherlands); Ioannis Sechopoulos, Ramona W. Bouwman, LRCB (Netherlands); Mireille J. M. Broeders, Nico Karssemeijer, Radboud Univ. Medical Ctr. (Netherlands); Ruben E. van Engen, LRCB (Netherlands); Wouter J. H. Veldkamp, Leiden Univ. Medical Ctr. (Netherlands) . . . . . [10952-11]

2:20 pm: **A foveated channelized Hotelling search model predicts dissociations in human performance in 2D and 3D images**, Miguel A. Lago, Craig K. Abbey, Miguel P. Eckstein, Univ. of California, Santa Barbara (USA) [10952-12]

2:40 pm: **Using transfer learning for a deep learning model observer**, William Murphy, Univ. of Surrey (UK); Premkumar Elangovan, Mark D. Halling-Brown, Emma Lewis, Kenneth C. Young, David R. Dance, The Royal Surrey County Hospital NHS Trust (UK); Kevin Wells, Univ. of Surrey (UK) . . . . . [10952-13]

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

CONF. 10952 continued page 52 ➡

CONFERENCE 10953

ROOM: PACIFIC SALON 2
Tues. - Thurs. 19–21 Feb. 2019
Proceedings of SPIE Vol. 10953

SESSION 7

ROOM: PACIFIC SALON 2 . WED 1:20 TO 3:00 PM

Neurological Imaging II

Session Chairs: **Axel Wismüller M.D.,** Univ. of Rochester Medical Ctr. (USA); **Nicholas J. Tustison,** Univ. of Virginia (USA)

1:20 pm: **Improving estimates of brain metabolite concentrations in MR spectroscopic imaging (H-MRSI) through MRI content**, Danilo R. Pereira Sr., Juliana Fontolan, Univ. Estadual de Campinas (Brazil); Roberto M. Souza, Univ. of Calgary (Canada); Simone Appenzeller, Letícia Rittner, Univ. Estadual de Campinas (Brazil) . . . . . [10953-29]

1:40 pm: **Electrical impedance mapping for localizing evolving traumatic brain injury**, Alicia Everitt, Dartmouth College (USA); Brandon K. Root M.D., David F. Bauer M.D., Dartmouth Hitchcock Medical Ctr. (USA); Ryan J. Halter, Dartmouth College (USA) . . . . . [10953-30]

2:00 pm: **Integration of imaging and epigenetics using multi-task collaborative regression**, Yuntong Bai, Zille Pascal, Tulane Univ. (USA); Vince D. Calhoun, The Mind Research Network (USA); Yu-Ping Wang, Tulane Univ. (USA) . . [10953-31]

2:20 pm: **Substantia nigra segmentation**, Touseef Ahmad Qureshi, Zhaoyang Fan, Lynch Cody, Debiao Li, Elliot Hogg, Michele Tagliati, Cedars-Sinai Medical Ctr. (USA) . . [10953-32]

2:40 pm: **Pseudo-CT image generation from mDixon MRI images using fully convolutional neural networks**, Joël V. Stadelmann, Philips Research Skolkovo (Russian Federation); Heinrich Schulz, Philips GmbH (Germany); Uulke A. van der Heide, The Netherlands Cancer Institute (Netherlands); Steffen Renisch, Philips GmbH (Germany) . . . . . [10953-33]

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

CONF. 10953 continued page 52 ➡

CONFERENCE 10956

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

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.

SESSION 1

ROOM: GOLDEN BALLROOM . .WED 1:20 TO 3:00 PM

Keynote and Microscopy

1:20 pm: **Pixels to diagnosis: image analysis for digital pathology** *(Keynote Presentation)*, Metin N. Gurcan M.D., Wake Forest Baptist Medical Ctr. (USA) . . . . . [10956-1]

2:20 pm: **Deep density regression for automatic microscopy cell counting using unsupervised domain adaption with adversarial loss**, Shenghua He, Kyaw T. Minn, Lilianna Solnica-Krezel, Hua Li, Mark Anastasio, Washington Univ. in St. Louis (USA). . . . . [10956-2]

2:40 pm: **Skeleton-based image registration of serial electron microscopy sections**, Xi Chen, Lijun Shen, Qiwei Xie, Institute of Automation (China); Hua Han, Institute of Automation (China) and Ctr. for Excellence in Brain Science and Intelligence Technology (China) and Univ. of Chinese Academy of Sciences (China) . . . . . [10956-3]

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

CONF. 10956 continued page 52 ➡

WEDNESDAY 20 FEBRUARY

CONFERENCE 10948

ROOM: TOWN & COUNTRY
Sun.–Wed. 17–20 Feb. 2019
Proceedings of SPIE Vol. 10948

SESSION 15

ROOM: TOWN & COUNTRY WED 3:30 TO 5:30 PM

Machine Learning II

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, Chengzhu 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**, Liyue 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, Joseph Harms, Ghazal Shafai-Erfani, Xue Dong, Jun Zhou, Pretesh Patel, Xiangyang Tang, Tian Liu, Walter J. Curran, Kristin 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**, Wanyi Fu, Shobhit Sharma, Taylor B. Smith, Rui Hou, Vignesh Selvakumaran, Ruixiang Tang, Joseph Y. Lo, William Paul Segars, Anuj Kapadia, Justin Solomon, Geoffrey D. Rubin M.D., Ehsan Samei, Duke Univ. (USA) . . . . . [10948-80]

5:10 pm: **Convolutional regularization methods for 4D, x-ray CT reconstruction**, Darin P. Clark, Cristian T. Badea, Duke Univ. Medical Ctr. (USA) . . . . . [10948-81]

END OF 10948 CONFERENCE

CONFERENCE 10949

ROOM: SAN DIEGO
Tues. - Thurs. 19–21 Feb. 2019
Proceedings of SPIE Vol. 10949

SESSION 8

ROOM: SAN DIEGO . . . . . WED 3:30 TO 5:30 PM

Classification

Session Chairs: **Alexandre X. Falcão,** Univ. Estadual de Campinas (Brazil); **Jerry L. Prince,** Johns Hopkins Univ. (USA)

3:30 pm: **Body part and imaging modality classification for a general radiology cognitive assistant**, Chinyere I. Agunwa, Mehdi Moradi, Ken C. L. Wong, Tanveer F. Syeda-Mahmood, IBM Research - Almaden (USA). . . . . [10949-35]

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 Handels, Institut für Medizinische Informatik, Univ. zu Lübeck (Germany) . . . . [10949-36]

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. Capaldi, 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) . . . [10949-37]

4:30 pm: **Localization and labeling of cervical vertebral bones in the micro-CT images of rabbit fetuses using a 3D deep convolutional neural network**, Antong Chen, Dahai Xue, Tosha Shah, Catherine D. G. Hines, Alexa Gleason, Manishkumar Patel, Barbara Robinson, Britta Mattson, Belma Dogdas, Merck & Co., Inc. (USA). . . . . [10949-38]

4:50 pm: **Quantitative and qualitative methods for efficient evaluation of multiple 3D organ segmentations**, Volker Dicken, Annika 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). . . . . [10949-39]

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CONFERENCE 10950

ROOM: GOLDEN WEST
Sun.–Wed. 17–20 Feb. 2019
Proceedings of SPIE Vol. 10950

SESSION 15

ROOM: GOLDEN BALLROOM . .WED 3:30 TO 5:30 PM

NOTE ROOM CHANGE

BreastPathQ: Cancer Cellularity Challenge

Results from the Cancer Cellularity Challenge will be discussed in this session. All attendees are encouraged to attend, especially those involved with the Computer-Aided Diagnosis and Digital Pathology conferences.

END OF 10950 CONFERENCE

CONFERENCE 10952

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

SESSION 4

ROOM: CALIFORNIA . . . . . .WED 3:30 TO 5:10 PM

Technology Impact and Assessment

Session Chairs: **Ingrid S. Reiser,** The Univ. of Chicago (USA); **Matthew A. Kupinski,** College of Optical Sciences, The Univ. of Arizona (USA)

3:30 pm: **Estimating variability of latent reader-performance outcomes using the Obuchowski-Rockette method**, Stephen L. Hillis, The Univ. of Iowa (USA); Badera Al Mohammad, Patrick C. Brennan, The Univ. of Sydney (Australia). . . . . [10952-14]

3:50 pm: **Adaptive sample size re-estimation in MRMC Studies**, Weijie Chen, Zhipeng Huang, Frank W. Samuelson, Lucas Tcheuko, U.S. Food and Drug Administration (USA) . . . . [10952-15]

4:10 pm: **Radiation therapy induced-erythema: comparison of spectroscopic diffuse reflectance measurements and visual assessment**, Ramy M.Y. M. Abdlaty, Military Technical College (Egypt) . . . . . [10952-16]

4:30 pm: **Impact of patient photos on detection accuracy, decision confidence and eye-tracking parameters in chest and abdomen images with tubes and lines**, Elizabeth A. Krupinski, Emory Univ. School of Medicine (USA) . . . . . [10952-17]

4:50 pm: **Is there a safety-net effect with computer-aided detection (CAD)?**, Ethan Du-Crow, The Univ. of Manchester (UK); Lucy M. Warren, National Coordinating Ctr. for the Physics in Mammography, The Royal Surrey County Hospital NHS Trust (UK); Susan M. Astley, Johan Hulleman, The Univ. of Manchester (UK) . . . . . [10952-18]

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CONFERENCE 10953

ROOM: PACIFIC SALON 2
Tues. - Thurs. 19–21 Feb. 2019
Proceedings of SPIE Vol. 10953

SESSION 8

ROOM: PACIFIC SALON 2 . . . .WED 3:30 TO 5:30 PM

Optical/Vascular II

Session Chairs: **Xavier Intes,** Rensselaer Polytechnic Institute (USA); **Ciprian N. Ionita,** Canon Stroke and Vascular Research Ctr. (USA)

3:30 pm: **Imaging inhibitory effect of fissure sealants on demineralization of adjacent enamel with cross polarization OCT**, Alaa Turkistani, King Abdulaziz Univ. (Saudi Arabia). . . . . [10953-34]

3:50 pm: **Spatial arrangement of leakage patterns in Diabetic Macular Edema is associated with tolerance of aflibercept treatment interval length: preliminary findings**, Prateek Prasanna, Case Western Reserve Univ. (USA); Justis Ehlers, Cleveland Clinic (USA); Vishal Bobba, Case Western Reserve Univ. (USA); Natalia Figueredo, Cleveland Clinic (USA); Cheng Lu, Case Western Reserve Univ. (USA); Sumit Sharma, Sunil Srivastava, Cleveland Clinic (USA); Anant Madabhushi, Case Western Reserve Univ. (USA) . . [10953-35]

4:10 pm: **Morphology of vascular network in eyes with Diabetic Macular Edema varies based on tolerance of aflibercept treatment interval length: preliminary findings**, Prateek Prasanna, Case Western Reserve Univ. (USA); Justis Ehlers, Cleveland Clinic (USA); Nathaniel Braman, Case Western Reserve Univ. (USA); Natalia Figueredo, Cleveland Clinic (USA); Vishal Bobba, Case Western Reserve Univ. (USA); Sumit Sharma, Sunil Srivastava, Cleveland Clinic (USA); Anant Madabhushi, Case Western Reserve Univ. (USA) . . . . . [10953-36]

4:30 pm: **Imaging of murine melanoma tumors using fluorescent gold nanoparticles**, Nancy L. Ford, Steve Kozomara, The Univ. of British Columbia (Canada). . . . . [10953-37]

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CONFERENCE 10956

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

SESSION 2

ROOM: GOLDEN BALLROOM . .WED 3:30 TO 5:30 PM

BreastPathQ: Cancer Cellularity Challenge

Results from the Cancer Cellularity Challenge will be discussed in this session. All attendees are encouraged to attend, especially those involved with the Computer-Aided Diagnosis and Digital Pathology conferences.

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

CONFERENCE 10949
ROOM: SAN DIEGO
Tues. - Thurs. 19–21 Feb. 2019
Proceedings of SPIE Vol. 10949

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]

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

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

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CONFERENCE 10953
ROOM: PACIFIC SALON 2
Tues. - Thurs. 19–21 Feb. 2019
Proceedings of SPIE Vol. 10953

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]

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

CONF. 10956 continued page 60 ➡

POSTERS — WEDNESDAY

TUESDAY/WEDNESDAY POSTER SESSION

LOCATION: GRAND HALL

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

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.

See Poster Presentation Guidelines for additional information.

CONFERENCE 10949

Image Processing

3D bifurcations characterization for intra-cranial aneurysms prediction, Anass Nouri, Florent Autrusseau, Romain Bourcier, Alban Gaignard, Vincent L'Allinec, Celine Menguy, Joëlle Veziers, Hubert Desal, Richard Redon, Univ. de Nantes (France) . . . . . [10949-63]

Shape-based three-dimensional body composition extrapolation using multimodality registration, Yao Lu, James K. Hahn, The George Washington Univ. (USA). . . . . [10949-64]

Optimal input configuration of dynamic contrast enhanced MRI in convolutional neural networks for liver segmentation, Mariëlle J. A. Jansen, Hugo J. Kuijf, Josien P. W. Pluim, Univ. Medical Ctr. Utrecht (Netherlands) . . . . . [10949-65]

Incorporating CT prior information in the robust fuzzy C-means algorithm for QSPECT image segmentation, Junyu Chen, Johns Hopkins Univ. (USA); Abhinav K. Jha, Washington Univ. in St. Louis (USA); Eric C. Frey, Johns Hopkins Univ. (USA) . . . . . [10949-66]

Automatic two-chamber segmentation in cardiac CTA using 3D fully convolutional neural networks, Yan Yang, Osama Masoud, Vital Images, Inc. (USA) . . . . . [10949-67]

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Visualization of hyperspectral fluorescent data with spectrally encoded enhanced representations, Wen Shi, Daniel E. S. Koo, Masahiro Kitano, Hsiao Ju Chiang, Le A. Trinh, Gianluca Turcatel, The Univ. of Southern California (USA); Benjamin Steventon, Univ. of Cambridge (UK); Cosimo Arnesano, David Warburton, Scott E. Fraser, Francesco Cutrale, The Univ. of Southern California (USA) . . . . . [10953-73]

Segmentation of dermal-epidermal junction in optical coherence tomography images using a fully convolutional neural network approach, Ting An Kuo, National Taiwan Univ. (Taiwan) . [10953-74]

Cascaded convolutional neural networks for spine chordoma tumor segmentation from MRI, Syed M. S. Reza, Old Dominion Univ. (USA) and Ctr. for Neuroscience and Regenerative Medicine, Henry M. Jackson Foundation (USA); Snehashis Roy, Ctr. for Neuroscience and Regenerative Medicine, Henry M. Jackson Foundation (USA); Deric M. Park, National Institutes of Health (USA); Dzung L. Pham, Ctr. for Neuroscience and Regenerative Medicine, Henry M. Jackson Foundation (USA); John A. Butman, Ctr. for Neuroscience and Regenerative Medicine, National Institute of Health (USA) . . . . . [10953-75]

Pulmonary Imaging

Generation of virtual lung SPECT/CT fusion image for functional avoidance radiotherapy planning using machine learning algorithm, Bum-Sup Jang M.D., Ji Hyun Chang, Seoul National Univ. Hospital (Korea, Republic of); Andrew J. Park, SELVAS AI Inc. (Korea, Republic of); Hong-Gyun Wu, Seoul National Univ. Hospital (Korea, Republic of). . . . . [10953-76]

Neurological Imaging

Conformal initialization for shape analysis applications in SlicerSALT, Zhengyang Fang, Mahmoud Mostapha, Juan Carlos Prieto, Martin A. Styner, The Univ. of North Carolina at Chapel Hill (USA) . . . . . [10953-77]

Preliminary result of a prototype small animal PET system with an adjustable gantry, Yong Hyun Chung, Hankyeol Song, Chanwoo Park, In Soo Kang, Min Kyu Baek, Kyu Bom Kim, Yonsei Univ. (Korea, Republic of) . . . . . [10953-78]

Evaluation of anti-cancer effect using molecular image of 131I-rituximab by atorvastatin-regulated in lymphoma model, A-Ram Yu, Min Kyoung Kang, Sang Woo Kim, Osong Medical Innovation Foundation (Korea, Republic of); Jin Su Kim, Korea Institute of Radiological & Medical Sciences (Korea, Republic of); Jae Jun Lee, Osong Medical Innovation Foundation (Korea, Republic of) . . . . . [10953-79]

Machine-learning based classification of glioblastoma using dynamic susceptibility enhanced MR image derived delta-radiomic features, Jason Jeong, Bing Ji, Yang Lei, Liya Wang, Tian Liu, Arif N. Ali, Walter J. Curran, Hui Mao, Xiaofeng Yang, Emory Univ. (USA). . . . . [10953-80]

Novel Imaging Techniques and Applications

Investigation of necessary conditions for imaging cell analysis using EIT, Christian Gibas, Birgyl Kruezi, Gregor Schulte, Rainer Brück, Holger Schönherr, Univ. Siegen (Germany). . . . . [10953-81]

Study of separation between ex vivo malignant and benign prostatic tissue using magnetic resonance-electrical property tomography, Ethan Murphy, Dartmouth College (USA); Elias S. Hyams, Jason Pettus, Dartmouth Hitchcock Medical Ctr. (USA) and Dartmouth College (USA); Ryan J. Halter, Dartmouth College (USA) . [10953-82]

CONFERENCE 10956

Digital Pathology

Hyperspectral imaging for intraoperative diagnosis of colon cancer metastasis in a liver, Ilvica Kopriva, Institut Ruder Boškovic (Croatia); Gorana Aralica, Univ. Hospital Dubrava (Croatia); Marijana Popovic Hadzija, Mirko Hadzija, Institut Ruder Boškovic (Croatia); Laura-Isabelle Dion-Bertrand, Photon etc. (Canada); Xinjian Chen, Soochow Univ. (China); Mirko Hadzija, Institut Ruder Boškovic (Croatia) . . . . . [10956-26]

Deep detection and classification of mitotic figures, Balamurali Murugesan, Indian Institute of Technology Madras (India); Sakthivel Selvaraj, Kaushik Sarveswaran, Keerthi Ram, Jayaraj Joseph, Healthcare Technology Innovation Centre (India); Mohanasankar Sivaprakasam, Indian Institute of Technology Madras (India) . . . . . [10956-27]

An investigation of aggregated transfer learning for classification in digital pathology, Taranpreet Rai, Ambra Morisi, Barbara Bacci, Univ. of Surrey (UK); Spencer Thomas, National Physical Lab. (UK); Roberto La Ragione, Miroslaw Bober, Kevin Wells, Univ. of Surrey (UK). . . . . [10956-28]

A fully automated system using a convolutional neural network to predict renal allograft rejection, Young-Gon Kim, Gyuheon Choi, Heoungjeong Go, Hyunna Lee, A-Reum Lee, Yongwon Cho, Beomhee Park, Namkug Kim, Asan Medical Ctr. (Korea, Republic of) . . . . . [10956-30]

Digital pathology with hyperspectral imaging for colon and ovarian cancer, Daiki Nakaya, Ayaka Tsutsumiuchi, Shin Satori, Happy Science Univ. (Japan); Makoto Saegusa, Tsutomu Yoshida, Ako Yokoi, Kitasato Univ. (Japan); Masaki Kanoh, Digi-Tapir Inc. (Japan) . . . . . [10956-32]

Deep neural networks for invasive ductal carcinoma detection, Mourad Gridach, High Institute of Technology - Agadir (Morocco); Abdelati Elasri, High Institute of Technology - Agadir (Morocco) and DeepAfricAI (Morocco); Mohamed Ouftou, ENSET (Morocco) and DeepAfricAI (Morocco); Meryem Elmoumne, ENSA (Morocco); El Mehdi El Allaoui, Maryem Zoubi, Hamza Mogni, High Institute of Technology - Agadir (Morocco) and DeepAfricAI (Morocco); Kaoutar Oulahyane, ENSET (Morocco) and DeepAfricAI (Morocco); Siham Faris, High Institute of Technology (Morocco) and DeepAfricAI (Morocco); Meryem Hagui, Safoine EL Khabich, Fadma Ennaji, High Institute of Technology - Agadir (Morocco) and DeepAfricAI (Morocco) . . . . . [10956-33]

Can ImageNet feature maps be applied to small histopathological datasets for the classification of breast cancer metastatic tissue in whole slide images?, Taranpreet Rai, Ambra Morisi, Barbara Bacci, Spencer Thomas, Miroslaw Bober, Roberto La Ragione, Kevin Wells, Univ. of Surrey (UK)[10956-29]

THURSDAY 21 FEBRUARY

CONFERENCE 10949

ROOM: SAN DIEGO
Tues. - Thurs. 19–21 Feb. 2019
Proceedings of SPIE Vol. 10949

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) . . . . . [10949-41]

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, Vishwesh Nath, Camilo Bermudez, Shunxing Bao, Prasanna Parvathaneni, Jeffrey J. Carr, Bennett A. Landman, Vanderbilt Univ. (USA) . . . . . [10949-42]

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); João L. Vilaça, Instituto Politécnico do Cávado 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 Išgum, Univ. Medical Ctr. Utrecht (Netherlands) . . . . . [10949-44]

9:20 am: **Automatic identification of coronary arteries and viewpoints in 2D x-ray angiography using deep learning**, Tanveer F. Syeda-Mahmood, Hui Tang, IBM Research - Almaden (USA) . . . . . [10949-45]

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

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CONFERENCE 10952

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

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,** Scanias 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 Leng, 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**, Gihun Kim, Minah Han, Hyunjung 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**, Weimin Zhou, Sayantan Bhadra, 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 Demchig, Patrick C. Brennan, Mark F. McEntee, The Univ. of Sydney (Australia) . . . . . [10952-22]

9:20 am: **Mammographic breast density classification using a deep neural network: assessment on the basis of inter-observer variability**, Nico Kaiser, Siemens Healthineers (Germany) and Lehrstuhl für Mustererkennung, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Andreas Fieselmann, Siemens Healthineers (Germany); Sulaiman Vesal, Nishant Ravikumar, Lehrstuhl für Mustererkennung, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Ludwig Ritschl, Steffen Kappler, Siemens Healthineers (Germany); Andreas Maier, Lehrstuhl für Mustererkennung, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) . . . . . [10952-23]

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

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CONFERENCE 10953

ROOM: PACIFIC SALON 2
Tues. - Thurs. 19–21 Feb. 2019
Proceedings of SPIE Vol. 10953

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 extremity cone-beam CT with a CMOS detector**, Shalini Subramanian, Michael Brehler, Qian Cao, Johns Hopkins Univ. (USA); Fernando J. Quevedo-González, Ryan E. Breighner, John A. Carrino, Timothy Wright, Hospital for Special Surgery (USA); John I. Yorkston, Carestream Health, Inc. (USA); Jeffrey H. Siewerdsen, Wojciech Zbijewski, Johns Hopkins Univ. (USA) . . . . . [10953-41]

8:40 am: **Advanced statistical analysis to classify high dimensionality textural probability-distribution matrices**, Jack Prothero, The Univ. of North Carolina at Chapel Hill (USA); Jean-Baptiste Vimort, 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 Cevidanes, 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 Rajeswari Amma, Kenzie Baer, Seamus Tredinnick, Tim Woodfield, Univ. of Otago, Christchurch (New Zealand); Peter Walker, Univ. of Otago (New Zealand); Benjamin Bamford, Aamir Y. Raja, Univ. of Otago, Christchurch (New Zealand); Anthony Butler, Univ. of Otago, Christchurch (New Zealand) and MARS Bioimaging Ltd. (New Zealand) and Univ. of Canterbury (New Zealand); Sikiru A. Adebileje, 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 Asghariomabad, Univ. of Otago, Christchurch (New Zealand); Ali Atharifard, Stephen T. Bell, MARS Bioimaging Ltd. (New Zealand); Srinidhi Bheesette, Pierre Carbonez, Univ. of Otago, Christchurch (New Zealand) and CERN (Switzerland); Alexander I. Chernoglazov, MARS Bioimaging Ltd. (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, Shengzhen Tao, Amy Benike, Shuai Leng, Cynthia H. McCollough, Mayo Clinic (USA) . . . . . [10953-44]

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CONFERENCE 10956

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

SESSION 3

ROOM: GOLDEN BALLROOM . . . . . THU 8:00 AM TO 9:40 AM

Diagnosis, Prognosis, Predictive Analysis

8:00 am: **Scale equivariant shared neural networks for multiscale histological analysis of prostate cancer**, Jin Tae Kwak, Dang Q. Vu, Quy D. Duong, Daigeun Lee, Sejong Univ. (Korea, Republic of); Stephen M. Hewitt, National Institutes of Health (USA) . . . . . [10956-4]

8:20 am: **Phenotyping tumor infiltrating lymphocytes (PhenoTIL) on H&E tissue images: predicting recurrence in lung cancer**, Cristian Barrera, Germán Corredor, Univ. Nacional de Colombia (Colombia); Xiangxue Wang, Case Western Reserve Univ. (USA); Vamsidhar Velcheti, Cleveland Clinic (USA); Kurt A. Schalper, David L. Rimm, Yale School of Medicine (USA); Anant Madabhushi, Ctr. for Computational Imaging and Personalized Diagnostics, Case Western Reserve Univ. (USA); Eduardo Romero Castro M.D., Univ. Nacional de Colombia Sede Bogotá (Colombia) . . . . . [10956-5]

8:40 am: **Examining structural patterns and causality in diabetic nephropathy using inter-glomerular distance and Bayesian graphical models**, Aurijoy Majumdar, Univ. at Buffalo (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]

9:00 am: **A deep learning framework for context-aware mitotic activity estimation in whole slide images**, Pushpak Pati, IBM Research - Zürich (Switzerland) and ETH Zurich (Switzerland); Raul Catena, Maria Gabrani, IBM Research - Zürich (Switzerland). . . . . [10956-7]

9:20 am: **High resolution whole prostate biopsy classification using streaming stochastic gradient descent**, Hans Pinckaers M.D., Wouter Bulten, Geert Litjens, Radboud University Medical Ctr. (Netherlands) . . . . . [10956-8]

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

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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

THURSDAY 21 FEBRUARY

CONFERENCE 10949

ROOM: SAN DIEGO
Tues. - Thurs. 19–21 Feb. 2019
Proceedings of SPIE Vol. 10949

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 Ehrhardt, 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]

10:50 am: **Progressively growing convolutional networks for deformable image registration of pulmonary CT images**, Koen A. J. Eppenhof, Maxime W. Lafarge, Josien P. W. Pluim, Technische Univ. Eindhoven (Netherlands). . . . . [10949-48]

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

11:30 am: **analysis of the kinematic motion of the wrist from 4D magnetic resonance imaging**, Batool 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 am: **Automatic left ventricular segmentation in 4D interventional ultrasound data using a patient-specific temporal synchronized shape prior**, Pedro Morais, Sandro Queirós, 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 RFW 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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CONFERENCE 10952

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

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**, Leng Dong, Loughborough Univ. (UK); Jacquie 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**, Badera Al Mohammad, 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 RFW runners up and poster award recipients will be recognized and certificates distributed.

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

CONF. 10952 continued page 62 ➡

CONFERENCE 10953

ROOM: PACIFIC SALON 2
Tues. - Thurs. 19–21 Feb. 2019
Proceedings of SPIE Vol. 10953

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 construction**, Changjian Sun, Jilin Univ. (China) and Univ. of Pennsylvania (USA); Yubing Tong, Jayaram K. Udupa, Caiyun Wu, Univ. of Pennsylvania (USA); Shuxu Guo, Jilin Univ. (China); Joseph M. McDonough, The Children's Hospital of Philadelphia (USA); Drew A. Torigian, 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); Eranga Ukwatta, Univ. of Guelph (Canada). . . . . [10953-46]

10:50 am: **Classification of autism spectrum disorder from resting-state fMRI with mutual connectivity analysis**, Adora M. DSouza, 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 9.4T MRI of the mouse circle of Willis to study flow-induced cerebral vascular remodeling**, Vincent Tutino, Hamidreza Rajabzadeh-Oghaz, Anusha Ramesh Chandra, Liza Gutierrez, Ferdinand Schweser, Adnan H. Siddiqui, Ciprian N. Ionita, Univ. at Buffalo (USA) . . . . . [10953-49]

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

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CONFERENCE 10956

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

SESSION 4

ROOM: GOLDEN BALLROOM . . . . . .THU 10:10 AM TO 12:10 PM

Precision Medicine and Grading

10:10 am: **In-vivo bladder tumor stratification using confocal laser endomicroscopy**, Marit Lucas, Esmee I.M.L Liem, C. Dilara Savci-Heijink, Henk A. Marquering, Ton G. van Leeuwen, Daniel M. de Bruin, Amsterdam UMC (Netherlands) . . . . . [10956-9]

10:30 am: **Computer aided antibody screening for IHC assay development**, Faranak Aghaei, Univ of Oklahoma (USA); Yao Nie, 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); Mena Gaed, Jose Gomez-Lemus, Madeleine Moussa, Joseph Chin, Stephen Pautler, 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 Arvidsson, Niels Christian Overgaard, Kalle Åström, 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, Weiguo 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

CONF. 10956 continued page 62 ➡

THURSDAY 21 FEBRUARY

CONFERENCE 10949

ROOM: SAN DIEGO
Tues. - Thurs. 19–21 Feb. 2019
Proceedings of SPIE Vol. 10949

SESSION 11

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. Atlason, Univ. of Iceland (Iceland); Askell Love M.D., Landspítali (Iceland); Sigurdur Sigurdsson, Icelandic Heart Association (Iceland); Vilmundur Gudnason M.D., 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 unruptured 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 MR images for orthopedic applications in the lower arm using a conditional generative adversarial network**, Frank Zijlstra, Koen Willemsen M.D., Mateusz C. Florkow, Ralph J. B. Sakkers M.D., Harrie H. Weinans, Bart C. H. van der Wal M.D., Marijn van Stralen, Peter R. Seevinck, Univ. Medical Ctr. Utrecht (Netherlands) . . . . . [10949-54]

2:20 pm: **Weakly supervised fully convolutional network for PET lesion segmentation**, Saeedeh Afshari, Aïcha BenTaieb, Zahra MiriKharaji, Ghassan Hamarneh, 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

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CONFERENCE 10952

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

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 (USA); **Yan Chen,** Loughborough Univ. (UK)

1:20 pm: **Blinding of the second reader in mammography screening: impact on behaviour and cancer detection**, Sian 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**, Alistair 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 Cockmartin, KU Leuven (Belgium); Lucy M. Warren, The Royal Surrey County Hospital NHS Trust (UK); Rosalind M. Given-Wilson, St George's Univ. Hospitals NHS Foundation Trust (UK); Louise S. Wilkinson, Oxford Univ. Hospitals NHS Foundation Trust (UK); Matthew G. Wallis, 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 Balta, Ioannis Sechopoulos, Radboud Univ. Medical Ctr. (Netherlands); Wouter J. H. Veldkamp, 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. Given-Wilson, St George's Univ. Hospitals NHS Foundation Trust (UK); Rita McAvinchey, Jarvis Breast Screening and Diagnostic Ctr. (UK); Matthew G. Wallis, 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**, Morteza Heidari, Seyedehnafiseh Mirniaharikandehei, Abolfazl Zargari 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]

END OF 10952 CONFERENCE

CONFERENCE 10953

ROOM: PACIFIC SALON 2
Tues. - Thurs. 19–21 Feb. 2019
Proceedings of SPIE Vol. 10953

SESSION 11

ROOM: PACIFIC SALON 2 . . . . . .THU 1:20 PM TO 3:00 PM

Novel Imaging Techniques and Applications II

Session Chairs: **Baohong Yuan,** The Univ. of Texas at Arlington (USA); **Ciprian N. Ionita,** Canon Stroke and Vascular Research Ctr. (USA)

1:20 pm: **Tomosynthesis method for depth resolution of beta emitters**, Thomy Mertzanidou, Nick Calvert, Univ. College London (UK); David S. Tuch, Lightpoint Medical, Ltd. (UK); Danail Stoyanov, Simon R. Arridge, Univ. College London (UK). . . . . [10953-50]

1:40 pm: **To gate or not to gate: an evaluation of respiratory gating techniques to improve volume measurement of murine lung tumors in micro-CT imaging**, Stephanie Blocker, Ctr. for In Vivo Microscopy, Duke Univ. Medical Ctr. (USA); Matthew Holbrook, Ctr. for In Vivo Microscopy (USA); Yvonne M. Mowery M.D., Duke Cancer Institute (USA); Cristian T. Badea, Ctr. for In Vivo Microscopy (USA) . . . . . [10953-51]

2:00 pm: **Scanning, registration, and fiber estimation of rabbit hearts using micro-focus and refraction-contrast X-ray CT**, Hirohisa Oda, Holger R. Roth, Takaaki Sugino, Naoki Sunaguchi, Noriko Usami, Masahiro Oda, Nagoya Univ. (Japan); Daisuke Shimao, Hokkaido Univ. of Science (Japan); Shu Ichihara M.D., Nagoya Medical Ctr. (Japan); Tetsuya Yuasa, Yamagata Univ. (Japan); Masami Ando, Tokyo Univ. of Science (Japan); Toshiaki Akita M.D., Yuji Narita M.D., Kensaku Mori M.D., Nagoya Univ. (Japan) . . . . . [10953-52]

2:20 pm: **Demonstration of improved image resolution for larger focal spot sizes by decreasing anode angles in clinical settings**, Harini Nishankar, Alok Shankar, Swetadri Vasan Setlur Nagesh, Daniel R. Bednarek, Stephen Rudin, Univ. at Buffalo (USA) . . . . . [10953-53]

2:40 pm: **Novel measurement of LV twist using cine CT: quantifying accuracy as a function of image noise**, Gabrielle Colvert, Ashish Manohar, Andrew Schluchter, Francisco Contijoch, Elliot R. McVeigh, Univ. of California, San Diego (USA). . [10953-54]

END OF 10953 CONFERENCE

CONFERENCE 10956

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

SESSION 5

ROOM: GOLDEN BALLROOM . . . . . .THU 1:20 PM TO 3:00 PM

Machine Learning Trends

1:20 pm: **From patch-level to ROI-level deep feature representations for breast histopathology classification**, Caner Mercan, Selim Aksoy, Bilkent Univ. (Turkey); Ezgi Mercan, Linda G. Shapiro, Univ. of Washington (USA); Donald L. Weaver, The Univ. of Vermont (USA); Joann G. Elmore, Univ. of California, Los Angeles (USA) . . . . . [10956-15]

1:40 pm: **Cancer detection in mass spectrometry imaging data by dilated convolutional neural networks**, Jannis van Kersbergen, Farhad Ghazvinian Zanjani, Svitlana Zinger, Fons van der Sommen, Technische Univ. Eindhoven (Netherlands); Benjamin Balluff, Naomi Vos, Shane Ellis, Ron M.A. Heeran, Maastricht Univ. (Netherlands); Marit Lucas, Henk A. Marquering, Ilaria Jansen, C. Dilara Savci-Heijink, Daniel M. de Bruin, Univ. van Amsterdam (Netherlands); Peter H. N. de With, Technische Univ. Eindhoven (Netherlands) . . . . . [10956-16]

2:00 pm: **Automated multi-class ground-truth labeling of H&E images for deep learning using multiplexed fluorescence microscopy**, Gouthamrajan Nadarajan, Univ. at Buffalo (USA); Tyna Hope, Dan Wang, Allison Cheung, Sunnybrook Research Institute, Univ. of Toronto (Canada); Fiona Ginty, GE Global Research (USA); Martin J. Yaffe, Sunnybrook Research Institute, Univ. of Toronto (Canada); Scott Doyle, Univ. at Buffalo (USA). . . . . [10956-17]

2:20 pm: **Detection of squamous cell carcinoma in digitized histological images from the head and neck using convolutional neural networks**, Martin Halicek, Georgia Institute of Technology & Emory Univ. School of Medicine (USA); Maysam Shahedi, The Univ. of Texas at Dallas (USA); James V. Little, Amy Y. Chen, Emory Univ. School of Medicine (USA); Larry L. Myers, The Univ. of Texas Southwestern Medical Ctr. at Dallas (USA); Baowei Fei, The Univ. of Texas at Dallas (USA) . . . . . [10956-18]

2:40 pm: **Deep density regression for automatic microscopy cell counting using cooperatively-supervised learning**, Shenghua He, Kyaw T. Minn, Lilianna Solnica-Krezel, Jian Wu, Mark Anastasio, Hua Li, Washington Univ. in St. Louis (USA) . . . . . [10956-19]

AWARD ANNOUNCEMENTS

ROOM: GOLDEN BALLROOM . . . . . 3:00 PM TO 3:05 PM

The Digital Pathology conference RFW runners up and poster award recipients will be recognized and certificates distributed.

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

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CONFERENCE 10949

ROOM: SAN DIEGO
Tues. - Thurs. 19–21 Feb. 2019
Proceedings of SPIE Vol. 10949

SESSION 12

ROOM: SAN DIEGO . . . . . .THU 3:30 PM TO 5:30 PM

OCT and Microscopy

Session Chairs: **Lin Shi,** The Chinese Univ. of Hong Kong (Hong Kong, China); **Mads Nielsen,** Niels Bohr Institute (Denmark)

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, Josien P. W. Pluim, Behdad Dasht Bozorg, Technische Univ. Eindhoven (Netherlands); Tos T. J. M. Berendschot, Technische Univ. Eindhoven (Netherlands) and Maastricht Univ. Medical Ctr. (Netherlands); A. J. H. M. Houben, Maastricht Univ. Medical Ctr. (Netherlands); Mitko Veta, Technische Univ. Eindhoven (Netherlands) . . . . . [10949-58]

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) . . . . . [10949-59]

4:30 pm: **Framework for the co-registration of MRI and histology images in prostate cancer patients with radical prostatectomy**, Mirabela Rusu, Christian Kunder, Richard Fan, Pejman Ghanouni M.D., Robert West, Geoffrey Sonn, James D. Brooks M.D., Stanford Univ. (USA) . . . . . [10949-60]

4:50 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); Jie Tian, Institute of Automation (China) and Univ. of Chinese Academy of Sciences (China) . . . . . [10949-61]

5:10 pm: **Objects characterization-based approach to enhance detection of degree of malignancy in breast cancer histopathology images**, Pedro Furtado, Univ. de Coimbra (Portugal) . . . . . [10949-62]

END OF 10949 CONFERENCE

CONFERENCE 10952

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

CONFERENCE 10953

ROOM: PACIFIC SALON 2
Tues. - Thurs. 19–21 Feb. 2019
Proceedings of SPIE Vol. 10953

CONFERENCE 10956

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

SESSION 6

ROOM: GOLDEN BALLROOM . . . . . .THU 3:30 PM TO 5:30 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); Anindya Sarkar, Chukka Srinivas, Roche (USA); Rachel Redman M.D., Roche Diagnostics Information Solutions (USA); Simrath Ratra, Roche (USA); Charles J. Bechert M.D., Roche Diagnostics Information Solutions (USA); Benjamin C. Calhoun, Karen Mrazeck, 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 Salimian, 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**, Ilknur Icke, Sophia Bardehle, Alice Z. Zhang, Sonal Singh, Belma Dogdas, 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. Wetstein, Technische Univ. Eindhoven (Netherlands); Allison M. Onken M.D., Gabrielle M. Baker M.D., Michael E. Pyle, Beth Israel Deaconess Medical Ctr. (USA); Josien P. W. Pluim, Technische Univ. Eindhoven (Netherlands); Rulla M. Tamimi, Brigham and Women's Hospital (USA) and Harvard Medical School (USA); Yujing J. Heng, Beth 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 Niazi, Wake Forest Baptist Medical Ctr. (USA); Vidya Arole, The Ohio State Univ. (USA); Weijie Chen, Berkman Sahiner, Ctr. for Devices and Radiological Health, U.S. Food and Drug Administration (USA); Arwa Shana'ah, The Ohio State Univ. (USA); Abner Louissaint, 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]

END OF 10956 CONFERENCE

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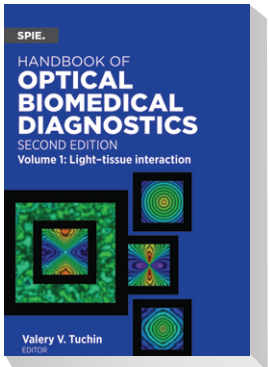

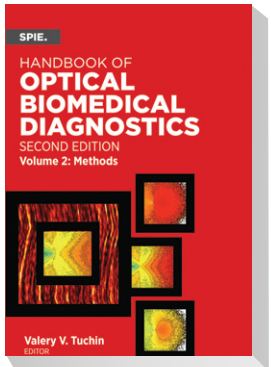

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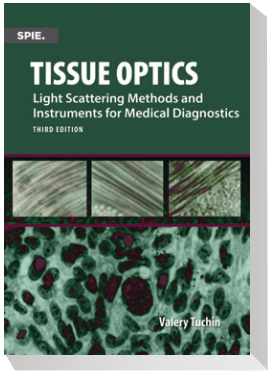

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Valery V. Tuchin
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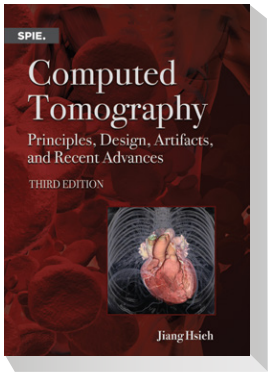

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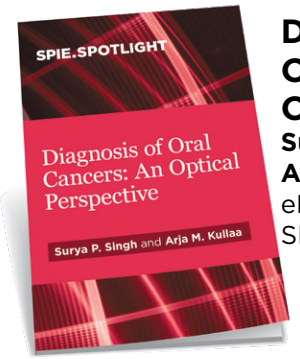

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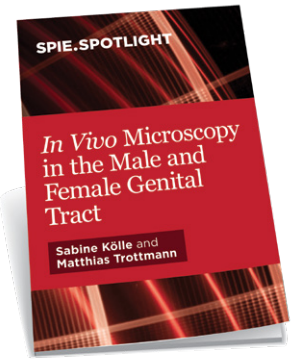

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Sabine Koelle and **Matthias Trottmann**
eBook: $24.80 / $31.00
SL19

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SATURDAY	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY
SC086 **Fundamentals of Medical Image Processing and Analysis** *(Deserno)* 8:30 am to 5:30 pm, p.67	SC1262 **Adversarial Networks: From Architecture to Practical Training** *(Wenzel, Meine)* 8:30 am to 12:30 pm, p.70		SC1239 **Virtual Clinical Trials: An In-depth Tutorial** *(Maidment, Bakic, Barufaldi)* 8:30 am to 12:30 pm, p.69		
SC1235 **Introduction to Medical Image Analysis using Convolutional Neural Networks** *(Wenzel, Meine)* 8:30 am to 5:30 pm, p.68	SC987 **Spectral CT Imaging** *(Schmidt, Flohr, Grant)* 8:30 am to 12:30 pm, p.70				
	SC1183 **Modern Diagnostic X-ray Sources** *(Behling)* 1:30 pm to 5:30 pm, p.68				
	SC1129 **Photon Counting CT** *(Danielsson, Grönberg)* 1:30 pm to 5:30 pm, p.67				
	SC1236 **SimpleITK Jupyter Notebooks: Biomedical Image Analysis in Python** *(Johnson, Lowekamp, Yaniv)* 1:30 pm to 5:30 pm, p.69				

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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 introduced.

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

This course will enable you to:
- 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

This course will enable you to:
- describe the fundamental operating principles of photon counting detectors for spectral x-ray imaging
- distinguish between the proposed detector materials in terms of their main physical limitations/challenges to high-rate energy resolved photon counting
- 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

Mats Danielsson has been developing photon counting x-ray detectors for medical imaging for 15 years and his research has resulted in detector systems in worldwide clinical use. He received his Ph.D. in experimental physics in 1996 based on work at CERN, Geneva and later did his postdoc at Lawrence Berkeley National Laboratory. In 2006 he was appointed Professor at KTH Royal Institute of Technology in Stockholm, Sweden, where he heads the physics of medical imaging research group. Dr. Danielsson is a lifetime member of SPIE.

Fredrik Grönberg holds a Master of Science in applied mathematics 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.

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 detal application, non-destructive testing and material analytics add to this.

As a sound basis for their work, specialists and academians working in the realm of X-rays like system developers, medical and X-ray physicists and clinicians may want to improve their background knowledge. Literature on the topic has grown recently, among others with several publications by the lecturer, see [1-10], including a textbook. In addition, this course will offer 1:1 interaction to improve understanding the physics of production of "clinical" X-rays for diagnostics.

It will comprehensively treat functional principles of X-ray sources. Design aspects, special features, radiation protection, modern performance metric, manufacturing technology, and cost aspects will be discussed. Why is vacuum technology not at all regarded outdated? Will we find the X-ray LED, compact X-ray Lasers or flat panel sources in medical imaging soon? Why do hundreds of tube types populate the market? The lecture will cover system performance aspects related to the source, material boundary conditions, and manufacturing technology. The quest for affordable healthcare demands for trade-offs between value and cost, and objective comparison of tube types. Initial costs and costs of tube replacement will be discussed as well as means to extend tube life and to save natural resources. Last but not least, the lecture may spark fascination for these vacuum electronic light sources off-the-mainstream.

LEARNING OUTCOMES

This course will enable you to:
- summarize history, rare artifacts and pictures from various vendors
- describe ideation processes
- explain the principles of the generation of braking radiation
- summarize milestones of innovation for X-ray tubes
- explain differences per field of application and trends, which are ask for investment in X-ray source technology
- classify X-ray tubes by technology, explain pro's and con's
- predict the performance in an X-ray system using documented metrics
- select the right tube, based on improved metric
- describe key components like bearings, cathodes, vacuum frame, and housing
- explain methods for heat management
- illustrate how to treat unwanted side-effects like vacuum discharges, off-focal radiation and others, and propose remedies
- summarize the peculiarities of bremsstrahlung from the various types of X-ray tubes
- explain the benefits of reflection targets for imaging
- analyze X-ray tubes by their initial and service costs in an imaging system
- discuss failure patreto'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 experiencend 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 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 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.

Bradley Lowekamp is a Senior Computer Scientist at MSC LLC, and the Lister Hill National Center for Biomedical Communications, US National Library of Medicine. He is the lead architect and developer of SimpleITK. He is actively involved in the development of open source software, contributing to multiple projects including 3D Slicer, ITK, and SimpleITK. Mr. Lowekamp's interests include biomedical image analysis and software engineering.

Ziv Yaniv is a Senior Computer Scientist at TAJ Technologies Inc, and the Lister Hill National Center for Biomedical Communications, US National Library of Medicine. He is the lead maintainer of the SimpleITK Jupyter notebooks environment. He is actively involved in the development of open source software, contributing to multiple projects including IGSTK, ITK, and SimpleITK. Dr. Yaniv served as chair of the SPIE Image-Guided Procedures, Robotic Interventions and Modeling, conference 2013-2016, and was program chair for the Information Processing in Computer-Assisted Interventions conference 2016. He is on the editorial boards of IET Healthcare Technology Letters and Int. J. Comput. Assist. Radiol. Surg.

As this is a hands-on course, participants will need to bring their own laptops.

Participants will be provided with the source code for all of the SimpleITK Jupyter notebooks (Python code) and the image data used in the course. These will be provided under an Apache 2.0 license.

Instructors will email attendees with instructions on how to install the SimpleITK Jupyter notebook environment before arriving at the conference venue. For those who do not install the environment in advance, one of the instructors will help them with the installation at the beginning of the first session.

ATTENDEE TESTIMONIAL:

Excellent course.

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. This, 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 (VCT) 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 there 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 [i]Introduction to Medical Image Analysis using Convolutional Neural Networks[I]. 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 experiencend 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.

Registration

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.

Author / Presenter Information

SPEAKER CHECK-IN AND PREVIEW STATION
Terrace Salon 1

Sunday. . . . . 7:00 AM - 5:00 PM
Monday–Thursday. . . . . 7:30 AM - 5:00 PM

All presenters must stop by Speaker Check-In to upload their file(s) at least two hours before their scheduled talk. Authors are not able to present using their own devices. All conference rooms have a laptop, projector, screen, lapel microphone, and laser pointer.

POSTER SETUP INSTRUCTIONS
Grand Hall Exhibit Hall

Sunday/Monday Poster Session

Author Setup Time . . . . . Sunday 12:00 PM - 9:00 PM
Authors Remove Posters . . . . . Monday 7:00 pm

Tuesday/Wednesday Poster Session

Author Setup Time . . . . . Tuesday 9:30 AM - 9:00 PM
Authors Remove Posters . . . . . Wednesday 7:00 PM

- Paper numbers will be placed on the poster boards in numerical order; please find your paper number and put up your poster in the designated space.

POSTER SESSION INSTRUCTIONS

- A poster author or coauthor is required to stand by the poster during the scheduled interactive poster session to answer questions from attendees.
- Presenters who have not placed their poster(s) on their assigned board by 30 minutes prior to the session on the day of their presentation will be considered a “no show” and their manuscript will not be published.

POSTER TEARDOWN INSTRUCTIONS

- Presenters must remove their posters immediately after the poster session. SPIE assumes no responsibility for posters and will not save abandoned posters.

POSTER GUIDELINES

spie.org/MIPosterGuidelines

Save money—Register by 1 February

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, representatives, or vendors, whose conduct is not in keeping with the character and purpose of the event. Without limiting the foregoing, SPIE and event management reserve the right to remove or refuse entry to anyone who has registered or gained access under false pretenses, provided false information, or for any other reason whatsoever that they deem is cause under the circumstances.

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.

SPIE Safe Meeting Policy | Code of Conduct

SPIE is committed to providing a harassment- and discrimination-free experience for everyone at our events, an experience that embraces the richness of diversity where participants may exchange ideas, learn, network, and socialize in the company of colleagues in an environment of mutual respect.

SPIE does not tolerate harassment of event participants, 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.

The SPIE Anti-Harassment Policy may be found at http://spie.org/policy (PDF)

The SPIE Code of Conduct may be found at http://spie.org/conduct (PDF)

In addition, SPIE Members and authors of SPIE publications must adhere to the SPIE Code of Ethics, found at http://spie.org/ethics (PDF)

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.

SPIE has established a confidential reporting system for staff and all meetings participants to raise concerns about possible unethical or inappropriate behavior within our community. Complaints may be filed by phoning toll-free to +1-888-818-6898 from within the United States and Canada, or online at www.SPIE.ethicspoint.com and may be made anonymously.

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.

Individuals are not allowed to pick up badges for other attendees. Further, attendees may not have some other person participate in their place at any conference-related activity. Such other individuals will be required to register on their own behalf to participate.

Access to Conference Events / Children Younger than 18

All conference technical and networking events require a badge for admission. Registered attendees may bring children with them as long as they have been issued a badge. Registration badges for children under 18 are free and available at the SPIE registration desk onsite. Children under 14 years of age must be accompanied by an adult at all times, and guardians are asked to help maintain a professional, disturbance-free conference environment.

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.

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 IIIa (<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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