MEDICAL IMAGING

THE LEADING CONFERENCE THAT EXPLORES THE SCIENCE OF MEDICAL IMAGING

15–20 February 2020
Marriott Marquis Houston
Houston, Texas, USA

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MEDICAL IMAGING 2020
THE PREMIER EVENT FOR THE SCIENCE BEHIND MEDICAL IMAGING
15–20 February 2020
Marriott Marquis Houston
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FOCUSED TECHNICAL TOPICS

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Registration Rates Increase after: **24 JANUARY 2020**

**PROGRAM CURRENT AS OF: 28 OCTOBER 2019**

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SPIE is the international society for optics and photonics, an educational not-for-profit organization founded in 1955 to advance light-based science, engineering, and technology. The Society serves nearly 264,000 constituents from 166 countries, offering conferences and their published proceedings, continuing education, books, journals, and the SPIE Digital Library in support of interdisciplinary information exchange, professional networking, and patent precedent. SPIE provided more than $5 million in support of education and outreach programs in 2019.

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

**Conferences:** Hear 1,000 presentations on the full range of medical imaging modalities including medical image acquisition, display, processing, analysis, perception, decision support, and informatics.

<table>
<thead>
<tr>
<th>Conference ID</th>
<th>Title</th>
<th>Authors</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>11312</td>
<td>Physics of Medical Imaging</td>
<td>Chen, Bosmans, Zhao</td>
<td>24</td>
</tr>
<tr>
<td>11313</td>
<td>Image Processing</td>
<td>Išgum, Landman</td>
<td>24</td>
</tr>
<tr>
<td>11314</td>
<td>Computer-Aided Diagnosis</td>
<td>Hahn, Mazurowski</td>
<td>24</td>
</tr>
<tr>
<td>11315</td>
<td>Image-Guided Procedures, Robotic Interventions, and Modeling</td>
<td>Fei, Linte</td>
<td>24</td>
</tr>
<tr>
<td>11316</td>
<td>Image Perception, Observer Performance, and Technology Assessment</td>
<td>Samuelson, Taylor-Phillips</td>
<td>24</td>
</tr>
<tr>
<td>11317</td>
<td>Biomedical Applications in Molecular, Structural, and Functional Imaging</td>
<td>Gimi, Krol</td>
<td>25</td>
</tr>
<tr>
<td>11318</td>
<td>Imaging Informatics for Healthcare, Research, and Applications</td>
<td>Chen, Deserno</td>
<td>25</td>
</tr>
<tr>
<td>11319</td>
<td>Ultrasonic Imaging and Tomography</td>
<td>Byram, Ruiter</td>
<td>25</td>
</tr>
<tr>
<td>11320</td>
<td>Digital Pathology</td>
<td>Tomaszewski, Ward</td>
<td>25</td>
</tr>
</tbody>
</table>

**Courses:** Get focused, efficient training on current approaches in medical imaging and deep learning, and AI, photon counting, and many more, that you can apply directly to your daily work. Register soon to ensure a spot.

<table>
<thead>
<tr>
<th>Course ID</th>
<th>Title</th>
<th>Authors</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC086</td>
<td>Fundamentals of Medical Image Processing and Analysis</td>
<td>Deserno</td>
<td>64</td>
</tr>
<tr>
<td>SC1129</td>
<td>Photon Counting CT</td>
<td>Danielsson, Sjölin</td>
<td>64</td>
</tr>
<tr>
<td>SC1235</td>
<td>Introduction to Medical Image Analysis Using Convolutional Neural Networks</td>
<td>Wenzel</td>
<td>65</td>
</tr>
<tr>
<td>SC1183</td>
<td>Modern Diagnostic X-ray Sources</td>
<td>Behling</td>
<td>65</td>
</tr>
<tr>
<td>SC1239</td>
<td>Virtual Clinical Trials: An In-depth Tutorial</td>
<td>Maidment, Bakic, Barufaldi</td>
<td>65</td>
</tr>
<tr>
<td>SC1262</td>
<td>Adversarial Networks: From Architecture to Practical Training</td>
<td>Wenzel</td>
<td>66</td>
</tr>
</tbody>
</table>

**DAILY EVENT SCHEDULE** ........................................ 16-17

**DAILY CONFERENCE SCHEDULE** .................................. 18-22

**PROCEEDINGS** .................................................. 62

**GENERAL INFORMATION** ........................................ 71-723

Registration · Author/Presenter Information · Policies · Food and Beverage · Onsite Services · Parking and Car Rental

**SPIE POLICIES** .................................................. 73-74

Download the SPIE Conference App
Plenary and Keynote Sessions 5–8
Don't miss these world-class speakers discussing the latest advancements and most promising breakthroughs.

Technical Events 10–12
Join your peers and colleagues in group discussions around focused technical topics, various workshops, live demos, and at the interactive poster sessions.

Social + Networking Events 13
Join your colleagues at various events, including the Student Dessert with the Experts, Women’s Networking Lunch—events not to be missed!

Award Events + Student Information 14–15
Participate in the following opportunities: RFW All-Conference Best Student Paper, Young Scientist Award, Student Paper Award, as well as information about Poster Awards.
Learn from over 1,000 presentations on the latest advances in medical imaging research

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

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

Symposium Chairs:

Metin N. Gurcan, M.D.
Wake Forest Baptist Medical Ctr. (USA)

Georgia D. Tourassi
Oak Ridge National Lab. (USA)

COOPERATING ORGANIZATIONS

AAPM—American Association of Physicists in Medicine
IFCARS—International Foundation for Computer Assisted Radiology and Surgery
MIPS—Medical Image Perception Society
SIIM—Society for Imaging Informatics in Medicine
WMIS—World Molecular Imaging Society
Awards and Plenary Session

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

Monday 17 February 2020 • 4:00 PM - 5:15 PM

4:00 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**

This award will be presented in recognition of outstanding accomplishments in medical imaging.

4:30 PM

**Plenary Presentation**

Are today’s mixed reality experience pillars and hardware architectures well aligned with the specific needs of medical imaging and surgical guidance?

**Bernard Kress**

Principal Optical Architect, HoloLens team

Microsoft Corp. (USA)

Mixed Reality (MR) headsets have the potential to revolutionize the way we work, learn, communicate, and get entertained. The main pillars for MR development are wearable, visual and social comfort, as well as immersion experience. Do these pillars intersect the specific needs of medical imaging and surgical guidance applications? We will review the various challenges to implement MR hardware specifically adapted to such tasks with today’s start of the art MR headset technology.

Biography: Bernard Kress has been involved in AR, VR and MR technology for the past decade, specifically focussing on hardware issues such as optics, optical architectures and related technologies as well as sensors (depth mapping, head and eye tracking, gesture sensing). Bernard published various books and book chapters and authored more than 100 papers on this topics and holds 50+ international patents on related technologies.

He has been involved in the Google Glass project at Google X Labs since its infancy in 2010, as the principal optical architect, and later joined the HoloLens Team at Microsoft in 2015 as the Partner Optical Architect. He is in charge of shaping the next generation mixed reality optical hardware architectures at HoloLens. He is also a board member and fellow of the SPIE, and conference chair for various SPIE and OSA conferences related to AR, VR and MR.

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.
Special Events • Keynote Presentations

IMAGING INFORMATICS FOR HEALTHCARE, RESEARCH, AND APPLICATIONS
Conference 11318 Sunday Keynote Presentation
Sunday 16 February 2020 • 3:30 PM - 4:30 PM

Cybersecurity in healthcare: is our patients’ health now at risk?

Dr. Jim Whitfill
HonorHealth and Society for Imaging Informatics (USA)

Abstract: The cybersecurity landscape continues to rapidly evolve across all industries including healthcare. Unique to healthcare, however, is the fact that patients’ lives can be impacted by simply altering or withholding information. This session will explore how attacks on personal information, to personal health information to personal health. In addition, potential methods to balance sharing of data with protecting patients’ identities will be explored to better understand concepts around federated databases and other anonymization techniques.

Biography: As Chief Transformation Officer, Jim Whitfill, MD, brings leadership expertise in healthcare, organizational culture, and information technology to promote a customer-centric experience and offer new ways to deliver more complete, coordinated and accessible care. He brings together data, technology and marketing to advance technical innovations, such as call center technology, CRM systems, apps and digital tools, to give both the customer and caregivers an enhanced approach to care.

By focusing the efforts of these businesses and areas finding the right digital tools, Dr. Whitfill aims to improve the customer journey so that it becomes more seamless and focused on the needs of the individual. The goal is to transform the organization into a more patient-focused and provider-friendly health system which better serves the surrounding community.

Before joining HonorHealth, Dr. Whitfill served as chief medical officer for Innovation Care Partners, a clinically integrated network in Phoenix. He also serves as a clinical associate professor in the departments of Internal Medicine and Biomedical Informatics at the University of Arizona College of Medicine-Phoenix.

Dr. Whitfill previously held or holds advisory board responsibilities at GE Healthcare, Philips Healthcare, IDX and KLAS. In July 2018, he began his term as the board chair of the Society of Imaging Informatics in Medicine and is a regular faculty member for the Radiology Society of North America and the American College of Radiology. He is a founding member of the HIMSS-SIIM community for Enterprise Imaging.

Dr. Whitfill received his BA from Princeton University and his MD from the University of Pennsylvania. He trained in internal medicine at the Hospital of the University of Pennsylvania, where he also completed a fellowship in medical informatics.

IMAGING INFORMATICS FOR HEALTHCARE, RESEARCH, AND APPLICATIONS
Conference 11318 Monday Keynote Presentation
Monday 17 February 2020 • 8:00 AM - 8:40 AM

Shining light into the machine learning “blackbox”: the state of explainable AI

William Hsu
Univ. of California, Los Angeles (USA)

Abstract: The rapid advancement of artificial intelligence (AI) and machine learning (ML) techniques has yielded models whose sensitivity and specificity rival those of trained human experts. However, as these models transition from proofs-of-concept to decision support tools that are used clinically, model developers and the end-users who interact with them should have a clear appreciation of how and what these models are “learning”. Future users of these models should not see them as a “black box” but demand greater transparency from model developers in conveying the rationale behind the chosen representation, how the model was trained, and the explanation associated with a model’s prediction.

In this talk, I will review current and late-breaking research on the development of explainable machine and deep learning algorithms, particularly in the areas of computer-aided detection and diagnosis. I will present a taxonomy of different types of explanations and highlight techniques that interrogate the model based on internal structure or the model’s response to perturbations in the input. I will discuss experiences in applying and interpreting the results of these techniques drawn from my work in lung and breast cancer screening and other published research. Finally, I will assess the limitations and opportunities of current work in interpretable AI/ML, emphasizing the need for visualizations that aid clinical end-users with understanding model outputs and tools for ensuring the validity of model predictions over time.

Biography: William Hsu is Associate Professor at University of California, Los Angeles in the Departments of Radiological Sciences, Bioinformatics, and Bioengineering and a core faculty member with the Medical & Imaging Informatics group. He directs the Integrated Diagnostics Shared Resource, an interdepartmental program that catalyzes research and development of computational tools to improve early detection, diagnosis, and treatment of cancer through the integration and curation of multi-scale data. His research lab focuses on the development of quantitative image analysis models to support clinical decision making. Research focus is on the development and application of artificial intelligence and machine learning techniques to detect and quantify disease in medical images. His work is supported by the National Institutes of Health, the Department of Defense, and the American Cancer Society.

PHYSICS OF MEDICAL IMAGING
Conference 11312 Monday Keynote Presentation
Monday 17 February 2020 • 10:10 AM - 10:50 AM

Innovations and translation in molecular PET/MR and PET/CT

Georges El Fakhri
Massachusetts General Hospital and Harvard Medical School (USA)

Abstract: In this talk, recent developments in Positron Emission Tomography (PET) and Magnetic Resonance Imaging (MRI) are explored and the challenges of simultaneous imaging in PET/MR and PET/CT as well as the opportunities afforded by two modalities are discussed. The unique sensitivity of PET (picomolar) and its quantitative capabilities can be associated with the superb spatial and temporal resolution of MR as well as its excellent soft tissue contrast to provide an ideal imaging modality for many cancers as well as cardiac and brain explorations. Improvements in image quality and diagnostic accuracy are illustrated in specific patient studies in PET/MR and PET/CT, and synergies between PET and MR spectroscopy are discussed in the context of guiding radiotherapy. Beyond oncology, applications in cardiac (viability, perfusion) and brain imaging (neurodegenerative disease, traumatic brain injury) are presented including very early imaging of prodromal AD and normal aging, mapping of mitochondrial membrane potential and simultaneous PET/MRI for mapping dopaminergic and serotoninergic neurotransmission.

Biography: Dr. El Fakhri is the Nathaniel & Diana Alpert Professor of Radiology at Harvard Medical School (HMS) and the founding Director of the Gordon Center for Medical Imaging at Massachusetts General Hospital and HMS with over 150 members. He is also co-Director of the Division of Nuclear Medicine and Molecular Imaging. Dr El Fakhri is an internationally recognized expert in quantitative molecular imaging (SPECT, PET-CT, and PET-MR) for in vivo assessment of patho-physiology in brain, cardiac and oncologic diseases. Current areas of research include high resolution PET & MR imaging in a range of diseases including neurodegenerative disease and traumatic brain injury (amyloid and neurofibrillary tangles), cardiac arrhythmia and heart failure (mitochondrial membrane potential), as well as guiding radiotherapy planning (PET/MRS). He has authored or co-authored over 300 papers and mentored over 100 students, post-docs and faculty. Dr El Fakhri received many awards and honors, including the Mark Tetelman Award from the Society of Nuclear Medicine, the Dana Foundation Brain and Immuno-Imaging Award, the Howard Hughes Medical Institutes Training Innovation Award and the Edward J. Hoffman Award from the Society of Nuclear Medicine and Molecular Imaging. He was elected Fellow to the SNMMI, AAPM and IEEF for “contributions to biological imaging”.

SPIE Medical Imaging 2020 • spie.org/mi20program • #SPIEMedicalImaging
Healthcare in need of innovation: (exponential) technology and biomedical entrepreneurship as solution providers

Michael Friebe
IDTM GmbH, Otto-von-Guericke Univ. Magdeburg (Germany)
Abstract: There are significant challenges in global healthcare delivery. Some countries have abundant services, but are stuck with a rather nimble and expensive system that focuses on incremental innovations. Other geographies are still in need of basic tools and infrastructure and require completely different, inexpensive, and with that more disruptive solutions.

Healthcare 4.0 with a focus on prevention / early detection and pro-active therapy will employ exponential technologies (AI, Sensor Technology, Synthetic Biology, Robotics, 3D Printing, ...). This will surely lead to significant changes in the way we experience and deliver healthcare, where an empowered patient will play a more and more important role.

Innovation in that segment can only lead to meaningful solutions if these actually solve a problem and if these problems have been properly studied and understood including the future economics and delivery changes. Which leads to the question on whether we actually teach our biomedical engineers the right skills considering these developments.

We should introduce a “MEDTEC DESIGN FOR FUTURE HEALTHCARE” type program that embraces technological developments, understands the needs of a future healthcare, teaches entrepreneurial basics and exponential thinking in an interdisciplinary setting.

Biography: Michael Friebe is a German citizen with expertise in diagnostic imaging + image guided therapies, as founder/innovator/CEO/investor, and research scientist.

Dr. Friebe currently is a research fellow of TUM in Munich, an adjunct professor at the Queensland University of Technology in Brisbane, and a professor of Image Guided Therapies at Otto-von-Guericke-University in Magdeburg, Germany.

He is a listed inventor of almost 100 patents, author of >250 scientific contributions, has started well over 20 medical technology start-ups, is a board member of four medical technology startup companies, and an investment partner of a MedTec investment-fund.

ULTRASONIC IMAGING AND TOMOGRAPHY
Conference 11319 Monday Keynote Presentation
Monday 17 February 2020 • 2:40 PM - 3:40 PM
Quantitative ultrasound successes: past, present, and future

Michael Oelze
Beckman Institute, Univ. of Illinois (USA)
Abstract: Diagnostic ultrasound is ubiquitous in clinical practice because it is safe, portable, inexpensive, has high spatial resolution and is real time. Therefore, improving the capabilities of diagnostic ultrasound is a highly significant clinically. In this talk we will discuss different applications of quantitative ultrasound (QUS) imaging and how QUS approaches have evolved over time. Specifically, we will discuss the use of spectral-based approaches to estimate the backscatter coefficient (BSC) and attenuation and the use of envelope statistics to describe underlying tissue microstructure. These QUS approaches have been successful at classifying tissue state, monitoring focused ultrasound therapy, detecting early response of breast cancer to neoadjuvant chemotherapy and the automatic detection of nerves in the imaging field. We will demonstrate how QUS approaches can be incorporated on breast tomography machines, which allow an expansion of the tradeoff between spatial resolution and the variance of QUS estimates. One of the ongoing issues with QUS is the inability to properly account for losses in tissues that affect the estimates of the backscatter coefficient. We will demonstrate new calibration procedures that can improve the ability to account for tissue losses. Finally, we will discuss how machine learning approaches can further improve QUS techniques by eliminating the need for models and in some cases eliminating the need for a reference scan.

Biography: Professor Oelze earned a B.S. in Physics and Mathematics (1994, Harding University) and Ph.D. in Physics (2000, University of Mississippi). Dr. Oelze joined the faculty of ECE at UIUC in 2005 and serves as a professor and Associate Head. His research interests involve biomedical ultrasound including: quantitative ultrasound, tomography, therapy and beamforming. Dr. Oelze is a fellow of the AILM and a senior member of IEEE. He is a member of the Technical Program Committee of the IEEE Ultrasonics Symposium and serves as an associate editor-in-chief of IEEE TUFFC, associate editor of Ultrasonic Imaging and associate editor for IEEE TBME.

BIOMEDICAL APPLICATIONS IN MOLECULAR, STRUCTURAL, AND FUNCTIONAL IMAGING
Conference 11317 Tuesday Keynote Presentation
Tuesday 18 February 2020 • 10:10 AM - 11:10 AM
Label-free molecular imaging with spins: a path to high resolution through learned subspaces

Zhi-Pei Liang
Univ. of Illinois (USA)
Abstract: Since its invention in the early 1970s, magnetic resonance imaging (MRI) has become a premier tool for structural imaging and functional imaging using water proton spin signals. MR spectroscopic imaging (MRSI) has also long been recognized as a potentially powerful tool for non-invasive, label-free molecular imaging by exploiting the spin signals from other molecules. However, state-of-the-art MRSI methods, after more than four decades of development, still fall far short of providing adequate spatial resolution, speed, and signal-to-noise ratio (SNR) useful for label-free molecular imaging applications.

The talk will discuss our recent “breakthroughs” in overcoming the long-standing technical barriers of MRSI-based label-free molecular imaging using a new technology known as SPICE (SPectroscopic Imaging by exploiting spatiotemporal CorrElation). SPICE uses a sub-space mathematical framework to effectively integrate rapid scanning, sparse sampling, constrained image reconstruction, quantum simulation, and machine learning. Preliminary results show an unprecedented capability for simultaneous mapping of brain structures, function and metabolism using intrinsic spin signals from multiple molecules. In this talk, I’ll give an overview of SPICE and also show some “SPICY” experimental results we have obtained.

Biography: Zhi-Pei Liang is currently the Franklin W. Woeltge Professor of Electrical and Computer Engineering at the University of Illinois at Urbana-Champaign (UIUC). His research is in the general area of magnetic resonance imaging and spectroscopy, ranging from spin physics, signal processing, machine learning, to biomedical applications. His work has been recognized by a number of awards, including the Sylvia Sorkin Greenfield Award (Medical Physics, 1990), Whitaker Biomedical Engineering Research Award (1991), NSF CAREER Award (1995), Henry Magnuski Scholar Award (UIUC, 1999), University Scholar Award (UIUC, 2001), the Otto Schmitt Award (IFMBE, 2012), and the Technical Achievement Award (IEEE-EMBS, 2014). Dr. Liang is a Fellow of the IEEE, ISMRM and AIMBE. He was elected to the International Academy of Medical and Biological Engineering in 2012. Dr. Liang served as President of the IEEE-EMBS from 2011-2012 and received its Distinguished Service Award in 2015.
COMPUTER- AIDED DIAGNOSIS
Conference 11314 Keynote Presentation Tuesday
Tuesday 18 February 2020 • 1:20 PM - 2:20 PM

Will AI make me a better doctor?

Jonathan I. Wiener
Boca Radiology Group and
FAU Medical School (USA)

Abstract: The term “Artificial Intelligence” has come into such common usage, that it is now used interchangeably with any software which automates routine tasks. In fact, AI software at its current usage is not intelligent and cannot think out of the box. In this lecture, we will explore the history of software and hardware development, of pattern recognition algorithms and lately deep learning, which are expected to allow healthcare providers to perform their tasks with more reliability, accuracy, and to avoid critical errors, known in medicine as sentinel events. While there is excitement about robots and androids also performing human tasks, as physicians and healthcare providers, we cannot lose the human touch, as that is a critical component in improving the experience and probably outcome of patients when faced with medical illness. Currently deployed AI and healthcare software often fails by distracting providers and decreases human interaction time with patients. The current state of software also often fails in catching mistakes and may even cause mistakes. We will discuss what is needed in order to truly improve the patient’s experience and outcomes, and which tasks would ideally be taken over by a future “AI”. Real life case examples will be used to make the points in this lecture.

Biography: Jonathan Wiener, MD is the Director of Neuroradiology and MRI at Boca Radiology Group and Boca Raton Regional Hospital since 1989. Dr. Wiener is currently an Associate Clinical Professor at Florida Atlantic University, teaching medical students and residents. He completed a degree in chemistry and obtained his medical degree at the State University of New York Downstate Medical Center. He then trained in internal medicine at the Albert Einstein Montefiore Medical Center. Dr. Wiener completed his Residency and Neuroradiology Fellowship at the Mallinckrodt Institute of Radiology, Washington University, St. Louis, MO. He worked as an ER physician at the St. Louis County Regional Hospital. His career has included 35 years of collaborations with the medical industry in software and hardware development, his publications include a book on the physics of MRI and a number of peer reviewed articles on software and its role in clinical care.

IMAGE PROCESSING
Conference 11313 Wednesday Keynote Presentation
Wednesday 19 February 2020 • 10:10 AM - 11:10 AM

Bringing machine learning to the clinic: opportunities and challenges

Tim Leiner
Univ. Medical Ctr. Utrecht (Netherlands)

Abstract: Machine learning and especially deep learning hold great promise to improve patient care. In several domains, algorithms perform as good as or better than fellowship trained radiologists for identification of abnormalities in clinically acquired images. However, there are much broader applications beyond image analysis such as patient selection and examination scheduling, image acquisition and reconstruction, using image data for prognostic purposes, and combing image data with information from electronic health records, laboratory and genetic data. Furthermore, in order for algorithms to be broadly accepted, there are many scenarios where it is important for the clinician that results are explainable. In addition, clinical deployment and workflow should be taken into consideration when designing the algorithm and bringing it to clinical practice. In my lecture I will focus on these aspects from a cardiovascular imaging perspective.

Biography: Dr. Tim Leiner is tenured Professor of Radiology and holds the Chair in Cardiovascular Imaging at Utrecht University Medical Center, Utrecht, The Netherlands. His research interests center around the development and implementation of new MR and CT techniques with a focus on cardiovascular imaging and machine learning. Dr. Leiner is Associate Editor of the Journal of Magnetic Resonance Imaging (JMRI), the Journal of Cardiovascular Magnetic Resonance (JCMR), and Radiology – Cardiothoracic. He is the author of over 300 original papers, review articles and book chapters as well as editor of several electronic radiology textbooks. He is currently Vice-President of the ISMRM.

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.
Petascale computational pathology for precision medicine

Nasir Rajpoot
Univ. of Warwick (United Kingdom)

Abstract: Modern day slide scanners are capable of generating large microscopic resolution images of conventional tissue slides, spurring a revolution in the practice of cellular pathology as a discipline. This development comes at a time when computing capacity and machine learning technologies are peaking, offering a remarkable opportunity to reveal complex cellular patterns in a data-driven manner. With an increasing number of NHS pathology labs being digitised in the UK, there is an explosion in the amount of pathology image data with linked clinical outcomes. This data is a potential goldmine of invaluable information, ripe for deep mining of novel digital histological biomarkers of the ‘state of play’ of complex diseases such as cancer. How can we facilitate the discovery of digital histology biomarkers to further our understanding of cancer, stratify patients into different risk groups and predict the progression and survival of cancer?

Biography: Nasir Rajpoot is Professor of Computational Pathology at the Computer Science department of the University of Warwick, where he started his academic career as a Lecturer (Assistant Professor) in 2001. He also holds an Honorary Scientist position at the Department of Pathology, University Hospitals Coventry & Warwickshire NHS Trust since 2016.

Prof Rajpoot is the founding Head of Tissue Image Analytics laboratory (TIA lab) at Warwick since 2012. In Autumn 2017, he was awarded the Wolfson Fellowship by the UK Royal Society and the Turing Fellowship by the Alan Turing Institute, the UK’s national institute for data science and artificial intelligence.

Current focus of research in Prof Rajpoot’s lab is on developing algorithms for the analysis of digitised pathology images, with applications to computer-assisted grading of cancer and image-based markers for prediction of cancer progression and survival. He has been active in the digital pathology community for almost a decade now, having co-chaired several meetings in the histology image analysis (HIMA) series since 2008 and served as a founding PC member of the SPIE Digital Pathology meeting since 2012.

Prof Rajpoot served as the President of the European Congress on Digital Pathology (ECDP), which was held at Warwick in April 2019. Since Jan 2019, he acts as Co-Director of the £15m PathLAKE national centre of excellence on AI in pathology, leading the computational arm of the centre.
Special Events • Technical Events

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

Sunday/Monday Poster Viewing
Monday 17 February 2020 • 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 following conferences will be included: 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: 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

X-ray Source Technologies: Fundamental Principles, Technological Advances, and Clinical Needs
Sunday 16 February 2020 • 5:45 PM - 7:45 PM

WK 1 TECHNICAL WORKSHOP: PHYSICS OF MEDICAL IMAGING (CONFERENCE 11312)

The x-ray source is one of the key components in modern x-ray and Computed Tomography (CT) imaging. X-ray beam characteristics have a profound impact on conventional x-ray and CT image quality. For this workshop, expert speakers were invited to discuss the fundamentals of conventional x-ray tubes, the physical principles that drive source technological innovations, and finally the challenges and opportunities of new x-ray source technology in current and future x-ray based medical imaging. Several blue sky short talks will introduce potentially impactful source technologies.

SPEAKERS:

Rolf Behling, Phillips Medizin Systeme GmbH (Germany) - “Fundamentals of Conventional X-ray Tube Technologies”

Paul Schwoebel, Univ. of New Mexico and SRI International (USA) - “Fundamental Physics Principles that Drive New X-ray Source Developments”

Norbert Pelc, Stanford Univ. (USA) - “Challenges and Opportunities of X-ray Source Technologies in Present and Future Applications”

Blue Sky Talks To Be Announced
**Special Events • Technical Events**

**TECHNICAL WORKSHOP**

**Live Demonstrations**

Sunday 16 February 2020 • 5:45 PM - 7:45 PM

**WK 4 COMPUTER-AIDED DIAGNOSIS (CONFERENCE 11314)**

**WORKSHOP CHAIRS:**

Dr. Lubomir Hadjiiski, Univ. of Michigan Health System (USA)

Dr. Karen Drukker, Univ. of Chicago (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**

January 17, 2020: Deadline for submission

January 24, 2020: Notification of acceptance

January 31, 2020: Deadline for two-slide summary

**JOIN THE WORKSHOP**

If you would like to demonstrate at the SPIE Medical Imaging Live Demonstrations Workshop, please send an e-mail with the subject “SPIE live demonstrations workshop” by the submission deadline to Lubomir Hadjiiski and Karen Drukker:

- lhadjisk@umich.edu
- kdrukker@uchicago.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 e-mail. Notification of acceptance or rejection will follow on the date given above.

**TECHNICAL WORKSHOP**

**Translation of Deep Learning Technology to the Clinic**

Tuesday 18 February 2020 • 5:00 PM - 7:00 PM

**WK 2 TECHNICAL WORKSHOP: IMAGE PROCESSING (CONFERENCE 11313)**

Medical AI market is expected to break to 2 billion USD revenue within 5 years. Even though promising we still need to overcome several barriers including technological robustness, clinical validation, regulatory compliance, market acceptance and financial risks. In a number of presentations we focus on the barriers and how to overcome these seen from start-up, regulators, and commercial perspectives.

**SPEAKERS:**

To Be Announced
Special Events • Technical Events

TECHNICAL WORKSHOP

Simulated Tumor Board: Brain and Breast
Tuesday 18 February 2020 • 5:00 PM - 7:00 PM

WK 3 TECHNICAL WORKSHOP: COMPUTER-AIDED DIAGNOSIS (CONFERENCE 11314) AND DIGITAL PATHOLOGY (CONFERENCE 11320)

This workshop will present two example clinical cases, one breast cancer case and one brain cancer case. A multi-disciplinary team will discuss the case, the imaging information, pathology, and treatment options. The workshop will mimic the format of a standard clinical tumor board process with time for Q&A at the end.

MODERATOR:
Kristy Brock, PhD, DABR, FAAPM
Professor, Department of Imaging Physics and Department of Radiation Physics, Univ. of Texas MD Anderson Cancer Center (USA)

BREAST PANEL SPEAKERS:
Simona Shaitelman, Univ. of Texas MD Anderson Cancer Ctr., Radiation Oncology (USA)
Isabelle Bedrosian, Univ. of Texas MD Anderson Cancer Ctr., Surgery (USA)
Jennifer Litton, Univ. of Texas MD Anderson Cancer Ctr., Medical Oncology (USA)
Wei Yang, Univ. of Texas MD Anderson Cancer Ctr., Diagnostic Radiology (USA)
Alejandro Contreras, Univ. of Texas MD Anderson Cancer Ctr., Pathology (USA)

BRAIN PANEL SPEAKERS:
Caroline Chung, Univ. of Texas MD Anderson Cancer Ctr., Radiation Oncology (USA)
Jeff Weinberg, Univ. of Texas MD Anderson Cancer Ctr., Surgery (USA)
Melissa Chen, Univ. of Texas MD Anderson Cancer Ctr., Diagnostic Radiology (USA)
Jason Huse, Univ. of Texas MD Anderson Cancer Ctr., Pathology (USA)

Task-driven AI: Taking into Account the User’s Perspective
Tuesday 18 February 2020 • 5:00 PM - 7:00 PM

WK 5: TECHNICAL WORKSHOP: IMAGE PERCEPTION, OBSERVER PERFORMANCE, AND TECHNOLOGY ASSESSMENT CONFERENCE (CONFERENCE 11316)

Machine learning and artificial intelligence techniques are exponentially being developed and applied to a wide variety of scenarios in medical imaging ranging from image segmentation and analysis to analyzing radiologists’ reports to managing clinical workflow. Although we are slowly seeing these applications integrated into clinical workflow, much of the development work is still in the research stages. In order to bridge the gap between research and clinical integration and implementation, a greater emphasis needs to be placed on understanding the impact of the output of these machine learning and AI schemes on the human decision-maker. This workshop will present a variety of perspectives on the role of AI and machine learning in medical imaging from the perspective of the user.

MODERATORS:
Yan Chen, Univ. of Nottingham (United Kingdom)
Elizabeth A. Krupinski, Emory Univ. (USA)

PANELISTS:
Sian Taylor-Phillips, Univ. of Warwick (United Kingdom)
Francine Jacobson, Brigham and Women’s Hospital (USA)
Elizabeth A. Krupinski, Emory Univ. (USA)

Tuesday/Wednesday Poster Viewing
Wednesday 19 February 2020 • 5:30 PM - 7:00 PM

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

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

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.

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 Session.

Poster Sessions.

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

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.

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

**Equity, Diversity, and Inclusion Presentation and Reception**
Sunday 16 February 2020 • 5:30 PM - 7:00 PM
Open to those with a paid registration badge.
Join us for a thought-provoking presentation and stay after to discuss topics with your colleagues during the reception.

**Women’s Networking Luncheon**
Monday 17 February 2020 • 12:10 PM - 1:20 PM
Sign up at registration before Monday morning coffee break. Lunch ticket required.
Join other women in the field for informal discussions and networking during the scheduled lunch on Monday.

**Dessert with the Experts - A Student Networking Event**
Wednesday 19 February 2020 • 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, gain career advice, and make valuable contacts at this complimentary student event.

**SCIENCe IS FOR EVERYONE**

**EQUITY**
Is access to opportunities, fair treatment, and advancement for all people; it’s about eliminating barriers that prevent full participation.

**DIVERSITY**
Includes all the ways in which people differ—identity markers such as race, ethnicity, gender, ability, sexual orientation, and more.

**INCLUSION**
Goes beyond diversity; it’s the act of creating an environment where everyone feels welcomed, respected, supported, and valued.

spie.org/inclusion
**Special Events • Award Events**

**THE 2020 STUDENT PAPER AWARDS INFORMATION**

SPIE annually hosts the Best Student Poster presentation contests, with certificates awarded. Some conferences host Best Student Paper Awards with cash prizes supported by the generosity of our sponsors. Entrants are judged by a committee of SPIE volunteers and winners are announced onsite. We thank our many award sponsors.

**WONDERING IF YOU ARE ELIGIBLE?**

Download the individual awards application criteria PDFs online:

[https://spie.org/conferences-and-exhibitions/medical-imaging/awards-information](https://spie.org/conferences-and-exhibitions/medical-imaging/awards-information)

**Deadline for all applications is 11 November.**

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**2020 Poster Award Information**

Monday 17 February 2020 • 8:00 AM - 8:30 AM

**POSTER AWARDS IN CONFERENCE ROOMS**

*Check the conference schedule for exact times.*

**RFW AWARD FINALISTS:**

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.

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**Robert F. Wagner All-Conference Best Student Paper Award**

Monday 17 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:**

[SPIE](https://spie.org)

Contributions by the Medical Imaging Community

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.

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**Image-Guided Procedures, Robotic Interventions, and Modeling Awards**

Tuesday 18 February 2020 • 12:10 PM - 12:15 PM

**Image-Guided Procedures, Robotic Interventions, and Modeling Young Scientist, Student Paper, and Poster Awards (Conference 11315)**

**YOUNG SCIENTIST AWARD**

This award is specific to papers in the Image-Guided Procedures, Robotic Interventions, and Modeling conference 11315.

**SPONSORED BY:**

[Siemens Healthineers](https://healthineers.com)

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.

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SPIE Medical Imaging 2020 • spie.org/mi20program • #SPIEMedicalImaging
Image-Guided Procedures Student Paper Award

This award is specific to papers in the Image-Guided Procedures, Robotic Interventions, and Modeling Conference 11315.

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.

SPONSORED BY: INTUITIVE.

The award winners for both awards will be recognized in the conference room on Tuesday morning before the lunch break.

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 morning before the lunch break.

Physics of Medical Imaging Student Paper and Poster Awards

Wednesday 19 February 2020 • 9:40 AM - 9:45 AM

Physics of Medical Imaging Student Paper Award (Conference 11312)

This award is specific to papers in the Physics of Medical Imaging conference 11312.

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

The award winners will be recognized in the conference room before the morning coffee break on Wednesday.

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 before the morning coffee break on Wednesday.

Image Processing Student Paper and Poster Awards

Thursday 20 February 2020 • 12:10 PM - 12:15 PM

Image Processing Student Paper Award (Conference 11313)

This award is specific to papers in the Image Processing conference 11313.

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

SPONSORED BY: I2SIGMA

The award winners will be recognized in the conference room before lunch on Thursday.

IMAGE PROCESSING POSTER PRESENTATION AWARD

SPONSORED BY: I2SIGMA

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 before lunch on Thursday.

Poster session dates, locations, and times

<table>
<thead>
<tr>
<th>SESSION</th>
<th>CONFERENCES</th>
<th>SETUP</th>
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<th>TEARDOWN</th>
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<tbody>
<tr>
<td>Monday 17 February</td>
<td>11312; 11314; 11315; 11318; 11319</td>
<td>Sunday, 16 February after 12:00 PM (noon)*</td>
<td>Texan Ballroom, 4th Floor - Salon D</td>
<td>Monday, 5:30 PM - 7:00 PM</td>
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<tr>
<td>Wednesday 19 February</td>
<td>11313; 11316; 11317; 11320</td>
<td>Tuesday, 18 February after 9:30 AM*</td>
<td>Texan Ballroom, 4th Floor - Salon D</td>
<td>Wednesday, 5:30 PM - 7:00 PM</td>
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*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 either Monday or Wednesday.
### Daily Events Schedule

#### SATURDAY 15 February
- **Conferences**
  - **SC086 Fundamentals of Medical Image Processing and Analysis (Deserno)** 8:30 AM - 5:30 PM, $325 / $380, p. 64
  - **SC1292 Technological Assessment of X-Ray Based Breast Imaging Systems Using Anthropomorphic Phantoms (Wenzel)** 8:30 AM - 12:30 PM, $325 / $380, p. 66
  - **SC1129 Photon Counting CT (Danielsson, Sjölin)** 1:30 PM - 5:30 PM, $325 / $380, p. 64

#### SUNDAY 16 February
- **Conferences**
  - **SC1115: Computer-Aided Diagnosis** Chairs: Horst K. Hahn, Fraunhofer MEVIS (Germany); Jacobs Univ. Bremen (Germany); Maciej A. Mazurowski, Duke Univ. (USA)
  - **SC1116: Image Perception, Observer Performance, and Technology Assessment** Chairs: Frank W. Samuelson, U.S. Food and Drug Administration (USA); Sian Taylor-Phillips, The Univ. of Warwick (United Kingdom)

#### MONDAY 17 February
- **Conferences**
  - **SC1115: Computer-Aided Diagnosis** Chairs: Horst K. Hahn, Fraunhofer MEVIS (Germany); Jacobs Univ. Bremen (Germany); Maciej A. Mazurowski, Duke Univ. (USA)
  - **SC1116: Image Perception, Observer Performance, and Technology Assessment** Chairs: Frank W. Samuelson, U.S. Food and Drug Administration (USA); Sian Taylor-Phillips, The Univ. of Warwick (United Kingdom)

#### TUESDAY 18 February
- **Conferences**
  - **SC1115: Computer-Aided Diagnosis** Chairs: Horst K. Hahn, Fraunhofer MEVIS (Germany); Jacobs Univ. Bremen (Germany); Maciej A. Mazurowski, Duke Univ. (USA)
  - **SC1116: Image Perception, Observer Performance, and Technology Assessment** Chairs: Frank W. Samuelson, U.S. Food and Drug Administration (USA); Sian Taylor-Phillips, The Univ. of Warwick (United Kingdom)

#### WEDNESDAY 29 February
- **Conferences**
  - **SC1115: Computer-Aided Diagnosis** Chairs: Horst K. Hahn, Fraunhofer MEVIS (Germany); Jacobs Univ. Bremen (Germany); Maciej A. Mazurowski, Duke Univ. (USA)
  - **SC1116: Image Perception, Observer Performance, and Technology Assessment** Chairs: Frank W. Samuelson, U.S. Food and Drug Administration (USA); Sian Taylor-Phillips, The Univ. of Warwick (United Kingdom)

#### THURSDAY 20 February
- **Conferences**
  - **SC1115: Computer-Aided Diagnosis** Chairs: Horst K. Hahn, Fraunhofer MEVIS (Germany); Jacobs Univ. Bremen (Germany); Maciej A. Mazurowski, Duke Univ. (USA)
  - **SC1116: Image Perception, Observer Performance, and Technology Assessment** Chairs: Frank W. Samuelson, U.S. Food and Drug Administration (USA); Sian Taylor-Phillips, The Univ. of Warwick (United Kingdom)
<table>
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<tr>
<th>SATURDAY 15 February</th>
<th>SUNDAY 16 February</th>
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<th>TUESDAY 18 February</th>
<th>WEDNESDAY 29 February</th>
<th>THURSDAY 20 February</th>
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<tr>
<td>SC1183 Modern Diagnostic X-ray Sources (Behling) 1:30 PM - 5:30 PM, $325 / $380, p. 65</td>
<td>KEYNOTE PRESENTATION: Healthcare in need of innovation: (exponential) technology and biomedical entrepreneurship as solution providers Conf. 11315, 1:20 - 2:20 PM, p. 7</td>
<td>KEYNOTE PRESENTATION: Title TBA • Conf. 11314, 1:20 - 2:20 PM, p. 8</td>
<td>Tuesday/Wednesday Poster Session/Reception, 5:30 PM - 7:00 PM, p. 12</td>
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<tr>
<td>Equity, Diversity, and Inclusion Presentation and Reception, 5:30 TO 7:00 PM, p.13</td>
<td>KEYNOTE PRESENTATION: Quantitative ultrasound successes: past, present, and future, Conf. 11319, Michael Geelze, 2:40 - 3:40 PM, p. 7</td>
<td>WORKSHOP (CONF. 11313): Translation of Deep Learning Technology to the Clinic, 5:00 PM - 7:00 PM, p. 11</td>
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<tr>
<td>WORKSHOP (CONF. 11314): Live Demonstrations, 5:45 PM - 7:45 PM, p. 11</td>
<td>Best Student Paper Awards Announcement, 4:15 PM</td>
<td>SPIE Harrison H. Barrett Award in Medical Imaging, 4:20 PM</td>
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<td>PLENARY PRESENTATION: Are today’s Mixed Reality experience pillars and hardware architectures well aligned with the specific needs of medical imaging and surgical guidance? Bernard Kress, 4:30 PM, p. 5</td>
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<td>Sunday/Monday Poster Session/Reception, 5:30 TO 7:00 PM, p. 10</td>
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<tr>
<td>10:10 AM - 12:10 PM</td>
<td>CT Reconstruction with DL Techniques, p. 28</td>
<td>Chest I, p. 28</td>
<td>AI Methods for Image-guided Therapy, p. 26</td>
<td>Big Data Management Platforms, p. 28</td>
<td>Ultrasound Signal and Image Processing, p. 28</td>
</tr>
<tr>
<td>12:00 PM - 9:00 PM</td>
<td>Sunday/Monday Poster Viewing</td>
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<td>3:30 PM - 5:30 PM</td>
<td>Quality Assessment and Optimization in Breast Imaging, p. 31</td>
<td>Abdomen, p. 31</td>
<td>Ultrasound Imaging and Image Guidance: Joint Session with Conferences 11315 and 11319, p. 31</td>
<td>Advanced Imaging Informatics, p. 31</td>
<td>Ultrasound Imaging and Image Guidance: Joint Session with Conferences 11315 and 11319, p. 31</td>
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<tr>
<td>5:45 PM - 7:45 PM</td>
<td>WORKSHOP X-ray source Technologies: Fundamental Principles, Technological Advances, and Clinical Needs, p. 32</td>
<td>WORKSHOP Live Demonstrations, p. 31</td>
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### Daily Conference Session Schedule

**MONDAY 17 FEBRUARY**

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<tbody>
<tr>
<td>8:00 AM - 9:40 AM</td>
<td>SESSION 5 Breast Imaging: New Technology, p. 33</td>
<td>SESSION 5 Image-Guided Neurosurgical Interventions, p. 33</td>
<td>SESSION 5 Musculoskeletal, p. 33</td>
<td>SESSION 5 Explainable Artificial Intelligence, p. 33</td>
<td>SESSION 5 USCT and 3D Ultrasound II, p. 33</td>
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<tr>
<td>10:10 AM - 12:10 PM</td>
<td>SESSION 6 Innovations in Nuclear Medicine and MRI, p. 34</td>
<td>SESSION 6 Radiomics, p. 34</td>
<td>SESSION 6 MD Anderson Invited Talks, p. 34</td>
<td>SESSION 6 Future PACS and Software, p. 34</td>
<td>SESSION 6 High Frequency Ultrasound and Acoustic Microscopy, p. 34</td>
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<td>11:10 AM - 12:10 PM</td>
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<td>1:20 PM - 3:40 PM</td>
<td>SESSION 7 Detector Technologies, p. 35</td>
<td>SESSION 1 Image Synthesis, GANs, and Novel Architectures</td>
<td>SESSION 7 Breast MRI / Skin, p. 35</td>
<td>SESSION 8 Deep Learning Segmentation, p. 35</td>
<td>SESSION 7 Keynote and New Applications, p. 35</td>
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<tr>
<td>4:00 PM - 5:15 PM</td>
<td>PLENARY AND AWARDS SESSION, Bernard C. Kress, p. 5</td>
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<td>5:30 PM - 7:00 PM</td>
<td>MONDAY POSTER SESSION, p. 37</td>
<td>MONDAY POSTER SESSION, p. 38</td>
<td>MONDAY POSTER SESSION, p. 42</td>
<td>MONDAY POSTER SESSION, p. 43</td>
<td>MONDAY POSTER SESSION, p. 43</td>
<td>MONDAY POSTER SESSION, p. 43</td>
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   Launchpad accepts all file types except LibreOffice, and there are no file size restrictions. Should you require assistance with uploading or presenting, technicians will be available at Speaker Check-In and throughout the meeting rooms to help.
   
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# Daily Conference Session Schedule

**TUESDAY 18 FEBRUARY**

<table>
<thead>
<tr>
<th>TIME</th>
<th>SESSION 8 Target: Contrast Agent Imaging Optimized, p. 44</th>
<th>SESSION 2 Image Analysis in Ultrasound and OCT: Joint Session with Conferences 11313 and 11319, p. 44</th>
<th>SESSION 8 Breast, p. 44</th>
<th>SESSION 10 Novel Imaging Technologies for Interventional Guidance, p. 44</th>
<th>SESSION 1 Neurological Imaging I, p. 44</th>
<th>SESSION 8 Image Analysis in Ultrasound and OCT: Joint Session with Conferences 11313 and 11319, p. 44</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 AM - 9:40 AM</td>
<td>SESSION 9 X-ray Phase Contrast Imaging, p. 45</td>
<td>SESSION 3 LESIONS AND PATHOLOGIES, p. 45</td>
<td>SESSION 9 Chest II: Lymph Nodes, p. 45</td>
<td>SESSION 11 Video and Optical Methods for Imaging, p. 45</td>
<td>SESSION 2 Keynote, p. 45</td>
<td></td>
</tr>
<tr>
<td>9:40 AM - 10:10 AM</td>
<td><strong>COFFEE BREAK</strong></td>
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<td>12:00 PM TO 9:00 PM</td>
<td>TUESDAY/WEDNESDAY POSTER VIEWING</td>
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<tr>
<td>1:20 PM - 3:00 PM</td>
<td>SESSION 11 CBCT Reconstruction Techniques, p. 48</td>
<td>SESSION 11 Eye, Head, and Neck, p. 48</td>
<td>SESSION 13 Modeling Applications for Image-guided Therapeutics, p. 48</td>
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<tr>
<td>3:30 PM - 4:50 PM</td>
<td>WORKSHOP Translation of Deep Learning Technology to the Clinic, p. 48</td>
<td>SESSION 11 Simulated Tumor Board: Brain, p. 48</td>
<td></td>
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<td></td>
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<tr>
<td>5:00 PM - 7:00 PM</td>
<td></td>
<td>WORKSHOP Simulated Tumor Board: Brain, p. 48</td>
<td>WORKSHOP Task-driven AI: Taking into Account the User’s Perspective, p. 12</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SESSION 2**
- Image Analysis in Ultrasound and OCT: Joint Session with Conferences 11313 and 11319, p. 44

**SESSION 3**
- LESIONS AND PATHOLOGIES, p. 45

**SESSION 4**
- Machine Learning and Deep Learning, p. 47

**SESSION 5**
- REGISTRATION, p. 48

**SESSION 6**
- Keynote and Methodology, p. 47

**SESSION 7**
- Robot-assisted Image-guided Therapy, p. 47

**SESSION 8**
- Contrast Agent Imaging Optimized, p. 44

**SESSION 9**
- X-ray Phase Contrast Imaging, p. 45

**SESSION 10**
- Photon Counting CT Applications, p. 47

**SESSION 11**
- CBCT Reconstruction Techniques, p. 48

**SESSION 12**
- Modeling Applications for Image-guided Therapeutics, p. 48

**SESSION 13**
- Simulated Tumor Board: Brain, p. 48
**Daily Conference Session Schedule**

<table>
<thead>
<tr>
<th></th>
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<tr>
<td>8:00 AM - 9:40 AM</td>
<td>SESSION 12 Spectral CT New Hardware, p. 49</td>
<td>SESSION 6 fMRI and DTI, p. 49</td>
<td>SESSION 14 AI-based Image Segmentation and Feature Detection, p. 49</td>
<td>SESSION 1 The Annual Harold L. Kundel Honorary Lecture, p. 49</td>
<td>SESSION 5 Innovations in Image Processing I, p. 49</td>
<td></td>
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<td></td>
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<tr>
<td>9:40 AM - 9:45 AM</td>
<td>AWARD ANNOUNCEMENTS</td>
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<tr>
<td>1:20 PM - 3:00 PM</td>
<td>SESSION 14 New Reconstruction Techniques in Dual Energy CT, p. 53</td>
<td>SESSION 8 Labeling and Segmentation, p. 53</td>
<td>SESSION 3 Model Observers I, p. 53</td>
<td>SESSION 7 Deep Convolutional Neural Networks in Molecular, Structural, and Functional Imaging I, p. 53</td>
<td>SESSION 1 Keynote and Computer-Aided Diagnosis, Prognosis, and Predictive Analysis, p. 53</td>
<td></td>
<td></td>
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<td>3:00 PM - 3:30 PM</td>
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</tr>
<tr>
<td>3:30 PM - 5:30 PM</td>
<td>SESSION 15 Artifacts in CBCT Solved, p. 54</td>
<td>SESSION 9 Deep Learning: Segmentation, p. 54</td>
<td>SESSION 4 Breast, p. 54</td>
<td>SESSION 8 Deep Convolutional Neural Networks in Molecular, Structural, and Functional Imaging II, p. 54</td>
<td>SESSION 2 Computer-Aided Diagnosis, Prognosis, and Predictive Analysis, p. 54</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5:30 PM - 7:00 PM</td>
<td>WEDNESDAY POSTER SESSION, p. 55</td>
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</table>

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Daily Conference Session Schedule

|----------|--------------------------------------|------------------------------|---------------------------------------|-------------------------------------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|---------------------------------|---------------------------------|

**THURSDAY 20 FEBRUARY**

<table>
<thead>
<tr>
<th>TIME</th>
<th>SESSION 10 Segmentation: Anatomy, p. 58</th>
<th>SESSION 5 ROC Methodology, p. 58</th>
<th>SESSION 9 Novel Imaging Methods, p. 58</th>
<th>SESSION 3 Segmentation of Cellular and Tissue Structures, p. 58</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 AM - 9:40 AM</td>
<td>9:40 AM - 10:10 AM</td>
<td>10:10 AM - 12:10 PM</td>
<td>12:10 PM - 1:20 PM</td>
<td>1:20 PM - 3:00 PM</td>
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<td>12:10 PM - 1:20 PM</td>
<td>AWARD ANNOUNCEMENTS</td>
<td>AWARD ANNOUNCEMENTS</td>
<td>AWARD ANNOUNCEMENTS</td>
<td>SESSION 5 Integration of Multimodal and Spatial Information, p. 60</td>
</tr>
<tr>
<td>12:10 PM - 1:20 PM</td>
<td>LUNCH BREAK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:20 PM - 3:00 PM</td>
<td>SESSION 12 Nuclear and Molecular, p. 60</td>
<td>SESSION 7 Model Observers II, p. 60</td>
<td>SESSION 11 Bone and Skeletal Imaging, Segmentation, Registration, and Decision-making, p. 60</td>
<td>SESSION 6 Multispectral Imaging, Computational Microscopy and Staining, p. 61</td>
</tr>
<tr>
<td>3:00 PM - 3:30 PM</td>
<td>3:30 PM - 5:30 PM</td>
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Program Committee: Amir A. Amini, Univ. of Louisville (USA); Juan R. Cebalos, George Mason Univ. (USA); Nancy L. Ford, The Univ. of British Columbia (Canada); Alejandro F. Frangi, Univ. of Leeds (UK); Xavier Intes, Rensselaer Polytechnic Institute (USA); Ciprian N. Ionița, Univ. at Buffalo (USA); Vikram Kodibagkar, Arizona State Univ. (USA); Ching-Chou Ku, Changgung Li, Univ. of California, Merced (USA); Armando Manduca, Mayo Clinic College of Medicine (USA); Robert C. Molthen, GE Healthcare (USA), Marquette Univ. (USA), Medical College of Wisconsin (USA); Nicholas J. Tustison, Univ. of Virginia (USA); John B. Weaver, Dartmouth Hitchcock Medical Ctr. (USA); Bilal H. Malik, University of Windsor, Canada; Shandong Wu, Univ. of Pittsburgh (USA)

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

Conference Chairs: Po-Hao Chen, Cleveland Clinic (USA); Thomas M. Deserno, Technische Univ. Braunschweig (Germany)

Program Committee: Peter R. Bak, McMaster Univ. (Canada); Tessa S. Cook, The Univ. of Pennsylvania Health System (USA); Steven C. Horii, The Univ. of Pennsylvania Health System (USA); Maria Y. Law, Hong Kong Sanatorium and Hospital (Hong Kong, China); Hienz U. Lemke, Computer Assisted Radiology and Surgery (Germany); Brent J. Liu, The Univ. of Southern California (USA); Brian Park, The Univ. of Pennsylvania Health System (USA); Eliot L. Siegel, Univ. of Maryland Medical Ctr. (USA); Wyatt Tellis, Univ. of California, San Francisco (USA); Barjor Gimi, Cooper Medical School, Rowan Univ. (USA); Andreas Krol, SUNY Upstate Medical Univ. (USA)

**Ultrasound Imaging and Tomography**

Conference Chairs: Brett C. Byram, Vanderbilt Univ. (USA); Nicole V. Ruiter, Kartuerau 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); Stanislav Y. Zmeinianov, The Univ. of Texas at Austin (USA); Mostafa Fatemi, Mayo Clinic College of Medicine (USA); Aaron Fenster, Roberts Research Institute (Canada); Jérémie Fromageau, The Institute of Cancer Research (UK); James F. Greenleaf, Mayo Clinic College of Medicine (USA); Peter E. Hughtuwaite, Imperial College London (UK); Michael Jaeger, Univ. of Bern (Switzerland); Jörgen Arendt Jenson, Technical Univ. of Denmark (Denmark); David H. Kim, Pohang Univ. of Science and Technology (Korea, Republic of); Guiping Li, Delphinus Medical Technologies, Inc. (USA); Roman G. Maev, Univ. of Windsor (Canada); Bilal H. Malik, QT Ultrasound LLC (USA); Stephen A. McAlavey, Univ. of Rochester (USA); Mohammad Mehri-mohammadi, Wayne State Univ. (USA); Svetoslav I. Nikolov, BK Medical (Denmark); Olivier Roy, Barbara Ann Karmanos Cancer Institute (USA); Kai E. Thomennius, Massachusetts Institute of Technology (USA); François Varray, GREATIT (France); James W. Wiskin, QT Ultrasound LLC (USA)

**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); Ullysses J. Bals, Univ. of Michigan Health System (USA); Rohit Bhargava, Univ. of Illinois at Urbana-Champaign (USA); Ulf-Dietrich Braunmann, 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); Marius 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 Lecrozay, 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, The Univ. of New South Wales (Australia); James P. Monaco, Inspira, 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); Gustavo Kunde Rohde, Carnegie Mellon Univ. (USA); Berkmah 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)

**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 pp. 37–43**

Location: Texan Ballroom, 4th Floor - Salon D

Posters will be on display Sunday and Monday with extended viewing until 9:00pm on Sunday. The poster session with authors in attendance will be Sunday 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.

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

**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. 55–57**

Location: Texan Ballroom, 4th Floor - Salon D

Conference attendees are invited to attend the Monday Poster Session, where authors will be in attendance. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Award winners will be identified with ribbons during the reception.

Poster presentations from the following conferences will be included: Physics of Medical Imaging; Computer-Aided Diagnosis; Image-Guided Procedures, Robotic Interventions, and Modeling; Imaging Informatics for Healthcare, Research, and Applications; and Ultrasound Imaging and Tomography.
SESSION 1
ROOM: SALON A ........... SUN 8:00 AM TO 9:40 AM
New Technologies in Imaging
Session Chairs: Wei Zhao, Stony Brook Medicine (USA); Guang-Hong Chen, Univ. of Wisconsin School of Medicine and Public Health (USA)
8:00 am: Principles of solid immersion imaging and its application to super resolution microscopy of soft biological tissues in the terahertz spectral range. Nikita Chernomrynid, A. M. Prokhorov General Physics Institute (Russian Federation); Anna Kucheryavenko, Galina Kolonbateva, Gleb Khabba, Irina Dolganova, Bauman Moscow State Technical Univ. (Russian Federation); Pavel Karakin, National Medical Research Radiology Ctr., Ministry of Healthcare of the Russian Federation (Russian Federation); Dmitry S. Ponomarev, Institute of UHF Technical Univ. (Russian Federation); Pavel Karalkin, Nikita Chernomyrdin, Zijia Guo, The C-arm CT imaging using the extended
Maximilians-Univ. München (Germany); Hopkins Univ. (USA); Katia Parodi, Ludwig-Siemens Healthineers (Germany) and Ludwig–Sascha Manuel Huck, Sunday–Wednesday 16–19 Feb. 2020
Guang-Hong Chen, Univ. Stony Brook Session Chairs:
CONFERENCE 11312
Proceedings of SPIE Vol. 11312
Mammography
SESSION 1
ROOM: SALON B ........... SUN 8:00 AM TO 9:40 AM
New Technologies in Imaging
Session Chairs: Wei Zhao, Stony Brook Medicine (USA); Guang-Hong Chen, Univ. of Wisconsin School of Medicine and Public Health (USA)
8:00 am: Principles of solid immersion imaging and its application to super resolution microscopy of soft biological tissues in the terahertz spectral range. Nikita Chernomrynid, A. M. Prokhorov General Physics Institute (Russian Federation); Anna Kucheryavenko, Galina Kolonbateva, Gleb Khabba, Irina Dolganova, Bauman Moscow State Technical Univ. (Russian Federation); Pavel Karakin, National Medical Research Radiology Ctr., Ministry of Healthcare of the Russian Federation (Russian Federation); Dmitry S. Ponomarev, Institute of UHF Technical Univ. (Russian Federation); Pavel Karalkin, Nikita Chernomyrdin, Zijia Guo, The C-arm CT imaging using the extended
Maximilians-Univ. München (Germany); Hopkins Univ. (USA); Katia Parodi, Ludwig-Siemens Healthineers (Germany) and Ludwig–Sascha Manuel Huck, Sunday–Wednesday 16–19 Feb. 2020
Guang-Hong Chen, Univ. Stony Brook Session Chairs:
CONFERENCE 11312
Proceedings of SPIE Vol. 11312
Mammography
SESSION 1
ROOM: SALON B ........... SUN 8:00 AM TO 9:40 AM
8:00 am: A hypersensitive breast cancer detector. Stefano Pedemonte, Whitboard.ai (USA) ........ [11314-1]
8:20 am: Microcalcification localization and cluster detection using unsupervised convolutional autoencoders and structural similarity index. Yifan Peng, Tsinghua Univ. (China) and Duke Univ. (USA); Rui Hou, Yiniao Ren, Lars Grimm, Jeffrey Marks, Shelley Hwang, Joseph Lo, Duke Univ. (USA) ........ [11314-2]
8:40 am: Performance deterioration of deep neural networks for mass classification in mammography due to data source: an analysis based on artificially created distribution shift. Alexej Gossmann, U.S. Food and Drug Administration (USA); XuXiong Sun, LuKai Univ. (München, Germany); Kenny H. Cha, U.S. Food and Drug Administration (USA) ........ [11314-3]
9:00 am: A multi-task deep learning method in simultaneously predicting occult invasive disease in ductal carcinoma in situ by segmenting microcalcifications in mammography. Rui Hou, Duke Univ. (USA); Machie A. Mazzurowi, Lars J. Grimm, Jeffrey R. Marks, Lorranza M. King, Duke Univ. School of Medicine (USA); Carlo C. Malley, Arizona State Univ. (USA); Shelley Hwang, Joseph Y. Lo, Duke Univ. School of Medicine (USA) ........ [11314-4]
Coffee Break. Sun 9:40 am to 10:10 am
SESSION 1
ROOM: HUNTERS CREEK ........... SUN 8:00 AM TO 9:40 AM
Calibration and Tracking for Image-guided Navigation
Session Chairs: Elvis C. S. Chen, Roberts Research Institute (Canada); Tamas Ungi M.D., Lab. for Percutaneous Surgery (Canada)
8:00 am: Miniature C-arm simulator using wireless accelerometer based tracking. Daniel R. Allen, John T. Moore, Roberts Research Institute (Canada); Colin Clarke, London Health Sciences Ctr. (Canada); Terry M. Peters, Elvis C. S. Chen, Roberts Research Institute (Canada) ........ [11315-1]
8:20 am: Pivot calibration concept for sensor attached mobile c-arms. Sang Chun Lee, Johns Hopkins Univ. (USA); Matthias Seibold, Technische Univ. München (Germany) and University Hospital Balgrist (Switzerland); Philipp Fürstnigl, Mzipta Fanshard, Univ. Hospital Balgrist Zwitzerland; Nasser Navab, Johns Hopkins Univ. (USA) and Technische Univ. München, Germany) ........ [11315-2]
8:40 am: 3D catheter guidance including shape sensing for endovascular navigation. Sonja Jäckle, Fraunhofer-Institut für Digitale Medizin MEVIS (Germany); Verónica García-Vázquez, Felix von Hathausen, Univ. zu Lübeck (Germany); Tim Eixmann, Medizinisches Laserzentrum Lübeck GmbH (Germany), Malte Maria Sieren, Universitätsklinikum Schleswig-Holstein (Germany); Hinnerk Schultz-Höhn, Rüdiger Wulff, Heinrich-Heine University Düsseldorf, Germany) ........ [11315-3]
9:00 am: Feasibility of 3D motion-compensated needle guidance for TIPS procedures. Martin G. Wagner, Sarvesh Penyjasamy, Michael A. Spaidel, Paul F. Laeseke, Univ. of Wisconsin-Madison (USA) ........ [11315-4]
9:20 am: Rehearsal simulation for left atrial appendage occlusion using patient-specific and 3D printed phantom based on CT images. Dayeong Hong, Sangwook Lee, Univ. of Ulster College of Medicine (Korea, Republic of); Yujin Cho, Il-Young Oh, Eun Ju Chun, Seoul National Univ. Bundang Hospital (Korea, Republic of); Namkug Kim, Univ. of Ulster College of Medicine (Korea, Republic of) ........ [11315-3]
9:40 am: Challenges and limitations of patient specific mitral valve 3-D printing. Jillian L. Senko, Univ. at Buffalo (USA); Ariana Aliman, Univ. at Buffalo (USA); Alexander R. Podgorsak, Univ. at Buffalo (USA) and Canon Stroke and Vascular Research Ctr. (USA); Mohammad Mahdi Shirzai Bhurunei, Univ. at Buffalo (USA) and Canon Stroke and Vascular Research Ctr. (USA); Mohammad Mahdi Shirzai Bhurunei, Univ. at Buffalo (USA) and Canon Stroke and Vascular Research Ctr. (USA); Mohammad Mahdi Shirzai Bhurunei, Univ. at Buffalo (USA) and Canon Stroke and Vascular Research Ctr. (USA) ........ [11315-2]
SESSION 1 (CONTINUED)
ROOM: SALON A  ..... SUN 8:00 AM TO 9:40 AM
9:20 am: Slot-scan dual-energy measurement of bone mineral density on a robotic x-ray system, Chumin Zhao, Johns Hopkins Univ. (USA); Christoph Luckner, Magdalena Herbst, Sebastian Vogt, Ludwig Ritschl, Steffen Kappler, Siemens Healthineers (Germany); Jeffrey H. Siewerdsen, Wojciech Zbijewski, Johns Hopkins Univ. (USA) ........ [11312-5]
Coffee Break . . . . . . . . . . . . . . Sun 9:40 am to 10:10 am

SESSION 1 (CONTINUED)
ROOM: HUNTERS CREEK  ...... SUN 8:00 AM TO 9:40 AM
9:20 am: Towards electromagnetic tracking of J-tip guidewire: precision assessment of sensors during bending tests, Roberta Piazza, EndoCAS, Univ. di Pisa (Italy) and Robarts Research Institute (Canada); Hareem Nisar, Robarts Research Institute (Canada) and Western Univ. (Canada); John Moore, Robarts Research Institute (Canada); Sara Condino, EndoCAS, Univ. di Pisa (Italy); Mauro Ferrari, EndoCAS (Italy); Vincenzo Ferrari, EndoCAS, Univ. di Pisa (Italy); Terry Peters, Elvis Chen, Robarts Research Institute (Canada) ........ [11315-5]
Coffee Break . . . . . . . . . . . . . . Sun 9:40 am to 10:10 am

SESSION 1 (CONTINUED)
ROOM: RIVER OAKS  ... SUN 8:00 AM TO 9:40 AM
9:20 am: Use of 3D printed patient-specific neurovascular phantoms to investigate the correlation between disease severity and quantitative angiography data analysis, Lauren M. Shepard, Univ. at Buffalo (USA) and Canon Stroke and Vascular Research Ctr. (USA); Maxim Mokin, Univ. of South Florida (USA); Adnan H. Siddiqui, Kenneth V. Snyder, Univ. at Buffalo (USA) and Canon Stroke and Vascular Research Ctr. (USA); Elad I. Levy, Univ. at Buffalo (USA) and Canon Stroke and Vascular Research Ctr. (USA); Jason M. Davies, Univ. at Buffalo (USA) and Canon Stroke and Vascular Research Ctr. (USA); Stephen Rudin, Canon Stroke and Vascular Research Ctr. (USA); Ciprian N. Ionita, Univ. at Buffalo (USA) and Canon Stroke and Vascular Research Ctr. (USA) ....... [11318-5]
Coffee Break . . . . . . . . . . . . . . Sun 9:40 am to 10:10 am
SESSION 2
ROOM: SALON B  .......... SUN 10:10 AM TO 12:10 PM
CT Reconstructon with DL Techniques I
Session Chairs: Marc Kachelriess, Deutsches Krebsforschungszentrum (Germany); Yingpu Qi, Univer. of California, Davis (USA)
10:10 am: Compressed sensing meets deep learning: a deep learning enabled prior image constrained compressed sensing (DL-PCS) reconstruction framework. Chengzhu Zhang, Yingsheng Li, Guang-hong Chen, Univer. of Wisconsin-Madison (USA) ................................................................. [11312-8]
10:30 am: Generalized iterative sparse-view CT reconstruction with deep neural network, Yongshuai Ge, Ting Su, Jingtong Zhu, Dong Liang, Shenzhen Institutes of Advanced Technology (China) ................................................................. [11312-7]
10:50 am: A deep learning reconstruction method for sparsely spaced multidetector helical CT using cascaded dual-domain CNN. Ao Zheng, Hewei Gao, Li Zhang, Yuixiang Xing, Tsinghua Univ. (China) ........................................................................................................ [11312-8]
11:10 am: Ultra-fast-pitch acquisition and reconstruction in helical CT, Hao Gou, Liqiang Ren, Yang Feng Yu, Mayo Clinic (USA) .................................................................................................................. [11312-9]
11:30 am: Fast spectral x-ray CT reconstruction with data-adaptive, convolutive regularization. Darrin F. Clark, Cristian T. Badea, Duke Univ. Medical Ctr. (Virginia, USA) ........................................................................................ [11312-10]
11:50 am: Semi-supervised learned sinogram restoration network for low-dose CT image reconstruction, Mingqiang Meng, Sui Li, Lisha Yu, Xiao Wang, South China Univ. of Technology (China); Danyang Li, Minnam Zhu, Qi Gao, Southern Medical Univ. (China); Qi Xie, Qian Zhao, Xi’an Jiaotong Univ. (China); Zhanying Bian, Jing Huang, Southern Medical Univ. (China); Deyu Meng, Xi’an Jiaotong Univ. (China); Jianhua Ma, Southern Medical Univ. (China) ........................................................................................................ [11312-11]
Lunch Break ................................. Sun 12:10 pm to 1:20 pm

SESSION 2
ROOM: HUNTERS CREEK  .......... SUN 10:10 AM TO 12:10 PM
AI Methods for Image-guided Therapy
Session Chairs: Stefanie Speidel, National Ctr. for Tumor Diseases Dresden (Germany); Jack H. Noble, Vanderbilt Univ. (USA)
10:10 am: Validation of a metal artifact reduction method based on 3d conditional GANs for CT images of the ear. Jianying Wang, Vanderbilt Univ. (USA) ........................................................................................................ [11312-6]
10:30 am: Ultrasound image simulation with generative adversarial network. Grace Pigueau, Lydia Elbatary, Victoria Wu, Abigail Schonewille, Gabor Fichtinger, Tamas Ungi, Queen’s Univ. (Canada) ........................................................................................................ [11312-7]
10:50 am: Image registration with deep probabilistic classifiers: application in radiation therapy. Alireza Sedghi, Gregory Salomon, Jean-David Jutras, John Schenker, Queen’s Univ. (Canada); William Wells, Brigham and Women’s Hospital (USA); Parvin Mousavi, Queen’s Univ. (Canada) ........................................................................................................ [11312-8]
11:10 am: Automatic labeling of respiratory phases and detection of abnormal respiratory signals in free-breathing thoracic dynamic MR image acquisitions based on deep learning. Changjian Sun, Jayaram K. Udupa, Yubing Tang, Caiyun Wu, Penn Medicine (USA); Joseph A. McDonald, The Children’s Hospital of Philadelphia (USA); Drew Torigian, Penn Medicine (USA); Patrick Caihill, The Children’s Hospital of Philadelphia (USA) ........................................................................................................ [11312-9]
11:30 am: Image-based deformable motion compensation in cone-beam CT: translation to clinical studies in interventional body radiology. Sarah Capostagno, Alejandro Sainiego, Joseph W. Stayman, Johns Hopkins Univ. (USA); Tina Ettuati, Siemens Medical Solutions USA, Inc. (USA); Clifford R. Weiss, Jeffrey H. Siewers, Johns Hopkins Univ. (USA) ........................................................................................................ [11312-10]

SESSION 2
ROOM: RIVER OAKS  .......... SUN 10:10 AM TO 12:10 PM
Big Data Management Platforms
Session Chair: Brian J. Park M.D., Penn Medicine (USA)
10:10 am: Scalable Quality Assurance for Neuroimaging (SQAN) - data management and quality control. Michael D. Young, Andrea Avena-Koengsberger, Soichi Hayashi, Arvind Gopu, Parvaneh Technology Institute, Indiana Univ. (USA); John D. West, Indiana Univ. School of Medicine (USA); Meiakatsukibundaram Paramasivam, RADY Imaging Ctr. (USA) ........................................................................................................ [11313-6]
10:30 am: PIM: a visualization-oriented web application for monitoring and debugging of large-scale image processing studies, Thomas Kros, Leiden Univ. Medical Ctr. (Netherlands); Hakim Achetberg, Marcel Koek, Arndt Vansteeg, Wiro Niessen, Aard van der Lught, Ehrasmus MC (Netherlands); Peter van het Hof, Baldir van Leew, Boudewijn Leewievelt, Leiden Univ. Medical Ctr. (Netherlands) ........................................................................................................ [11313-7]
10:50 am: Preprocessing of clinical neuro- oncology MRI studies for big data applications. Safratj Chakraborty, Pamela LaMontagne, Daniel S. Marcus, Mikhail Milchenko, Washington Univ. in St. Louis (USA) ........................................................................................................ [11313-8]
11:10 am: Exploiting the PubMed central repository to mine out a large multimodal dataset of rare cancer studies. Anjali K. Dhrangadhariya, Oscar Jimenez-del-Toro, Vincent Andrearczyk, Manfredo Atzori, Henning Müller, HES-50 Valais-Wallis (Switzerland) ........................................................................................................ [11313-9]
11:30 am: SNIPB; Stroke Neuroimaging Phenotype Repository. Hosein Mohammad Foroushaki, Washington Univ. in St. Louis (USA); Rajat Dhar, Yasheng Chen, Jenny Gunrey, Ali Hamzehloo, Jim-Moo Lee, Daniel S. Marcus, Washington Univ. School of Medicine in St. Louis (USA) ........................................................................................................ [11313-10]
11:50 am: WeLineation: crowdsourcing delineations for reliable ground truth estimation. Saksham Goel, Yash Sharma, Indian Institute of Technology Bombay (India); Matte-Levin, Jauer, Thomas M. Deserno, Peter L. Reichertz Institut für Medizinische Informatik, Medizinischen Hochschule Hannover (Germany) ........................................................................................................ [11313-11]
SUNDAY 16 FEBRUARY

CONFERENCE 11312
ROOM: SALON A
Sunday–Wednesday 16–19 Feb. 2020
Proceedings of SPIE Vol. 11312

CONFERENCE 11314
ROOM: SALON B
Sunday–Wednesday 16–19 Feb. 2020
Proceedings of SPIE Vol. 11314

CONFERENCE 11315
ROOM: HUNTERS CREEK
Sunday–Wednesday 16–19 Feb. 2020
Proceedings of SPIE Vol. 11315

CONFERENCE 11318
ROOM: RIVER OAKS
Sunday–Monday 16–17 Feb. 2020
Proceedings of SPIE Vol. 11318

CONFERENCE 11319
ROOM: SALON C
Sunday–Tuesday 16–18 Feb. 2020
Proceedings of SPIE Vol. 11319

SUNDAY/MONDAY POSTER VIEWING
ROOM: SALON D/E ........ 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 ............. Mon 12:10 pm to 1:20 pm

THIS PDF PROGRAM IS CURRENT AS OF 28 OCTOBER 2019. Find complete, up-to-date information and create your personalized schedule at spie.org/mi20program
SUNDAY 16 FEBRUARY

CONFERENCE 11312
ROOM: SALON A
Sunday–Wednesday 16–19 Feb. 2020
Proceedings of SPIE Vol. 11312

CONFERENCE 11314
ROOM: SALON B
Sunday–Wednesday 16–19 Feb. 2020
Proceedings of SPIE Vol. 11314

CONFERENCE 11315
ROOM: HUNTERS CREEK
Sunday–Wednesday 16–19 Feb. 2020
Proceedings of SPIE Vol. 11315

CONFERENCE 11318
ROOM: RIVER OAKS
Sunday–Monday 16–17 Feb. 2020
Proceedings of SPIE Vol. 11318

CONFERENCE 11319
ROOM: SALON C
Sunday–Tuesday 16–18 Feb. 2020
Proceedings of SPIE Vol. 11319

SESSION 3
ROOM: SALON B  ...  SUN 1:20 PM TO 3:00 PM
Photon Counting Detectors
Session Chairs: Mats Danielsson, KTH Royal Institute of Technology (Sweden); Stephen J. Glick, U.S. Food and Drug Administration (USA)
1:20 pm: Multi-energy inter-pixel coincidence counters for charge sharing in photon counting detectors: assessment at a normalized spatial resolution, Katasuku Taguchi, Johns Hopkins Univ. School of Medicine (USA) .................. [11312-12]
1:30 pm: A study of energy resolution in CPD indirect photon-counting imaging, Tohuiyi Nishihara, Sony Semiconductor Solutions Corp. (Japan); Hiroyu Abe, Sony Global Manufacturing & Operations Corp. (Japan); Ochi Kumagai, Takashi Izawa, Sony Semiconductor Solutions Corp. (Japan); Norimitsu Shinohara, Gifu Univ. of Medical Science (Japan); Izawa, Sony Semiconductor Solutions Corp. (Japan); & Operations Corp. (Japan); Oichi Kumagai, Takashi Mihara, Johns Hopkins Univ. (USA) .................. [11312-13]
2:00 pm: 1 μm spatial resolution in silicon photon-counting CT detectors by measuring charge diffusion, Christel Sundberg, Mats Persson, KTH Royal Institute of Technology (Sweden); J. Jacob Wikner, Linköping Univ. (Sweden); Mats Danielsson, KTH Royal Institute of Technology (Sweden) .................. [11312-14]
2:20 pm: Hybrid energy-integrating and photon-counting micro-CT, Matthew Haltbrak, Duke Univ. School of Medicine (USA); Darin P. Clark, Duke Univ. School of Medicine (USA); Darin P. Clark, Duke Univ. School of Medicine (USA) .................. [11312-15]
2:40 pm: Performance of amorphous selenium based unipolar charge sensing detector for photon-counting X-ray imaging, Ahmet Cakmak, Univ. of Waterloo (Canada); Denny Lee, Direct X Ray Digital Imaging Technology, LLC (USA); Hyunsang Jang, Vieworks Co., Ltd. (Korea, Republic of); Salim M. Arnab, Concordia Univ. (Canada); Yuan Fang, Mimosa Diagnostics Inc. (Canada); M. Z. Kabir, Concordia Univ. (Canada); Karim S. Karim, Univ. of Waterloo (Canada) .................. [11312-16]

SESSION 3
ROOM: SALON B  ...  SUN 1:20 PM TO 3:00 PM
Neuro I
1:20 pm: Combining symmetric and standard deep convolutional representations for detecting acute hemorrhagic stroke, Arko Barman, UT Health Science Ctr. at Houston (USA); Victor Lopez-Rivera, Songmi Lee, Farhaan Vahidy, James Z. Fan, Sean L. Savitz, Sunil A. Sheth, Luca Giancardo, The Univ. of Texas Health Science Ctr. at Houston (USA) .................. [11312-14]
1:40 pm: Generative synthetic adversarial network for internal bias correction and handling class imbalanced problem in multi-class medical image classification, Mira Rezaei, Massachusetts General Hospital, Harvard Medical School (USA); Janne Nappi, Hirohito Yoshida, Massachusetts General Hospital, Harvard Medical School (USA); Konstantin Harmuth, Hasso-Plattner-Institut (Germany); Christoph Meinel, Hasso-Plattner-Institut (Germany) .................. [11312-15]
2:00 pm: Automatic detection of contrast enhancement in T1-weighted brain MRI of human adults, Mihail Milchenko, Pamela LaMontagne, Daniel Marcus, Washington Univ. School of Medicine St. Louis (USA) .................. [11312-16]
2:20 pm: A hypersacrum stroke segmentation method using 3D U-Net integrated with physicians’ knowledge for NCCT, Takuya Fuchigami, Sadato Akahori, FUJIFILM Corp. (Japan); Takuyuki Okatani, Graduate School of Information Sciences, Tohoku Univ. (Japan) and RIKEN Ctr. for Advanced Intelligence Project (Japan); Yuzhong Li, FUJIFILM Corp. (Japan) .................. [11312-15]
2:40 pm: Deep learning with context encoding for semantic brain tumor segmentation and patient survival prediction, Khan M. Rehkaruddin, Monibor MD Rahman, Limmin Pei, Lasitha Vidyanayake, Old Dominion Univ. (USA) .................. [11312-16]

CONFERENCE 11315
ROOM: HUNTERS CREEK  ...  SUN 1:20 PM TO 3:00 PM
Image-guided Orthopedic Applications
Session Chairs: David R. Haynor, Univ. of Washington (USA); Parvin Mousavi, Queen’s Univ. (Canada)
1:20 pm: Infrared image-guidance for intraoperative assessment of limb length discrepancy during total hip arthroplasty orthopedic procedures, Jerry Yan, Akash Chauara, Katie McCarron, Robert Li, Claire State, Hannah Takasaka, Evan Bender, Aditi Jhendara, Matthew Hill, Julio Wu, Amir Manbachi, Johns Hopkins Univ. (USA) .................. [11312-15]
1:40 pm: Three-dimensional ultrasound for monitoring knee inflation and cartilage damage in osteoarthritis and rheumatoid arthritis, Sam Papernick, Derek J. Gilles, Tom Appleton, Aaron Fenster, Western Univ. (Canada) .................. [11312-15]
2:00 pm: Multi-body registration for fracture reduction and guidance of orthopaedic trauma surgery, Runze Han, Ali Uneri, Pengwei Wu, Prasad Vadgadi, Rohan C. Vijayan, Michael D. Ketcha, Niraj Sheth, Johns Hopkins Univ. (USA); Sebastian Vogt, Gerhard Kleinschmi, Siemens Healthineers (Germany); Jeffrey H. Siewerdsen, Johns Hopkins Univ. (USA) .................. [11312-15]
2:20 pm: Calibration and registration of a freehand video-guided surgical drill for orthopaedic trauma, Prasad Vadgadi, Ali Uneri, Niraj Sheth, Alejandro Siemins, Thanhdui De Silva, Johns Hopkins Univ. (USA); Greg M. Osgood, Johns Hopkins Medicine (USA); Jeffrey H. Siewerdsen, Johns Hopkins Univ. (USA) .................. [11312-15]
2:40 pm: MRI-compatible needle guidance toolkit that streamlines arthrography procedures: phantom accuracy study, Reza Montafari, Pavel Yarmolenko, Children’s National Health System (USA); Eung Joo Lee, Univ. of Maryland, College Park (USA); Viktoriya Beskin, Kevin Cleary, Karun Sharma, Children’s National Health System (USA) .................. [11312-16]

SESSION 3
ROOM: RIVER OAKS  ...  SUN 1:20 PM TO 3:00 PM
Deep Learning Diagnostics
Session Chair: William Y. Hsu, Univ. of California, Los Angeles (USA)
1:20 pm: Breast cancer classification from digital breast tomosynthesis using 3D multi-subvolume approach, Emine Doganay, Univ. of Pittsburgh (USA); Pucih Li, Yihong Luo, Lianison Cancer Hospital & Institute (China); Yuan Guo, Ruimei Chai, Shandong Wu, Univ. of Pittsburgh (USA) .................. [11312-16]
1:40 pm: Automated detection of microcalcifications in color fundus images using deep learning with different preprocessing approaches, Meyasam Tavakoli, Indiana Univ.-Purdue Univ. Indianapolis (United States); Mahdieh Nazar, Shahid Beheshti Univ. of Medical Sciences (Iran, Islamic Republic of) .................. [11312-37]
2:00 pm: A two-stage deep learning architecture for Schizophrenia with structure-enforced collaborative regression, Yuntong Bai, Isabelle Lian, Xiao Zhang, Anqi Liu, Tulane Univ. (United States); Vinc D. Cahoun, Ctr. for Translational Research in Neuroimaging and Data Science (USA); Yu-Ping Wang, Tulane Univ. (USA) .................. [11312-42]
2:20 pm: Two-stage deep learning architecture for pneumonia detection and its diagnosis in chest radiographs, Venkata Salini Priyamvada Davuluri, Barath Narayanan Narayanan, Russell C. Hardie, Univ. of Dayton (USA) .................. [11312-15]
2:40 pm: Deep super-resolution network on diffusion weighted imaging for improving prediction of histological grade in breast cancer, Zhuoli Liu, Ming Fan, Hangzhou Dianzi Univ. (China); Shiwai Wang, Maosheng Xu, First Affiliated Hospital, Zhejiang Chinese Medical Univ. (China); Lihua Li, Hangzhou Dianzi Univ. (China) .................. [11312-16]

CONFERENCE 11318
ROOM: RIVER OAKS
Sunday–Monday 16–17 Feb. 2020
Proceedings of SPIE Vol. 11318

CONFERENCE 11319
ROOM: SALON C
Sunday–Tuesday 16–18 Feb. 2020
Proceedings of SPIE Vol. 11319

USCT and 3D Ultrasound
1:20 pm: Quantitative Breast Density (QBD) estimation with 3D transmission ultrasound and incomplete information, James W. Wiskin, Sam Lee, Rajee Natesan, Bilal Malik, QT Ultrasound LLC (USA) .................. [11312-13]
1:30 pm: Attenuating significant differences in breast density assessment using 3D transmission ultrasound, Bilal H. Malik, Sanghyeb Lee, Rajee Natesan, James W. Wiskin, QT Ultrasound LLC (USA) .................. [11313-14]
2:40 pm: Clustering-based quantitative breast density assessment using 3D transmission ultrasound, Bilal H. Malik, Sanghyeb Lee, Rajee Natesan, James W. Wiskin, QT Ultrasound LLC (USA) .................. [11313-14]

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

CONF. 11312 continued page 31  ➤
CONF. 11314 continued page 31  ➤
CONF. 11315 continued page 31  ➤
CONF. 11318 continued page 31  ➤
CONF. 11319 continued page 31  ➤
SESSION 4 (CONTINUED)
ROOM: SALON B  ....... SUN 3:30 PM TO 5:30 PM
4:50 pm: A complex dual-modality kidney phantom for renal biopsy studies, Jose Vargas, Phuc Le, Maysam Shahedi, Sarah Shahub, The Univ. of Texas at Dallas (USA); Jeffrey Gahan, Brett Johnson, The Univ. of Texas Southwestern Medical Ctr. at Dallas (USA); Matthew Pfefferle, Blake O. Judson, Yasmeen Alshara, The Univ. of Texas at Dallas (USA); Qimmei Li, The Univ. of Texas at Dallas (USA) and The Second Affiliated Hospital of Guangzhou Medical Univ. (China); James D. Dormer, The Univ. of Texas at Dallas (USA); Baowei Fei, The Univ. of Texas at Dallas (USA) and The Univ. of Texas Southwestern Medical Ctr. at Dallas (USA) ......... [11319-17]

5:10 pm: Integration of optical and virtual colonoscopy images for enhanced classification of colorectal polyps, Marc J. Pomeroy, Stony Brook Univ. (USA); Yi Wang, Tianjin Univ. (China); Anushka Banerjee, Aimas Abbas, Matthew A. Barish, Edward Sun, Juan Carlos Bucobo, Stony Brook Univ. (USA); Perry J. Pickardt, Univ. of Wisconsin-Madison (USA); Zhengrong Liang, Stony Brook Univ. (USA) ................. [11314-22]

WORKSHOP
ROOM: SALON B  ....... SUN 5:45 PM TO 7:45 PM
Workshop: Live Demonstrations
Workshop Chairs: Dr. Lubomir Hadjiiski, Univ. of Michigan Health System (USA); Dr. Karen Drukker, Univ. of Chicago (USA)
The Royal Surrey County Hospital NHS Trust
Wells, Ignacio Hernandez Montilla, Univ. of Surrey
rectangular arrays of X-ray emitters for digital
(AUSA)  ................................ [11312-26]
A. Fessler, Heang-Ping Chan, Univ. of Michigan

9:00 am:
Deep convolutional neural network
Stayman, Johns Hopkins Univ. (USA) .... [11312-25]
Bambot, Fischer Imaging Corp. (USA); Joseph W.
Grace J. Gang, Alejandro Sisniega, Wenying Wang,
, Andrew Leong,
Medicine (USA) .................... [11312-24]
Hailiang Huang, Xiaoyu Duan, Wei Zhao, Stony Brook

using dual energy digital breast tomosynthesis
Volumetric breast density estimation
8:20 am:
Zhang, John W. Garrett, Guang-Hong Chen, Ke Li,
(USA)  ................................ [11312-23]
Ran
prototype system 2.0: fast data acquisition
technique without spatial resolution loss
, Patrick J. La Rivière,
Breast Imaging: New Technology
SESSION 5
ROOM: SALON B  .... MON 8:00 AM TO 9:40 AM
Musculoskeletal
8:00 am:
Accurately identifying vertebral levels in large datasets. Daniel Elton, Veit Sandfort,
National Institutes of Health Clinical Ctrl. (USA); Perry
J. Pickhardt M.D., Univ. of Wisconsin-Madison (USA);
Ronald M. Summers M.D., National Institutes of
Health Clinical Ctrl. (USA). .......................... [11314-23]
8:20 am:
Supervised learning for predicting
total knee replacement with unsupervised data
augmentation. Jérémie Tan, Bofei Zhang, Kiyonori
Bourtzis, New York Univ. (USA); Gregory Chang, Cem M.
Deniz, NUI Langone Health (USA) ............ [11314-24]
8:40 am:
Deciphering tissue relaxation parameters from a single MR image using
deep learning. Yan Wu, Stanford Univ. (USA); Yajun Ma,
Jiang Du, Univ. of California, San Diego (USA); Dante
Capaldi, Lei Xing, Stanford Univ. (USA). ....... [11314-25]
9:00 am:
Automatic Kellgren-Lawrence grade
estimation driven deep learning algorithms.
Nianyi Li, Albert Swiecicki, Nicholas Said, Jonathan
O’Donnell, Mazed A. Mazanowski, Duke Univ.
(USA) .......................................................... [11314-26]
9:20 am:
Computer-aided detection of focal
bone metastases from whole-body multi-modal
MRI. Jakub Ceranka, Vrije Univ. Brussel (Belgium);
Frederic Lecouvet, Cliniques Univ. Saint-Luc
(Belgium); Johan De Mey, Vrije Universiteit Brussel
(Belgium); Jef Vandermeulebroecke, Vrije Univ.
Brussel (Belgium) ......................................... [11314-27]
Coffee Break. ................................. [Mon 9:40 am to 10:10 am]

SESSION 5
ROOM: HUNTERS CREEK  .... MON 8:00 AM TO 9:40 AM
Image-guided Neurosurgical Interventions
Session Chairs: Ivor Wolf, Hochschule
Mannheim (Germany); David M. Kwartzwitz,
Grand Canyon Univ. (USA) .................... [11315-20]
8:00 am:
Comparison of head pose tracking methods for mixed-reality neuro-navigation
for transcranial magnetic stimulation. Supriya
Sathyaranyakar, Christoph Leuze, Brian Hargreaves,
Bruce L. Daniel, Jennifer A. McNab, Stanford Univ.
(USA) .......................................................... [11315-21]
8:20 am:
Localisation of the subthalamic nucleus in MRT via convolutional neural networks
for deep brain stimulation planning. John S. H.
Baxter, Eheurn Maguet, Pierre Jannin, Univ. de
Rennes 1 (France) ........................ [11315-22]
8:40 am:
Intraoperative thermographic perfusion
mapping in neurosurgery using regularized
semiparametric regression. Juliane Müller,
Universitätsklinikum Carl Gustav Carus Dresden,
TU Dresden (Germany); Nico Hoffmann, Helmholtz-
Zentrum Dresden-Rossendorf e. V. (Germany); Martin
Oelschlägel, Christian Schnabel, Gerhard Steiner,
Edmund Koch, Stephan B. Sobottka, Gabriele
Schackert, Universitätsklinikum Carl Gustav Carus
Dresden, TU Dresden (Germany); Matthias Kirch,
Universitätsklinikum Carl Gustav Carus Dresden,
TU Dresden (Germany) and Asklepios Kliniken
GmbH (Germany) ................... [11315-23]
9:00 am:
A guidance system for electrode
placement in epilepsy cases. Xiaoyao Fan, David
W. Roberts, Keith D. Paulsen, Dartmouth College
(USA) .......................... [11315-24]
9:20 am:
Brain deformation compensation for
deep brain lead placement surgery: a comparison of simulations driven by surface and deep brain
sparse data. Chen Li, Xiaoyao Fan, Joshua P.
Aronson, Keith D. Paulsen, Dartmouth College
(USA) .......................................................... [11315-25]
Coffee Break. ................................. [Mon 9:40 am to 10:10 am]

SESSION 5
ROOM: RIVER OAKS  .... MON 8:00 AM TO 9:40 AM
Explainable Artificial Intelligence
Session Chair: Po-Hao Chen M.D.,
Cleveland Clinic (USA)
8:00 am:
Impact of data augmentation techniques
on a deep learning based medical imaging task.
Sandeep Dutta, Prakhar Prakash, GE Healthcare
(USA) .......................................................... [11318-21]
8:20 am:
A method of dividing clinical data for
medical image AI training. Dezhong Zheng, The
Shanghai Institute of Technical Physics (China);
Zhanyang Yang, The Shanghai Institute of Technical
Physics (China); Wentao Li, Fudan Univ. Shanghai
Cancer Ctr. (China) ................... [11318-22]
8:40 am:
The strategy of tumor quantification
based on unsupervised learning features: a
feasibility study. Yidong Wan, Lei Xu, Pengfei Yang,
Zuzhao Gao, Chen Luo, Zhejiang Univ. (China);
Jesse Wu, Daming Shen, Zhejiang Univ. (China).

SESSION 5
ROOM: SALON C  .... MON 8:00 AM TO 9:40 AM
USCT and 3D Ultrasound II
8:00 am:
Comprehensive quantitative evaluations
of reconstruction method using oil-gel-based
phantom in ultrasound computed tomography.
Atsuo Suzuki, Hitachi, Ltd. (Japan) ........ [11319-19]
8:20 am:
Fat ultrasound transmission
tomography: preliminary experimental results
with simulated data. Torsten Hopp, Franziska Zuch,
Nicole Rüter, Karlsruhe Institut für Technologie
(Germany) ........................ [11319-20]
8:40 am:
Incident angle-dependent gain
correction for reflectance images on ultrasound
computed tomography. Yuki Tsuobuta, Takahide
Terada, Atsuo Suzuki, Wenhui Wu, Kazuhiro
Yamakawa, Hitachi, Ltd. (Japan); Hiroko Yamashita,
Motsumi Nishida, Fumi Kato, Megumi Sato,
Hokkaido Univ. Hospital (Japan); Ken-ichi Kawabata,
Hitachi, Ltd. (Japan) ................ [11319-21]
9:00 am:
Variational mode decomposition
for ultrasound computed tomography.
Shanshan Wang, Liang Zeng, Hubei Univ. of Technology
(China); Ming Yuchi, Mingyu Ding, Huazhong Univ.
of Science and Technology (China) .................. [11319-22]
9:20 am:
Improvements on USCT SAFT imaging
by divergence compensation. Diego A. Cardenas
Cardenas, Sergio Shigeharu Furue, Univ. de São
Paulo (Brazil) .......................... [11319-23]
Coffee Break. ................................. [Mon 9:40 am to 10:10 am]
CONFERENCE 11312
ROOM: SALON A
Sunday–Wednesday 16–19 Feb. 2020
Proceedings of SPIE Vol. 11312

INNOVATIONS IN NUCLEAR MEDICINE AND MRI

Monday, February 17, 2020
9:00 AM–5:00 PM
Conferences Room 11312

Chair: Guan-Hong Chen, Univ. of Wisconsin School of Medicine and Public Health (USA); Quanzheng Li, Massachusetts General Hospital (USA)

11:10 AM: Joint-low-count PET/CT segmentation and reconstruction with paired variational neural networks, Hongki Lim, Yuni K. Dewaraja, Jeffrey A. Schmidtlein, Memorial Sloan-Kettering Cancer Ctr. (USA); Andrzej Krol, SUNY Upstate Medical Univ. (USA).

11:30 AM: Medical image reconstruction with imaging physics of generative adversarial networks, Sayantan Bhadra, Weimin Zhou, Washington Univ. in St. Louis (USA); Mark A. Anastasio, Univ. of Illinois (USA).


12:10 PM: Al-based methods for Tissue Classification: Diagnosis and Therapy Applications, Session Chair: Jeffrey H. Wierswesdor, Johns Hopkins Univ. (USA).


1:10 PM: Future PACS and software, Session Chair: Ayll Kohli, Penn Medicine (USA).
SESSION 7
ROOM: SALON A . . . . . . . MON 1:20 PM TO 3:40 PM

Detecto Technologies
Session Chairs: Rebecca Fahrig, Siemens Healthineers (Germany); Karin S. Karim, Univ. of Waterloo (Canada)
1:20 pm: Initial characterization of a hybrid-direct inverse active matrix flat panel imager for digital radiography, Adrian F. Howansky, Stony Brook Univ. (USA); Anastasiia Mishchenko, Sébastien Adrian F. Howansky, Stony Brook Univ. (USA); Koen Van Leemput, Univ. of Liubljana (Slovenia); Wolfgang Wein, IM Fusion GmbH (Germany)
SESSION 1
ROOM: BRIARGROVE . . . . . . . MON 1:20 PM TO 3:40 PM

Image Synthesis, GANs, and Novel Architectures
1:20 pm: Multi-modality MRI arbitrary transformation using unified generative adversarial networks, Yifei Ji, Yabo Fu, Hu Mao, Walter L. Carr, Tian Liu, Xingfang Yang, Emory Univ. (USA) ...
1:40 pm: Joint intensity fusion with normalized cross-correlation for cross-modality MRI synthesis, Kathryn Ufford, Ipek Oguz, Vanderbilt Univ. (USA); Simon Vandekar, Vanderbilt Univ. Medical Ctr. (USA) ...
2:00 pm: Multi-frequency super-resolution loss for GAN-based super-resolution of clinical CT images using micro CT image database, Lixiang Shen, Albert K. Liang, Youssef El-Mohri, Gihua Zhao, Larry E. Antonuk, Univ. of Michigan (USA) ...
2:40 pm: Novel irradiation side sampling system flexible flat panel detectors with high image quality and light weight, Shrishki Ushikita, Tatsunori Tanimoto, Munetaka Kato, Takashi Tajima, Hisao Fujwara, Keiichi Akamatsu, Yoshinori Okada, FUJIRLM Corp. (Japan) ...

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

Breast MRI / Skin
1:20 pm: Explainable AI for medical imaging: deep-learning CNN ensemble for classification of estrogen receptor status from breast MRI, Zachary Papanastassiou, Ravi K. Samala, Heang-Ping Chang, Lubomir Hadijski, Chintana Paramagul, Mark A. Helvie, Colleen H. Neal, Univ. of Michigan (USA) ...
1:40 pm: Long short-term memory networks predict breast cancer recurrence in analysis of consecutive MRIs acquired during the course of neoadjuvant chemotherapy, Karen Drukker, Univ. of Chicago Medical Ctr. (USA); Alexandra Edwards, John Papapapadopoulos, Mark Giger, Univ. of Chicago Medical Ctr. (USA) ...
2:00 pm: Using ResNet feature extraction in computer-aided diagnosis of breast cancer on 927 lesions imaged with multiparametric MRI, Oxana Hl, The Univ. of Chicago (USA); Heather M. Whitney, Wheaton College (USA) and The Univ. of Chicago (USA); Murugesan M. G. Pillai, The Univ. of Chicago (USA) ...
2:20 pm: Interpretable deep learning regression for breast density estimation on MRI, Bas H.M. van der Velden, Max A. A. Ragusi, Maximilian K. A. Jasper, Univ. Medical Ctr. Utrecht (Netherlands); Claudette E. Loo, The Netherlands Cancer Institute-Antoni van Leeuwenhoek Hospital (Netherlands); Mats G. A. Gilhus, Univ. Medical Ctr. Utrecht (Netherlands) ...
2:40 pm: MRI image harmonization using cycle-consistent generative adversarial network, Gourav Gupta, Mark H. A. Jansen, Max A. A. Ragusi, Marius H. J. A. Jansen, Univ. Medical Ctr. Utrecht (Netherlands); Claudette E. Loo, The Netherlands Cancer Institute-Antoni van Leeuwenhoek Hospital (Netherlands); Mats G. A. Gilhus, Univ. Medical Ctr. Utrecht (Netherlands) ...
3:00 pm: Melanoma detection with electrical impedance spectroscopy and dermoscopy using joint deep learning models, Nils Gessert, Marcel Beng, Alexander Schlaefer, Technische Univ. Hamburg-Harburg (Germany) ...

SESSION 8
ROOM: HUNTERS CREEK . . . . . . . MON 1:20 PM TO 2:20 PM

Keynote Presentation
Session Chairs: Cristian A. Linte, Rochester Institute of Technology (USA); Baowei Fei, The Univ. of Texas at Dallas (USA)
1:20 pm: Healthcare in need of innovation: (exponential) technology and biomedical entrepreneurship as solution providers (Keynote Presentation), Michael Friede, Otto-von-Guericke Univ. Magdeburg (Germany) ...

SESSION 9
ROOM: HUNTERS CREEK . . . . . . . MON 2:20 PM TO 3:40 PM

Augmented Reality for Image-guided Therapy
Session Chairs: Eric J. Seibel, Univ. of Washington (USA); Maryam E. Rettmann, Mayo Clinic (USA)
2:20 pm: Augmented reality visualization of hyperspectral imaging classifications for image-guided brain tumor resection, James Huang, Martin Halicek, Maysam Shahedi, Baowei Fei, The Univ. of Texas at Dallas (USA) ...
2:40 pm: Accuracy study of Smartglasses/Smartphone AR systems for percutaneous needle interventions, Reza Seifi badi, Ming Li, Dilara Long, Sheng Xu, Bradford J. Wood, National Institutes of Health Clinical Ctr. (USA); Qingdong Yang, Emory Univ. (USA) ...
2:40 pm: Deep-learning-based multi-organ segmentation in pancreatic CT image, Yingzi Liu, Yang Li, Yabo Fu, Tonghe Wang, Xiaojun Jiang, Tian Liu, Walter Carr, Marquita C. Craft, Xiaofeng Yang, Emory Univ. (USA) ...
3:00 pm: Skin cancer segmentation and classification with improved deep convolutional neural network, Mi Zhang, Talmud Suthar, The Univ. of Texas at Dallas (USA); Majid Chalaei, The Univ. of Texas at Dallas (USA); Max A. A. Ragusi, Yabo Fu, The Univ. of Texas at Dallas (USA) and The Univ. of Texas Southwestern Medical Ctr. at Dallas (USA) ...

SESSION 7
ROOM: RIVER OAKS . . . . . . . MON 2:00 PM TO 3:20 PM

Deep Learning Segmentation
Session Chair: Shandong Wu, Univ. of Pittsburgh (USA)
1:20 pm: Fully automated tumor segmentation in breast DCE-MRI using deep learning and kinetic prior, Lei Zhang, Dooman Arifian, Yuan Guo, Shandong Wu, Univ. of Pittsburgh (USA) ...
1:40 pm: Deep learning cervix anatomical landmark segmentation and evaluation, Peng Guo, Zhiyun Xue, Leonard R. Long, Sameer K. Antani, U. National Library of Medicine (USA) ...
2:00 pm: Automated coronary artery segmentation in Coronary Computed Tomography Angiography (CCTA) using deep learning neural networks, Bang Jun Guo, Emory Univ. (USA); Yang Lei, Emory Univ. (USA); Yabo Fu, Tonghe Wang, Tian Liu, Walter Carr, Marquita C. Craft, Xiaofeng Yang, Emory Univ. (USA) ...
2:20 pm: Coffee Break .... Mon 3:40 pm to 4:00 pm
2:40 pm: Cycle-consistent generative adversarial network for image-guided brain tumor resection, James Huang, Martin Halicek, Maysam Shahedi, Baowei Fei, The Univ. of Texas at Dallas (USA) ...
3:00 pm: Skin cancer segmentation and classification with improved deep convolutional neural network, Mi Zhang, Talmud Suthar, The Univ. of Texas at Dallas (USA); Majid Chalaei, The Univ. of Texas at Dallas (USA); Max A. A. Ragusi, Yabo Fu, The Univ. of Texas at Dallas (USA) and The Univ. of Texas Southwestern Medical Ctr. at Dallas (USA) ...
3:20 pm: Quantitative ultrasound successes: past, present, and future (Keynote Presentation), Michael Oelze, Beckman Institute for Advanced Science and Technology (USA) ...
3:40 pm: Coffee Break. . . Mon 3:40 pm to 4:00 pm

SESSION 8
ROOM: HUNTERS CREEK . . . . . . . MON 2:20 PM TO 3:20 PM

Deep Learning Segmentation
Session Chair: Shandong Wu, Univ. of Pittsburgh (USA)
1:20 pm: Fully automated tumor segmentation in breast DCE-MRI using deep learning and kinetic prior, Lei Zhang, Dooman Arifian, Yuan Guo, Shandong Wu, Univ. of Pittsburgh (USA) ...
1:40 pm: Deep learning cervix anatomical landmark segmentation and evaluation, Peng Guo, Zhiyun Xue, Leonard R. Long, Sameer K. Antani, U. National Library of Medicine (USA) ...
2:00 pm: Automated coronary artery segmentation in Coronary Computed Tomography Angiography (CCTA) using deep learning neural networks, Bang Jun Guo, Emory Univ. (USA); Yang Lei, Emory Univ. (USA); Yabo Fu, Tonghe Wang, Tian Liu, Walter Carr, Marquita C. Craft, Xiaofeng Yang, Emory Univ. (USA) ...
2:20 pm: Coffee Break .... Mon 3:40 pm to 4:00 pm
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3:20 pm: Quantitative ultrasound successes: past, present, and future (Keynote Presentation), Michael Oelze, Beckman Institute for Advanced Science and Technology (USA) ...
3:40 pm: Coffee Break. . . Mon 3:40 pm to 4:00 pm
SESSION 7 (CONTINUED)
3:20 pm: A multidimensional scaling and sample clustering to obtain a representative subset of training data for transfer learning based Rosacea lesion identification. Hamidullah Binal, M. Khalid Khan Niazi, Wake Forest Ctr. for Biomedical Informatics (USA); Benjamin Kaffenberger, The Ohio State Univ. (USA); Metin N. Gurcan, Wake Forest Ctr. for Biomedical Informatics (USA) ... [11314-38]

Coffee Break... Mon 3:40 pm to 4:00 pm

SESSION 9 (CONTINUED)
3:20 pm: Towards augmented reality-based suturing in monocular laparoscopic training. Chandrakanth Jayachandran Preetha, Otto-von-Guericke Univ. Magdeburg (Germany); Fabian Siegried Wehrtmann, UniversitätsKlinikum Heidelberg (Germany); Lalith Sharan, Hochschule Mannheim (Germany); Carolyn Fan, UniversitätsKlinikum Heidelberg (Germany); Jonathan Kloss, Otto-von-Guericke Univ. Magdeburg (Germany); Beat Peter Müller-Stich, Nickel Felix, UniversitätsKlinikum Heidelberg (Germany); Sandy Engelhardt, Hochschule Mannheim (Germany). ... [11315-32]

Coffee Break... Mon 3:40 pm to 4:00 pm

Awards and Plenary Session
Session Chairs: Metin N. Gurcan, Wake Forest Baptist Medical Ctr. (USA) and Georgia D. Tourassi, Oak Ridge National Lab. (USA)

4:00 PM - 4:30 PM: Award presentations
4:30 pm: Are today’s Mixed Reality experience pillars and hardware architectures well aligned with the specific needs of medical imaging and surgical guidance? (Plenary), Bernard C. Kress, Microsoft Corp. (USA)
Active semi-supervised expectation-maximization learning for lung cancer detection from Computed Tomography (CT) images with minimally labeled training data, Phuong Nguyen, Yuchen Du, Meiyan Lu, University of Maryland, Baltimore County (USA); Michael Morris, Jeremy M. V. Cheung, Medical University of South Carolina (USA); Xingde Li, University of Maryland, College Park (USA) ........ [11314-83]

Artificially augmenting data or adding more samples? A study on a 3DN for lung nodule classification, Panagiotis Gogos, David Elsinga, Diederik Sijtsma, TU Delft (Netherlands); Jeroen J. M. Kruijssen, Maastricht University (Netherlands); Xi Zhai, Medical University of Graz (Austria) .......... [11314-84]


Deep learning-based automatic reporting system for lung cancer screening program, HyoJun Park, Seungho Lee, Gwanpoangee Park, Minspark Park, Jin-Kyeong Sung, Sangkeun Kim, Kyu-Hwan Jung, VUNO, University of Maryland, Baltimore County (USA); Michael Morris, Jeremy M. V. Cheung, Medical University of South Carolina (USA) .......... [11314-86]

Deep convolutional neural networks for molecular subtyping of gliomas using magnetic resonance imaging, Dong Wei, Tencent (China); Yiming Li, Yinyan Wang, Capital Medical Univ. (China); Tianyi Qian, Tencent (China) and Simulation Ventures (China); Yefeng Zheng, Tencent (China) ........ [11314-91]

Lesion conditional image generation for improved segmentation of intracranial hemorrhage from CT images, Daniel de la Fuente, Catalin Karki, Kjetil Karlsoe, and CADE SYSTEMS (USA) .......... [11314-92]

Feasibility of using recurrent neural networks to predict treatment outcome of intracranial aneurysms using angiographic parametric imaging, Mohammad Mahdi Shiraz Bhurwani, Daiwuo Lee, Amina A. Rana, Alexander R. Podgorski, University of Buffalo (USA) and Canon Stroke and Vascular Research Ctr. (USA); Mohammad Waqas, Canon Stroke and Vascular Research Ctr. (USA) and University of Buffalo (USA); Ryan A. Rana, Alexander R. Podgorski, University of Buffalo (USA) and Canon Stroke and Vascular Research Ctr. (USA); Kenneth V. Snyder, Canon Stroke and Vascular Research Ctr. (USA) and University of Buffalo Neurosurgery, University at Buffalo Jacobs School of Medicine (USA); Elad I. Levy, Canon Stroke and Vascular Research Ctr. (USA) and University of Buffalo (USA); Jason M. Davies, Canon Stroke and Vascular Research Ctr. (USA) and University of Buffalo Neurosurgery, University at Buffalo Jacobs School of Medicine (USA); Adnan H. Siddiqi, Canon Stroke and Vascular Research Ctr. (USA) and University of Buffalo (USA); Ciprian N. Ionuta, University at Buffalo (USA) and Canon Stroke and Vascular Research Ctr. (USA) .......... [11314-93]

Retrospective study on computer-aided brain metastasis detection using 3D MRI imaging, Eunji Kim, Gyeong Yun Yi, Ye Ran Park, Young Jae Kim, Kwang Ki Goh, Gachon Univ. (Korea, Republic of) .......... [11314-94]

Deep learning-based computer-aided detection for glioma detection of 3D DSAS using deep learning, Tatsuya Rajendran Patel, Nikhil Paliwal, Canon Stroke and Vascular Research Ctr. (USA); Prakrit Jaiswal, Mohammad Waqas, Canon Stroke and Vascular Research Ctr. (USA) and University at Buffalo (USA); Mohammad Mehdi Shiraz Bhurwani, University of Buffalo (USA); Adnan H. Siddiqi, Canon Stroke and Vascular Research Ctr. (USA) and University of Buffalo Neurosurgery, University at Buffalo Jacobs School of Medicine (USA); Darko Filipovic, University at Buffalo (USA) .......... [11314-103]

Automatic detection of brain metastases using 3D mask R-CNN for stereotactic radiosurgery, Yan Li, Zhen Tian, Shannon Kahn, Walter J. Curran, Tian Liu, Xiaofeng Yang, Emory University (USA) .......... [11314-104]

Automatic arteriovenous malformations segmentation from brain MRI using combined region proposal network and V-Net, Yao Fu, Yang Lei, Hongbing Lu, Fourth Military Medical Univ. and Shanghai Key Lab. of Magnetic Resonance Imaging, China; Bin Zheng, The University of Oklahoma (USA); Jiaxing Tan, The City University of New York (USA) .......... [11314-103]

Computer-assisted quantification of surgical outcome in infants with sagittal craniosynostosis using 3D head CT images using mean normal skull model, Min Jin Lee, Heng Heong, Seoul Women’s University (Korea, Republic of); Eun Hee Min, Kyung Soo Park, Yeon Seung University of Medicine (Korea, Republic of) .......... [11314-104]

Using “Lesion-habitat” radiomics to distinguish radiation necrosis from tumor recurrence on post-treatment MRI in metastatic brain tumors, Ramon Correa, Jonathan Chen, Pallavi Tiwari, Case Western Reserve University (USA); Jennifer Yu, Johnathan Zheng, Qiu Lei, Cleveland Clinic (USA) .......... [11314-109]

First steps into endoscopic video analysis for Barrett’s cancer detection: challenges and opportunities, Joost van der Putten, Technische Univ. Eindhoven (Netherlands); Jeroen de Groef, Amsterdam UMC (Netherlands); Fons van der Sommen, Technische Univ. Eindhoven (Netherlands); Maarten Struyvenberg, Amsterdam UMC (Netherlands); Svitlana Zinger, Technische Univ. Eindhoven (Netherlands); Kensaku Mori, Nagoya Univ. (Japan) .......... [11314-110]

Dealing applied to hyperspectral endoscopy for optical clearing tomography, Alexandre Girgoriou, Univ. of Cambridge (UK) and Cancer Research UK Cambridge Institute, Univ. of Cambridge (UK); Weihua Li, University of Cambridge (UK) .......... [11314-112]

A novel multi-classifier system for triaging patients with suspected prostate cancer using 3D convolutional neural networks and volumetric biparametric MRI, Prithvi Mehta, Michela Antonelli, Hashim Ahmed, Mark Emberton, Shonit Punwani, Univ. College London (UK); Sebastian Ourselin, King’s College London (UK) .......... [11314-113]

Visualizing intestines for diagnostic assistance of ileus based on intestinal region segmentation from 3D CT, Hiroshi Oda, Nisho Kogyo, Nagoya Univ. (Japan); Takayuki Kitasaka, Aichi Institute of Technology (Japan); Martin M. Klos, University of South Florida (USA); Adnan H. Siddiqi, Raul Raul, Univ. at Buffalo (USA); Hui Meng, Canon Stroke and Vascular Research Ctr. (USA) .......... [11314-101]

Comparative performance of 3D DenNet, 3D-ResNet, and 3D-VGG models in polyp detection for CT colonography, Tomoki Uemura, Massachusetts General Hospital (USA) and Harvard Medical School (USA); Tomoki Uemura, Massachusetts General Hospital (USA); Se Hyung Kim, Seoul National Univ. (Korea, Republic of) and Seoul National Univ. College of Medicine (Korea, Republic of); Hyungsoo Kim, Kyushu Institute of Technology (Japan); Hiroki Yoshida, Massachusetts General Hospital (USA) .......... [11314-102]

A deep learning based integration of multiple texture patterns from intensity, gradient and deep-learning feature maps for differentiating benign polyps from malignant polyps, Shu Zhang, Weiqiu Cao, Marc Pomeroy, Yongfeng Gao, Stony Brook Univ. (USA); Xiaojing Tan, The City University of New York (USA); Ning Li, Weiqiu Cao, Marc Pomeroy .......... [11314-119]

Deformation robust texture features for polyp classification via CT colonography, Weiqiu Cao, Marc Pomeroy, Shu Zhang, Stony Brook Univ. (USA); Perry J. Pickhardt, Univ. of Wisconsin-Madison (USA) .......... [11314-116]

Visualisation deciding-reasoning regions in computer-aided pathological pattern diagnosis of endoscopyctopic images based on CNN weights analysis, Hayato Itoh, Zongyuan Lu, Masahiro Oda, Nagoya Univ. (Japan); Yuichi Mori, Masashi Misawa, Shien-i Kudo, Showa Univ. Northern Yokohama (Japan); Kensaku Mori, Nagoya Univ. (Japan) .......... [11314-113]

Computer-aided staging of gastric cancer using radiomics and deep learning, Qian Zhang, Yongfeng Gao, Stony Brook Univ. (China); Li Wu, Fujian Medical University (China); Bin Zheng, The Univ. of Oklahoma (China); Jie Wu, Shanghai Key Lab. of Magnetic Resonance Imaging, East China Normal Univ. (China); Guang Yang, Shanghai Key Lab. of Magnetic Resonance, East China Normal Univ. (China) .......... [11314-114]

Poster abstracts

POSTERS — MONDAY

Deformation robust texture features for polyp classification via CT colonography, Weiqiu Cao, Marc Pomeroy, Shu Zhang, Stony Brook Univ. (USA); Perry J. Pickhardt, Univ. of Wisconsin-Madison (USA); Hongbing Lu, Fourth Military Medical Univ. (China); Zongyuan Lu, Masahiro Oda, Nagoya Univ. (Japan); Yuichi Mori, Masashi Misawa, Shien-i Kudo, Showa Univ. Northern Yokohama (Japan) .......... [11314-113]

Computer-aided staging of gastric cancer using radiomics and deep learning, Qian Zhang, Yongfeng Gao, Stony Brook Univ. (China); Li Wu, Fujian Medical University (China); Bin Zheng, The Univ. of Oklahoma (China); Jie Wu, Shanghai Key Lab. of Magnetic Resonance Imaging, East China Normal Univ. (China); Guang Yang, Shanghai Key Lab. of Magnetic Resonance, East China Normal Univ. (China) .......... [11314-114]

Performance investigation of deep learning versus classifier for polyp differentiation via texture features, David Liang, David Wang, Alice Wei, Yeseul Choi, Zhu Shang, Marc J. Pomeroy, Stony Brook Univ. (USA); Perry J. Pickhardt, Univ. of Wisconsin-Madison (USA) .......... [11314-116]

Comparative performance of 3D machine-learning network, East China Normal Univ. (China); Guang Yang, Shanghai Key Lab. of Magnetic Resonance Imaging, East China Normal Univ. (China) .......... [11314-115]


Performance investigation of deep learning versus classifier for polyp differentiation via texture features, David Liang, David Wang, Alice Wei, Yeseul Choi, Zhu Shang, Marc J. Pomeroy, Stony Brook Univ. (USA); Perry J. Pickhardt, Univ. of Wisconsin-Madison (USA) .......... [11314-116]

Comparative performance of 3D machine-learning network, East China Normal Univ. (China); Guang Yang, Shanghai Key Lab. of Magnetic Resonance Imaging, East China Normal Univ. (China) .......... [11314-115]
Usefulness of fine-tuning for deep learning based image classification technique. Masahiro Oda, Nagoya Univ. (Japan); Naoyuki Miyoshi, Ohsaki Univ. (Japan); Yosuke Yamanouchi, Shizuoka Medical School (Japan) and Shizuoka Medical Science University (Japan) ....[11314-139]
Investigation of the accuracy of classifying coronary artery disease severity using machine learning with subdomain analysis of Fractional Flow Reserve diagnosis in patients, Alexander R. Podgorski, Canin Stroke and Vascular Research Ctr (USA) and Univ. at Buffalo, The State Univ. of New York (USA); Kelsey N. Sommer, Canon Stroke and Vascular Research Ctr. (USA) and Univ. at Buffalo, The State Univ. of New York (USA); Frank J. Rybicki, Univ. of Cincinnati (USA); Dimitrios Mirtoras, Univ. of California, San Francisco (USA); Umesh Sharma, Canon Stroke and Vascular Research Ctr. (USA) and Univ. at Buffalo, The State Univ. of New York (USA); Michael F. Wilson, Canon Stroke and Vascular Research Ctr. (USA) and Univ. at Buffalo, The State Univ. of New York (USA); Jeffrey Bax, Univ. of Pittsburgh (USA) and Imperial College London (UK). Blood flow anomaly detection via generative adversarial networks: a preliminary study, Ahsa Singhamalali, Jhinil Mitra, Kirk Wallace, Prem Venukopati, L. Scott Smith, Larry Mo. GE Global Research (USA); Lai Yeung, Uniformed Services Univ. of the Health Sciences (USA); Jonathan Morrison, Univ. of Maryland, Baltimore (USA); Todd Rasmussen, Uniformed Services Univ. of the Health Sciences (USA); L.J. Carter (USA) . . [11315-60]

Rigid and deformable corrections in real-time ultrasound imaging for endoscopic looping challenges in clinic, Daniel Seghesio, Bhavya Nithalikumar Ajani, Adhara Bhardwaj, Soumik Mukhopadhyay, Samsung R&D Institute India – Bangalore (India); Jun-Sung Park, Yuri Son, SAMSUNG Electronics Co., Ltd. (Korea, Republic of); Srikander Sharda, Self Employed (India) . . [11315-61]

Automated segmentation of brain tumor tissue: comparison between hyperspectral imaging and diffuse reflectance spectroscopy, Marco Lai, Philips Research (Netherlands); Simon Skyrman, Karolinska University Hospital (Sweden); Caifeng Shan, Elvis Paulussen, Philips Research (Netherlands); Francesca Manni, Technische Univ. Eindhoven (Netherlands); Akash Swamy, Drakeno Babic, Philips Research (Netherlands); Erik Edström, Oscar Persson, Gustav Burström, Adrian Elmi Terander, Karolinska University Hospital (Sweden); Benno H. W. Niessen, Philips Research (Netherlands); Peter H. de With, Technische Univ. Eindhoven (Netherlands) . . [11315-62]

Blood flow anomaly detection via generative adversarial networks: a preliminary study, Ahsa Singhamalali, Jhinil Mitra, Kirk Wallace, Prem Venukopati, L. Scott Smith, Larry Mo. GE Global Research (USA); Lai Yeung, Uniformed Services Univ. of the Health Sciences (USA); Jonathan Morrison, Univ. of Maryland, Baltimore (USA); Todd Rasmussen, Uniformed Services Univ. of the Health Sciences (USA); L.J. Carter (USA) . . [11315-66]

Exploiting confident information for weakly supervised prostate segmentation based on image-level labels, Zhang Chen, Zhenqiang Tian, Zhiyuan Li, Jiashen Jiang, Zhiqiang Tian, (China) . . [11315-68]

Workflow for creation and evaluation of virtual nephrolithotomy training models, Catherine O. Wu, Kyle Sunderland, Queen’s Univ. (Canada); Mikhail Filepov, Ben Sansbury, Marion Surgical (Canada); Gabor Fichtinger, Tamás Ungi, Queen’s Univ. (Canada) . . [11315-69]

Value based decision support to prioritize development of innovative technologies for interventional vascular surgery in a hybrid operating theater, Friso G. Heslinga, Hendrik Koffijberg, Univ. of Twente (Netherlands); Robert H. Geelken, Queen’s University (Canada); Robert Koffijberg, University of Twente, Netherlands and Bronovo Hospital, Rotterdam, Netherlands; Thijs G. ter Mors, GE Healthcare (Netherlands); Carine J. M. Doggen, Marj van Hummel, Univ. of Twente, Netherlands . . [11315-70]

Open source software platform for interventional ablation treatment planning, Alice Santilli, Csaba Pinter, Lab. for Percutaneous Surgery (Canada); Bote Jiang, Queen’s Univ. (Canada); Gabor Fichtinger, Lab. for Percutaneous Surgery (Canada); Gernot Knorpp, ACMT GmbH (Austria) . . [11315-71]

Blood flow anomaly detection via generative adversarial networks: a preliminary study, Ahsa Singhamalali, Jhinil Mitra, Kirk Wallace, Prem Venukopati, L. Scott Smith, Larry Mo. GE Global Research (USA); Lai Yeung, Uniformed Services Univ. of the Health Sciences (USA); Jonathan Morrison, Univ. of Maryland, Baltimore (USA); Todd Rasmussen, Uniformed Services Univ. of the Health Sciences (USA); L.J. Carter (USA) . . [11315-66]

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Automated segmentation of spinal ultrasound landmarks with U-net using multiple consecutive image inputs as input, Victoria Wu, Tamas Ungi M.D., Kylo Sunderland, Queen’s Univ. (Canada); Abigail Schonewille, Gabor Fichtinger, Queen’s Univ. (Canada) . . [11315-72]

Applications of VR medical image visualization to choral length measurements for cardiac procedures, Patrick Cannon, Western Univ. (Canada) and Robarts Research Institute (Canada); John T. Moore, Robarts Research Institute (Canada); Daniel Baimbridge M.D., London Health Sciences Ctr. (Canada); Alexander F. Kolen, Philips Research (Netherlands); Peter H. de With, Technische Univ. Eindhoven (Netherlands) . . [11315-66]

Feasibility study of catheter segmentation in 3D Frustum Ultrasound by DCNN, Lin Min, Hongyu Yang, Technische Univ. Eindhoven (Netherlands); Candrakant Shah, Alexander F. Kolen, Philips Research (Netherlands); Peter H. de With, Technische Univ. Eindhoven (Netherlands) . . [11315-66]

Applications of VR medical image visualization to choral length measurements for cardiac procedures, Patrick Cannon, Western Univ. (Canada) and Robarts Research Institute (Canada); John T. Moore, Robarts Research Institute (Canada); Daniel Baimbridge M.D., London Health Sciences Ctr. (Canada); Alexander F. Kolen, Philips Research (Netherlands); Peter H. de With, Technische Univ. Eindhoven (Netherlands) . . [11315-66]

Virtual radial-probe endobronchial ultrasound for image-guided bronchoscopy, William E. Higgins, Wennnan Zhao, Rebecca Bascorn, Jennifer Toth, The Pennsylvania State Univ. (USA) . . [11315-59]
Data-driven detection and registration of spine instrumentation in intraoperative images, Sophia A. Doer, Ali Uneri, Yuichiro Huang, Xiaoxuan Zhang, Johns Hopkins Univ. (USA); Patrick Helm, Medtronic, Inc. (USA); Nick Theodore, Jeffrey H. Siewerdson, Johns Hopkins Univ. (USA) ........................................ [11315-91]

Force and torque feedback in endoscopic vessel harvesting, Julia Wienczgorch, Lab. for Percutaneous Surgery, Queen’s Univ. (Canada); Keyvan Haghtroudi, Razieh Jafari, Queen’s Univ. (Canada); Tamas Ungi, Lab. for Percutaneous Surgery, Queen’s Univ. (Canada); Gianluigi Bisleri, Queen’s Univ. (Canada); Gabor Fichtinger, Lab. for Percutaneous Surgery, Queen’s Univ. (Canada) ........................................ [11315-92]

Multi-step segmentation for prostate MR image based on reinforcement learning, Xiangyu Si, Shafiya Sabah, Salam Labadie, Jack H. Noble, Vanderbilt Univ. (USA) ........................................ [11315-93]

Image-based extraction of breathing signal from cone-beam CT projections, Qinmei Li, Aravind S. Ponukumati, Geisel School of Medicine (USA); Yuan Shi, Thayer School of Engineering - Haifa (Israel); Juha Pajula, VTT Technical Research Ctr. of Finland Ltd. (Finland); Oliver Hijano-Cubelo, Instituto Curie (France); Abdel Khater, IBM Research - Haifa (Israel); Jaroslav Vizera, IBM Research - Haifa (Israel) ........................................ [11315-94]

Poster session dates, locations, and times

**CONFERENCE 11318** Imaging Informatics for Healthcare, Research, and Applications

**CONFERENCE 11319** Ultrasonic Imaging and Tomography

**POSTERS — MONDAY**

<table>
<thead>
<tr>
<th>SESSION</th>
<th>CONFERENCES</th>
<th>SETUP</th>
<th>LOCATION</th>
<th>SESSION TIME</th>
<th>TEARDOWN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
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<tr>
<td>17 February</td>
<td>11312, 11313, 11315, 11318, 11319</td>
<td>Texan Ballroom, 4th Floor - Salon D</td>
<td>Monday, 16 February after 12:00 PM (noon)*</td>
<td>Monday, 5:30 PM - 7:00 PM</td>
<td>7:00 PM</td>
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<tr>
<td>Wednesday</td>
<td>11313, 11316, 11320</td>
<td>Texan Ballroom, 4th Floor - Salon D</td>
<td>Tuesday, 18 February after 9:30 AM*</td>
<td>Wednesday, 5:30 PM - 7:00 PM</td>
<td>7:00 PM</td>
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*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 either Monday or Wednesday.
SESSION 8
ROOM: SALON A  ........ TUE 8:00 AM TO 9:40 AM

Target: Contrast Agent Imaging Optimized
Session Chairs: John I. Yorkston, Carestream Health, Inc. (USA); Maria Drangova, Robarts Research Institute (Canada)

8:00 am: Patient-informed modelling of hepatic and aortic contrast dynamics in contrast-enhanced CT imaging. Hananiel Setawwan, Duke Univ. Medical Physics Graduate Program (USA); Ehsan Abadi, Wanyi Fu, Francesco Ria, Duke Univ. (USA); Taylor B. Smith, Duke Univ. Medical Physics Graduate Program (USA); Ehsan Samiei, Duke Univ. (USA) ....... [11312-32]

8:20 am: Contrast flow velocity quantification with deep-learning-based unsupervised CT angiography: a phantom study. Pieter Boonen, Vrije Univ. Brussels (Belgium) and imec (Belgium); Nicci Buets, Gert Van Gompel, Yannick De Brucker, Dimitri Aerden, Johan De Mey, Vrije Univ. Brussels (Belgium); Jef Vandemeulebroucke, Vrije Univ. Brussels (Belgium) and imec Belgium (Belgium) ........ [11312-31]

8:40 am: Power injector for angiographic flow analysis using custom contrast density profiles. Erick L. Obestad, Sarvesh Periyasamy, Paul F. Laeseke, Michael A. Speidel, Univ. of Wisconsin-Madison (USA) ....... [11312-42]

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

Image Analysis in Ultrasound and OCT

Session Chairs: John L. Park, University of California, Irvine (USA) and University of Massachusetts Dartmouth (USA)

8:00 am: Deep learning-based breast tumor detection and segmentation in 3D ultrasound image. Yang Li, Emory Univ. (USA); Jinsong Yao, Zhejiang Cancer Hospital (China); Xiaoxue He, Emory Univ. (USA); Dong Xu, Zhejiang Cancer Hospital (China); Walter J. Curran, Tian Liu, Xiaofeng Yang, Emory Univ. (USA) .......... [11313-39]

8:20 am: Unsupervised motion tracking of left ventricle in echocardiography. Shenan An, Kervin Y. Wang, Vrije Univ. Brussels (Belgium); Allen Lu, Echonious Inc. (USA); James S. Dennis, Yale Univ. (USA) .......... [11313-36]

8:40 am: Left ventricular and atrial segmentation of 2D echocardiography with convolutional neural networks. Joshua V. Stough, Bucknell Univ. (USA) and Geisinger Health (USA); Sushraya Raghurath, John M. Pfeifer, Brandon K. Formwald, Christopher M. Haggerty, Geisinger Health (USA) .......... [11313-9]

9:00 am: Multiresolution LOGISMOS graph search for automated choroidal neovascular segmentation of OCT scans. Kwangmyoo Lee, Elliot H. Sohn, Hongzhai Zhang, Alexei K. Warren, Andinras Wahle, S. Scott Whitmore, Milan Sonka, Michael D. Abramoff, The Univ. of Iowa (USA) .......... [11313-10]


9:40 am: Combining spectral CT acquisition methods for high-sensitivity material decomposition. Matthew Timvan, Wenying Wang, Grace J. Gang, Eleni Liapi, Johns Hopkins University (USA); Peter B. Noell, Univ. of Pennsylvania (USA); Joseph W Stayman, Johns Hopkins Univ. (USA) .......... [11313-44]

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

CONF. 11312 continued page 45 ➔
CONF. 11313 continued page 45 ➔
CONF. 11314 continued page 45 ➔

SESSION 10
ROOM: HUNTERS CREEK  ........ TUE 8:00 AM TO 9:40 AM

Novel Imaging Technologies for Interventional Guidance

Session Chairs: David R. Holmes III, Mayo Clinic (USA); Ziv R. Yaniv, National Institute of Allergy and Infectious Diseases (USA)

8:00 am: Patient-specific deep deformation models (PDDM) to register planning and interventional ultrasound volumes in image fusion-guided interventions. Jimin Miria, Michael MacDonald, David Mitt, Soumya aerospace, L. Scott Smith, Speechy Sarcar, Desmond T. B. Yoo, GE Global Research (USA); Clare M. C. Tempary, Brigham and Women’s Hospital (USA); Bryan Betran; Sydney J. Augsburger, University of Wisconsin-Madison (USA); Thomas K. F. Fox, GE Global Research (USA) .......... [11313-33]

8:20 am: Image guided mitral valve replacement: registration of 3D ultrasound and 2D x-ray images. James D. Dormer, Mfd Faisal Bhuiyan, The Univ. of Texas at Dallas (USA); Nahian Rahman, Nancy Deaton, GE Institute of Technology (USA); Jun Sheng, Univ. of California, Riverside (USA); Muradali Padala, Emory Univ. (USA); Jaydev P. Desai, Georgia Institute of Technology (USA); Xiaofang Lu, The Univ. of Texas at Dallas (USA); and The Univ. of Texas southwestern Medical. (USA) .......... [11313-34]

8:40 am: Multi-view 3D echocardiography volume compounding for mitral valve procedure planning. Patrick Carahan, Western Univ. (Canada) and Robarts Research Institute (Canada); John T. Moore, Robarts Research Institute (Canada); Daniel Banaridjo, M.D., London Health Sciences Ctr. (Canada); Elvis C. S. Chinc, Terry M. Peters, Robarts Research Institute (Canada) and Western Univ. (Canada) .......... [11313-35]

9:00 am: Inferring brain functional hubs with eigenvector centrality mapping of phase fMRI connectivity. Zhecan Chen, Bihong Chen, City of Hope (USA) .......... [11313-4]

9:20 am: Reduced sine hyperbolic polynomial model for brain neurodevelopmental analysis. Peyman Hosseinzadeh Kassani, Tulane Univ. (USA); Vince D. Calhoun, Georgia State Univ. (USA); Yu-Fung Wang, Tulane Univ. (USA) .......... [11313-5-7]

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

CONF. 11317 continued page 45 ➔
CONF. 11318 continued page 45 ➔

CONFERENCE 11318
ROOM: SALON C  ........ TUE 8:00 AM TO 9:40 AM

Neurological Imaging I

Session Chairs: Axel Wissmüller, M.D., Univ. of Rochester Medical Ctr. (USA); Vikram D. Kodikabgar, Arizona State Univ. (USA)

8:00 am: Graph embedding methods for InSOM for classification and brain functional connectivity. Xiaoxue Li, Nia C. Dworkem, Juntang Zhang, Pamela Ventola, James Duncan, Yale Univ. (USA) .......... [11317-1]

8:20 am: Classification of Attention-Deficit/Hyperactivity Disorder from resting-state fMRI with mutual connectivity analysis. Seyed Saman Sarfraz, John J. Fox, National Inst. of Health (USA) .......... [11317-2]

8:40 am: Minimizing cotton retention in neurological procedures: which imaging modality can help? Raphael Beckfield, Niki Tasiopoulos, Zachary Boono, Benjamin Garbow, James Pitpinto, Cristina Madalo, Isabelfera Ferralla, Collin Shaie, Michele Belzberg, Johns Hopkins Univ. (USA); George Coles, Johns Hopkins Univ., Applied Physics Lab., LLC (USA); Ian Suk, Judy Huang, Henry Brem, Amir Manbachi, Johns Hopkins Univ. (USA) .......... [11317-3]

9:00 am: Multiresolution LOGISMOS graph search for automated choroidal neovascular segmentation of OCT scans. Kwangmyoo Lee, Elliot H. Sohn, Hongzhai Zhang, Alexei K. Warren, Andreas Wahle, S. Scott Whitmore, Milan Sonka, Michael D. Abramoff, The Univ. of Iowa (USA) .......... [11313-9]


9:40 am: Sine functional model for brain neurodevelopmental analysis. Peyman Hosseinzadeh Kassani, Tulane Univ. (USA); Vince D. Calhoun, Georgia State Univ. (USA); Yu-Fung Wang, Tulane Univ. (USA) .......... [11313-5-7]

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

CONF. 11319 continued page 45 ➔
CONF. 11318 continued page 45 ➔

CONFERENCE 11319
ROOM: SALON C  ........ TUE 8:00 AM TO 9:40 AM

Image Analysis in Ultrasound and OCT

Joint Session with Conferences 11313 and 11319

8:00 am: Deep learning-based breast tumor detection and segmentation in 3D ultrasound image. Yang Li, Emory Univ. (USA); Jincao Yao, Zhejiang Cancer Hospital (China); Xiaoxue He, Emory Univ. (USA); Dong Xu, Zhejiang Cancer Hospital (China); Walter J. Curran, Tian Liu, Xiaofeng Yang, Emory Univ. (USA) .......... [11319-39]

8:20 am: Unsupervised motion tracking of left ventricle in echocardiography. Shawn An, Kervin Y. Wang, Vrije Univ. Brussels (Belgium); Allen Lu, Echonious Inc. (USA); James S. Dennis, Yale Univ. (USA) .......... [11319-36]

8:40 am: Left ventricular and atrial segmentation of 2D echocardiography with convolutional neural networks. Joshua V. Stough, Bucknell Univ. (USA) and Geisinger Health (USA); Sushraya Raghurath, John M. Pfeifer, Brandon K. Formwald, Christopher M. Haggerty, Geisinger Health (USA) .......... [11319-33]

9:00 am: Multiresolution LOGISMOS graph search for automated choroidal neovascular segmentation of OCT scans. Kwangmyoo Lee, Elliot H. Sohn, Hongzhai Zhang, Alexei K. Warren, Andreas Wahle, S. Scott Whitmore, Milan Sonka, Michael D. Abramoff, The Univ. of Iowa (USA) .......... [11313-9]

### Tuesday/Wednesday Poster Viewing

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

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

### SESSION 11 CONTINUED

**Monday/Friday Poster Viewing**

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

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**WORKSHOP**

**Room: Salon B**... Sun 5:00 PM to 7:00 PM

**Simulated Tumor Board:** Brain and Breast

*Workshop Chair: Kristy Brock, PhD, DABR, FAAPM Professor, Department of Imaging Physics and Department of Radiation Physics, Univ. of Texas MD Anderson Cancer Center (USA)*
SESSION 11
ROOM: SALON A ........ TUE 3:30 PM TO 4:50 PM
CBCT Reconstruction Techniques
Session Chairs: Adam M. Alessio, Michigan State Univ. (USA); Adam S. Wang, Stanford Univ. School of Medicine (USA)
3:30 pm: High temporal resolution time-resolved C-arm cone-beam CT imaging using a multi-sweep data acquisition scheme, Yinsheng Li, John W. Garrett, Ke Li, Charles Strother, Guang-Hong Chen, Univ. of Wisconsin–Madison (USA) ................ [11312-56]
3:50 pm: Deep-learning-aided CBCT image reconstruction of interventional material from four x-ray projections, Elias Eulig, Deutsches Klinikum Harburg (Germany); Klaus Hörndler, Ziehm Imaging GmbH (Germany); Adam S. Wang, Stanford Univ. School of Medicine (USA); Joscha Maier, Deutsches Klinikum Harburg (Germany); Jörg Sander, Dennis Gerstner, Klínínium Braunschweig GmbH (Germany); Nina A. Müller, Rheinische Friedrich-Wilhelms-Universität Bonn (Germany); Christian Betz, Wiebke Lafers, Universitätshôpital Klinikum Hamburg-Eppendorf (Germany); Andreas O. H. Gerstner, Klinikum Braunschweig GmbH (Germany); José Luis Sánchez, John Lloyd, Heather Borgard, Sidney Fels, Massachusetts General Hospital (USA); C. Antonio Sánchez, John Lloyd, Heather Borgard, Sidney Fels, The Univ. of British Columbia (Canada); Joseph Paydarfar, Dartmouth-Hitchcock Medical Ctr. (USA) and Geisel School of Medicine (USA); Ryan Halter, Thayer School of Engineering at Dartmouth (USA) ................................................ [11313-49]
4:30 pm: The image-to-physical liver registration spare data challenge: characterizing inverse biomechanical model resolution, Jon S. Heiselman, Michael I. Miga, Vanderbilt Univ. (USA) ....................... [11313-50]
4:10 pm: Image data-driven thermal dose prediction for microwave ablation therapy, Alice K. Ding, Jon S. Heiselman, Michael I. Miga, Vanderbilt Univ. (USA) ......................... [11313-51]
4:30 pm: Modeling the surgical exposure of anatomy in robot-assisted laparoscopic partial nephrectomy, Michael A. Kokko, Dartmouth College (USA); John D. Seigne, Dartmouth-Hitchcock Medical Ctr. (USA); Douglas W. Van Citters, Ryan J. Halter, Dartmouth College (USA) .................. [11313-52]
1:30 pm: Registration
3:30 pm: Deformable alignment of longitudinal postoperative brain GBM scans using deep learning, Yi Luo, Victoria Yu, Univ. of California, Los Angeles (USA); Eric Chang, Wenwina Yang, The Univ. of Southern California (USA); Ke Li, Guang-Hong Chen, Stanford (USA) ................................................ [11312-23]
3:50 pm: An adversarial machine learning based approach and biomechanically-guided validation for improving deformable image registration accuracy between a planning CT and cone-beam CT for adaptive radiotherapy applications, Anand P. Santhanam, Michael Lauria, Univ. of California, Los Angeles (USA); Daniel Elliott, Saty Seshan, Sekgina, LLC (USA); Scott Hsieh, Minsong Cao, Daniel Low, Univ. of California, Los Angeles (USA) ........................................ [11312-24]
4:10 pm: Deep learning based CT-CBCT image registration for adaptive radio therapy, Sven Kuckertz, Nils Papenberg, Fraunhofer-Institut für Digitale Medizin MEVIS (Germany); Jonas Honegger, Tomasz Mrogas, Benjamin Haas, Varian Medical Systems, Inc. (Switzerland); Stefan Heldmann, Fraunhofer-Institut für Digitale Medizin MEVIS (Germany) ........................................ [11312-25]
4:30 pm: Mutual information for unsupervised deep learning image registration, Bob D. de Vos, Bas van der Velden, Joost Nijenhuis, Univ. Medical Ctr. Utrecht (Netherlands); Marcus Staring, Leiden Univ. Medical Ctr. (Netherlands); Ivana Ilgum, Univ. Medical Ctr. Utrecht (Netherlands) .......... [11312-26]
3:30 pm: Deformable CT images with structure-texture image decomposition, Yosuke Ohnuki, Kenji Eguchi, Shota Fuketa, Ryouhei Kurumi (Japan)
3:30 pm: Estimating tongue deformation during laryngoscopy using hybrid FEM-multibody model and intraoperative tracking: a cadaver pilot study, Xiaoqian Wu, Gordon Ctr. for Medical Imaging, Massachusetts General Hospital (USA); C. Antonio Sánchez, John Lloyd, Heather Borgard, Sidney Fels, The Univ. of British Columbia (Canada); Joseph Paydarfar, Dartmouth-Hitchcock Medical Ctr. (USA) and Geisel School of Medicine (USA); Ryan Halter, Thayer School of Engineering at Dartmouth (USA) ................................................ [11313-49]
3:50 pm: An improved combination of ordered subsets and momentum for fast model-based iterative CT reconstruction, Viktor Husa, Karl Sterstorfer, Katharina Hahn, Harald Schindüle, Siemen Healthineers (Germany); Andreas Maier, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Frédéric Neco, The Univ. of Utah (USA) ........ [11312-59]
3:30 pm: A combined metric of the heterogeneity and smoothness to measure the quality of the reconstruction in CBCT, Hailin Tsui, University of Michigan (USA)
3:30 pm: Anatomical and functional image registration for in-vivo hyper-spectral laryngeal cancer detection, Marcel Bens, Technische Univ. Hamburg-Harburg (Germany); Stephan Westermann, Friedrich-Wilhelms-Universität-Bonn (Germany); Nils Gesbert, Technische Univ. Hamburg-Harburg (Germany); Dennis Eggert, Universitätshôpital Klinikum Hamburg-Eppendorf (Germany); Andreas O. H. Gerstner, Klinikum Braunschweig GmbH (Germany); José Luis Sánchez, John Lloyd, Heather Borgard, Sidney Fels, Massachusetts General Hospital (USA); C. Antonio Sánchez, John Lloyd, Heather Borgard, Sidney Fels, The Univ. of British Columbia (Canada); Joseph Paydarfar, Dartmouth-Hitchcock Medical Ctr. (USA) and Geisel School of Medicine (USA); Ryan Halter, Thayer School of Engineering at Dartmouth (USA) ................................................ [11313-49]
4:10 pm: Direct classification of type 2 diabetes from retinal fundus images in a population-based sample from the Maastricht Study, Froo G. Heslinga, Joes P. W. Pluin, Technische Univ. Eindhoven (Netherlands); A.J.M.H. Huisjen, Ronald M. A. Heirey, Miranda T. Schram, Marleen J. van Groenverbouw, Maastricht Univ. Medical Ctr. (Netherlands); Tos J.T.M. Berendschot, Technische Univ. Eindhoven (Netherlands) and Maastricht Univ. Medical Center (Netherlands); Milko Veta, Technische Univ. Eindhoven (Netherlands) .......... [11312-54]
4:30 pm: Segmentation of retinal low cost optical coherence tomography images using deep learning, Timo Kepp, Univ. zu Lübeck (Germany); Helge M. Sudkamp, Medizinisches Laserzentrum Lübeck GmbH (Germany); Claus von der Burchard, Hendrik Schenke, Christian-Aubrechts-Univ. zu Kiel (Germany); Peter Koch, Genove M. Hüttermann, Medizinisches Laserzentrum Lübeck GmbH (Germany); Johann Roeder, Christian-Aubrechts-Univ. zu Kiel (Germany); Matthias P. Heine, Hein handels, Univ. zu Lübeck (Germany) .... [11314-56]
3:30 pm: Eye, Head, and Neck
SESSION 11
ROOM: SALON B ........ TUE 3:30 PM TO 4:50 PM
Translation of Deep Learning Technology to the Clinic
Session Chair: Mads Nielsen, Univ. of Copenhagen (Denmark)
The medical AI market is expected to break 2 billion USD revenue within 5 years. While promising, we still need to overcome several barriers including technological robustness, clinical validation, regulatory compliance, market acceptance and financial risks. In a number of presentations we focus on the barriers and how to overcome these seen from start-up, regulators, and commercial perspectives.
<table>
<thead>
<tr>
<th>Room</th>
<th>Conference Name</th>
<th>Days</th>
<th>Proceedings of SPIE Vol.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salon B</td>
<td>Conference 11313</td>
<td>Monday–Thursday 17–20 Feb. 2020</td>
<td>11313</td>
</tr>
<tr>
<td>Salon C</td>
<td>Conference 11314</td>
<td>Sunday–Wednesday 16–19 Feb. 2020</td>
<td>11314</td>
</tr>
<tr>
<td>Hunters Creek</td>
<td>Conference 11315</td>
<td>Sunday–Wednesday 16–19 Feb. 2020</td>
<td>11315</td>
</tr>
<tr>
<td>Briargrove</td>
<td>Conference 11316</td>
<td>Wed.–Thurs. 19–20 Feb. 2020</td>
<td>11316</td>
</tr>
<tr>
<td>River Oaks</td>
<td>Conference 11317</td>
<td>Tuesday–Thursday 18–20 Feb. 2020</td>
<td>11317</td>
</tr>
</tbody>
</table>

**SESSION 12 CONTINUED**

9:20 am: Accurate proton stopping power images reconstructed using joint statistical dual energy CT: experimental verification and impact of scatter, Maria Jose Medrano Matamoros, Tyler Webb, Washington Univ. in St. Louis (USA); Mariela Porras-Chaverri, Univ. de Costa Rica (Costa Rica); Ruirui Liu, Tianyu Zhao, David G. Politte, Jeffrey F. Williamson, Washington Univ. in St. Louis (USA); Bruce R. Whiting, Univ. of Pittsburgh (USA); Joseph A. O’Sullivan, Washington Univ. in St. Louis (USA). Coffee Break. Wed 9:40 am to 10:10 am


**SESSION 14 CONTINUED**

9:20 am: A deep learning approach for surgical instruments detection in Orthopaedic surgery using transfer learning, Belayat Hossain, Shoichi Nishio, Univ. of Hyogo (Japan); Hiranaka Takafumi, Takatsuki General Hospital (Japan); Syoji Kobashi, Univ. of Hyogo (Japan). Coffee Break. Wed 9:40 am to 10:10 am

CONFERENCE 11312
ROOM: SALON A
Sunday–Wednesday 16–19 Feb. 2020
Proceedings of SPIE Vol. 11312

CONFERENCE 11313
ROOM: SALON B
Sunday–Wednesday 16–19 Feb. 2020
Proceedings of SPIE Vol. 11313

CONFERENCE 11314
ROOM: HUNTERS CREEK
Sunday–Wednesday 16–19 Feb. 2020
Proceedings of SPIE Vol. 11314

CONFERENCE 11315
ROOM: BRIARGROVE
Wed.–Thurs. 19–20 Feb. 2020
Proceedings of SPIE Vol. 11315

CONFERENCE 11316
ROOM: RIVER OAKS
Tuesday–Thursday 18–20 Feb. 2020
Proceedings of SPIE Vol. 11316

Virtual Imaging

Keynote and Highlights
10:10 am: Bringing machine learning to the clinic - opportunities and challenges (Keynote Presentation), Tim Leiner, Univ. Medical Ctr. Utrecht (Netherlands) 11133-32
11:10 am: Variational intensity cross channel encoder for unsupervised vessel segmentation on OCT angiography, Yihao Liu, Liuni Zuo, Aaron Carass, Yufan He, Johns Hopkins Univ. (USA); Angeliki Filipatou, Sharon D. Solomon, Shiv Sadila, Peter A. Calabresi, The Johns Hopkins Univ. School of Medicine (USA); Jerry L. Prince, Johns Hopkins Univ. (USA) 11133-33
11:30 am: Cardiac cine MRI left ventricle segmentation combining deep learning and graphical models, Fumin Guo, Univ. of Toronto (Canada) 11133-34
11:50 am: Contrast phase classification with a generative adversarial network, Yucheng Tang, Yuchen Xu, Olivia Tang, Ho Hin Lee, Vanderbilt Univ. (USA); Zhichong Han, Yunqiang Chen, Dashan Gao, Yufan He, Johns Hopkins Univ. (USA); Yucheng Tang, Yuchen Xu, Olivia Tang, Ho Hin Lee, Vanderbilt Univ. (USA) 11133-35
Lunch Break. 12:10 pm to 1:20 pm

Journal of Medical Imaging Special Section on Interventional Data Science

Neuro II
10:10 am: Attention-deficit/hyperactivity disorder prediction using graph convolutional networks, Seyed Saman Saboksiyar, John J. Foxe, Axel Wismüller, Univ. of Rochester (USA). 11134-62
10:30 am: An extended-2D CNN for multiclass Alzheimer’s Disease diagnosis through Structural MRI, Mariana Gupt, Caluha Wang, Yuaichoung Li, FUJIFILM Corp. (Japan); Yukihiro Tsuboshita, Fuji Xerox Co., Ltd. 11134-63
10:50 am: Combining deep and handcrafted MRI features for identifying gender-specific differences in ASD versus normal controls, Yashas Hiremath, Marwa Imaid, Ruchika Verma, Ashish Gupta, Pallavi Tiwari, Case Western Reserve Univ. (USA) 11134-65
11:10 am: Multi-modal deep learning for predicting progression of Alzheimer’s disease using bi-linearshake fusion, Tsusaba Goto, Caluha Wang, Yuaichoung Li, FUJIFILM Corp. (Japan); Yukihiro Tsuboshita, Fuji Xerox Co., Ltd. (Japan) 11134-66
11:30 am: Large-scale Extended Granger Causality (xGCG) for classification of Autism Spectrum Disorder from resting-state functional MRI, Axel Wismüller, John J. Foxe, Seyed Saman Saboksiyar, Univ. of Rochester (USA) 11134-64

Obver Performance Evaluation

Session Chairs: Mark F. McIntee, The Univ. of Sydney (Ireland); Susan M. Astley, The Univ. of Manchester (UK)
10:10 am: A closer look at inter-reader variability, Robert M. Nishikawa, Univ. of Pittsburgh (USA) 11136-3
10:30 am: Where’s WALDO: a potential tool for training radiology residents?, Elizabeth A. Krupinski, Asian Gale, Louis Fajardo, Michael I. Miga, Univ. of Rochester Medical Ctr. (Netherlands); Tsuboshita, Fuji Xerox Co., Ltd. (Japan) 11136-4
10:50 am: Understanding digital pathology performance: an eye tracking study, Amanda Koh, The Univ. of Nottingham (UK); Alastair Gale, Louis Fajardo, Michael I. Miga, Univ. of Nottingham (UK); David Snead, Univ. Hospitals Coventry and Warwickshire NHS Trust (UK) 11136-5
11:10 am: Effect of time of day on radiology image interpretations, Abdulaziz S. Alshabibi, The Univ. of Sydney (Australia) and King Saud Univ. (Saudi Arabia); Mohamad E. Suleiman, Krsica A, Tapia, Robert Heard, Patrick C. Brennan, The Univ. of Sydney (Australia) 11136-6
11:30 am: Blue light filtering glasses and computer vision syndrome: a pilot study, Elizabeth A. Krupinski, Alexander Dabrowiecki, Alexander Villalobos, Emory Univ. School of Medicine (USA) 11136-7

Innovations in Image Processing II

Session Chairs: Xavier Intes, Rensselaer Polytechnic Institute (USA); Nicholas J. Tustison, Univ. of Virginia (USA)
10:10 am: Automated computer-based enumeration of acellular capillaries for assessment of diabetic retinopathy, Mihrun Tuceryan, Anish H. Hermady, Craig Schebler, Alpha Alex, Ashay D, Bhatwadekar, Indiana Univ.-Purdue Univ. Indianapolis (USA) 11137-1
10:30 am: A prospective randomized clinical trial for measuring radiology study reporting time on Artificial Intelligence-based detection of intracranial hemorrhage in emergent care CT, Axel Wismüller, Larry Stokkemaster, Univ. of Rochester Medical Ctr. (USA) 11137-12
10:50 am: Sparse-view CT perfusion with filtered backprojection image reconstruction, Kevin J. Chung, Western Univ. (Canada); Bijoy K. Menon, Univ. of Calgary (Canada); Ting-Yim Lee, Lawson Health Research Institute (Canada) and Roberts Research Institute (Canada) 11137-22
11:10 am: Detection of epidermal adipose tissue in cardiac MRI using deep learning, Miranda R. Fulton, Amy H. Givan, Maria Fernandez-del-Valle, Jon D. Klingensmith, Southern Illinois Univ. Edwardsville (USA) 11137-25
11:30 am: IBIS: Interactive Real-Time Feedback Image Segmentation with deep learning, Antonio Peppe, Technische Univ. Graz (Austria) and Stanford Univ. (USA); Jianming Li, Technische Univ. Graz (Austria); Jan Egger, Technische Univ. Graz (Austria) and Medizinischen Univ. Graz (Austria) and Shanghai Jiao Tong Univ. (China) 11137-26

THIS PDF PROGRAM IS CURRENT AS OF 28 OCTOBER 2019. Find complete, up-to-date information and create your personalized schedule at spie.org/mi20program
SESSION 13 CONTINUED

11:50 am: Optimization of energy thresholds in photon-counting CT via a virtual clinical trial. Ehsan Abadi, Jayasai Rajagopal, Thomas J. Sauer, Duke Univ. (USA); Elizabeth Jones, National Institutes of Health Clinical Ctr. (USA); William Paul Segars, Ehsan Samei, Duke Univ. (USA) ................ [11312-70]

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

SESSION 13 CONTINUED

11:50 am: Prognostic power of the human psoas muscles FDG metabolism in amyotrophic lateral sclerosis. Rita Lai, Istituto Superconduttori, Materiali Innovativi e Dispositivi (Italy); Daniela Schenone, Univ. degli Studi di Genova (Italy); Gianmario Sambuceti, Univ. degli Studi di Genova (Italy) and IRCCS Ospedale Polyclinico San Martino Genova (Italy); Anna Maria Massone, Istituto Superconduttori, Materiali Innovativi e Dispositivi (Italy) and Univ. degli Studi di Genova (Italy); Michele Piana, Univ. degli Studi di Genova (Italy) and Istituto Superconduttori, Materiali Innovativi e Dispositivi, Consiglio Nazionale delle Richerche (Italy); Adriano Chiti, ALS Ctr. Rita Levi Montalcini, Univ. degli Studi di Torino (Italy) and AOU Città della Salute e della Scienza Torino (Italy); Claudia Caponnetto, ALS Ctr. Rita Levi Montalchi, Univ. degli Studi di Torino (Italy) and AOU Città della Salute e della Scienza Torino (Italy); Manish Sharma, PAREXEL International Corp. (India); J. Michael O’Connor, PAREXEL International Corp. (USA) and Univ. of Massachusetts Lowell (USA); Anitha Singareddy, PAREXEL International Corp. (USA) and Univ. of Massachusetts Lowell (USA); Sayali Karve, Nicholas Enus, PAREXEL International Corp. (USA); Kassel Fotinos-Hoyer, PAREXEL International GmbH (Germany); Yibin Shao, PAREXEL China Co., Ltd. (China) ............... [11314-67]

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

SESSION 6 CONTINUED

11:50 am: Quantification of flow through intracranial AVFs using Angiographic Parametric Imaging (API) software. Kyle A. Williams, Mohammed Mahdi Shiraz Bhurwani, Canon Stroke and Vascular Research Ctr. (USA); Kenneth V. Snyder, Elad I. Levy, Jason M. Davies, Adnan H. Siddiqui, Gates Vascular Institute (USA); Ciprian N. Ionita, Canon Stroke and Vascular Research Ctr. (USA) ... [11317-27]
**SESSION 14**
ROOM: SALON A  
Wed 1:20 pm to 3:00 pm  
New Reconstruction Techniques in Dual Energy CT  
Session Chairs: Frédéric Noo, The Univ. of Utah (USA); Yuxiang Xing, Tsinghua Univ. (China)

1:20 pm: Prospective prediction and control of image properties in model-based material decomposition for spectral CT, Wenying Wang, (USA)  
1:30 pm: kVp switching for material decomposition, Linxi Chen, Stony Brook Univ. (USA); Yongfeng Gao, Stony Brook Univ. (USA); Yongyi Shi, Xi'an Jiaotong Univ. (China); and Stony Brook Univ. (USA)

**SESSION 8**
ROOM: SALON C  
Wed 1:20 pm to 3:00 pm  
Labeling and Segmentation  
Session Chairs: Howard C. Gifford, Univ. of Washington (USA)  

1:20 pm: Vessel wall segmentation of common carotid artery via multi-layer branch network, Haochen Tan, Huimin Shi, Minquan Lin, City Univ. of Hong Kong (Hong Kong, China); John David Spence, Stroke Prevention & Atherosclerosis Research Ctr., Roberts Research Institute (Canada); Kwok-Leung Chan, Bernard Chu, City Univ. of Hong Kong (Hong Kong, China)  
1:40 pm: Anatomical labeling of human airway branches using a novel two-step machine learning and hierarchical features, Syed Ahmed Nadeem, Eric A. Hoffman, The Univ. of Iowa (USA); Alejandro P. Cuebas, The Univ. of Iowa Hospitals and Clinics (USA); Panum K. Saha, The Univ. of Iowa (USA)  
2:00 pm: Incorporating minimal user input into deep learning based image segmentation, Maysam Shahedi, The Univ. of Texas at Dallas (USA); Martin Halicek, Georgia Institute of Technology (USA) and The Univ. of Texas at Dallas (USA); James D. Dormer, The Univ. of Texas at Dallas (USA); Baowei Fei, The Univ. of Texas at Dallas (USA) and The Univ. of Texas Southwestern Medical Ctr. at Dallas (USA)  
2:20 pm: Weakly supervised pancreas segmentation based on classactivation maps, Monia Schumacher, Univ. zu Lübeck (Germany); Nina A. Leibl, Aachen Univ. of Applied Sciences (Germany); Andreas Genz, MeVis Medical Solutions AG (Germany); Matthias Paul Heinrich, Univ. zu Lübeck (Germany)  
2:40 pm: Detection of frame informativeness in endoscopic videos using Grad-CAM and recurrent neural networks, Tim Boers, Joost van der Putten, Technische Univ. Eindhoven (Netherlands); Jeroen de Groof, Maarten H. Stroeymundt, Kiki Fockens, Amsterdam UMC (Netherlands); Wouter Curvers, Erik Schoon, Catharina Hospital (Netherlands); Fons van der Sommen, Technische Univ. Eindhoven (Netherlands); Jacques Bergman, Amsterdam UMC (Netherlands); Peter H. N. de With, Technische Univ. Eindhoven (Netherlands)  

Coffee Break  

Wed 3:00 pm to 3:30 pm

**SESSION 3**
ROOM: BRIARGROVE  
Wed 1:20 pm to 3:00 pm  
Deep Convolutional Neural Networks in Molecular, Structural, and Functional Imaging I  
Session Chairs: Baohong Yuan, The Univ. of Texas at Arlington (USA); David L. Wilson, Case Western Reserve Univ. (USA)

1:20 pm: Supervised learning of model observers for assessment of CT image reconstruction algorithms, Gregory Onge, Emil Y. Sadky, Ingrid S. Reiser, Xiaochuan Pan, The Univ. of Iowa (USA)  
1:40 pm: Autoencoder dual loss: a generalized method for computing task-specific efficient channels for the Hotelling Observer, Jason L. Granstedt, Weimin Zhou, Washington Univ. in St. Louis (USA); Mark A. Anastasio, Univ. of Illinois (USA)  
2:00 pm: Markov-Chain Monte Carlo approximation of the Ideal Observer using generative adversarial networks, Weimin Zhou, Washington Univ. in St. Louis (USA); Mark A. Anastasio, Univ. of Illinois (USA)  
2:20 pm: Deep learning-based model observers that replicate human observers for PET imaging, Fenglei Fan, Sangtong Ahn, Bruno De Man, GE Global Research (USA); Kristen A. Wangerin, Scott D. Wollesperi, GE Healthcare (USA); Craig K. Abbey, Univ. of California, Santa Barbara (USA); Paul E. Kinahan, Univ. of Washington (USA)  
2:40 pm: Deep learning based multi-organ segmentation and metastases segmentation in whole mouse body using cryo-imaging cancer imaging and therapy analysis platform (CITAP), Yiqiao Liu, Case Western Reserve Univ. (USA); Madhu Gargesh, BioVision, Inc. (USA); Mohammed Qattash, Zhuxian Zhou, Case Western Reserve Univ. (USA); Bryan Scott, BioVision, Inc. (USA); Hamed Youssefi, Zhengrong Lu, David L. Wilson, Case Western Reserve Univ. (USA)  

Coffee Break  

Wed 3:00 pm to 3:30 pm

**SESSION 7**
ROOM: RIVER OAKS  
Wed 1:20 pm to 3:00 pm  
Deep Deep Convolutional Neural Networks in Molecular, Structural, and Functional Imaging II  
Session Chairs: David A. Parkash, Case Western Reserve Univ. (USA); Robert W. Herbst, Cleveland Medical Ctr. (USA); Jun Xu, Nanjing Univ. of Information Science & Technology (China)  

1:20 pm: Supervised machine learning for region assignment of zebrafish brain nuclei based on computational assessment of cell neighborhoods, Samarth Gupta, Sharon X. Huang, Yuan Xue, The Pennsylvania State Univ. (USA); Keith C. Cheng, Damian V. Rossouw, Maxim Yakovlev, Daniel Vanselow, Yulu Ding, Pern State College of Medicine (USA)  
1:40 pm: Deep learning-based high-resolution reconstruction of trabecular bone microarchitectures from low-resolution CT scans using GAN-CIRCLE, Indranil Gaha, Syed Ahmed Nadeem, The Univ. of Iowa (USA); Chenyu You, Stanford Univ. (USA); Xiaoliang Zhang, Steven M. Levy, The Univ. of Iowa (USA); Ge Wang, Rensselaer Polytechnic Instit (USA); James C. Toman, Panum K. Saha, The Univ. of Iowa (USA)  
2:00 pm: Deep learning based multi-organ segmentation and metastases segmentation in whole mouse body using cryo-imaging cancer imaging and therapy analysis platform (CITAP), Yiqiao Liu, Case Western Reserve Univ. (USA); Madhu Gargesh, BioVision, Inc. (USA); Mohammed Qattash, Zhuxian Zhou, Case Western Reserve Univ. (USA); Bryan Scott, BioVision, Inc. (USA); Hamed Youssefi, Zhengrong Lu, David L. Wilson, Case Western Reserve Univ. (USA)  

Coffee Break  

Wed 3:00 pm to 3:30 pm

**SESSION 1**
ROOM: SALON A  
Wed 1:20 pm to 3:00 pm  
Keynote and Computer-Aided Diagnosis, Prognosis, and Predictive Analysis  
Session Chairs: David L. Wilson, Case Western Reserve Univ. (USA); Zein Zhong, Nanjing Univ. of Information Science & Technology (China); Patrick Leo, Andrew Janowczyk, Huaqiao Li, Kaustubh Bera, Case Western Reserve Univ. (USA); Behtash Nozami, Howard Meyerzon, Univ. Hospitals Cleveland Medical Ctr. (USA); Jun Xu, Nanjing Univ. of Information Science & Technology (China); Leland Metheny, Univ. Hospitals Cleveland Medical Ctr. (USA); Anant Madabhushi, Case Western Reserve Univ. (USA) and Louis Stokes Cleveland Veterans Administration Medical Ctr. (USA)  

2:00 pm: Compactness measures of tumor infiltrating lymphocytes in lung adenocarcinoma are associated with overall patient survival and immune scores, Ruixen Ding, Prateek Prasanna, Germán Corredor, Cheng Lu, Case Western Reserve Univ. (USA); Priya Velu, Welli Cornell Medicine (USA); Khol Le, Patrick Leo, Case Western Reserve Univ. (USA); VamsiDhar Veichetti, New York Univ. (USA); David Rimm, Kurt Schalper, Yale Univ. (USA); Anant Madabhushi, Case Western Reserve Univ. (USA)  
2:40 pm: Computationally derived image markers for predicting risk of relapse in acute myeloid leukemia patients following bone marrow transplantation, Sara Arabaymohammadi, Case Western Reserve Univ. (USA); Zelin Zhong, Nanjing Univ. of Information Science & Technology (China); Patrick Leo, Andrew Janowczyk, Huaqiao Li, Kaustubh Bera, Case Western Reserve Univ. (USA); Behtash Nozami, Howard Meyerzon, Univ. Hospitals Cleveland Medical Ctr. (USA); Jun Xu, Nanjing Univ. of Information Science & Technology (China); Leland Metheny, Univ. Hospitals Cleveland Medical Ctr. (USA); Anant Madabhushi, Case Western Reserve Univ. (USA) and Louis Stokes Cleveland Veterans Administration Medical Ctr. (USA)  

Coffee Break  

Wed 3:00 pm to 3:30 pm
SESSION 15
ROOM: SALON A  
SUNDAY–WEDNESDAY 16–19 FEB. 2020
Proceedings of SPIE Vol. 11312

SESSION 9
ROOM: SALON C  
SUNDAY–WEDNESDAY 16–19 FEB. 2020
Proceedings of SPIE Vol. 11313

SESSION 4
ROOM: BRIAGROVE  
MONDAY–THURSDAY 17–20 FEB. 2020
Proceedings of SPIE Vol. 11316

SESSION 8
ROOM: RIVER OAKS  
MONDAY–THURSDAY 17–20 FEB. 2020
Proceedings of SPIE Vol. 11317

SESSION 2
ROOM: SALON A  
WEDNESDAY 19 FEBRUARY
Proceedings of SPIE Vol. 11320

Artifacts in CBCT Solved
Session Chairs: Joseph W. Stayman, Johns Hopkins Univ. (USA); Marc Kachelriess, Deutsches Krebsforschungszentrum (Germany)
3:30 pm: Evaluation of patient-specific scatter-corrected digital chest tomosynthesis, Christina R. Incroce, Cannabis Puett, Alex J. Billinghurst, Kevin H. Bhimar, Otto Zhou, Jianguo Lu, Yuhe Lee, The Univ. of North Carolina at Chapel Hill (USA) .... [11312-76]
3:50 pm: Projection-domain metal artifact correction using a dual layer detector, Linzi Shi, N. Robert Bennett, Stanford Univ. (USA); Adam N. Robert Bennett, Stanford Univ. (USA); Josh Star, Linxi Shi, correction using a dual layer detector

Breast
Session Chairs: Sian Taylor-Phillips, The Univ. of Warwick (UK); François G. Bochud, Ctr. Hospitalier Univ. Vaudois (Switzerland)
3:30 pm: Sequential reading effects in Dutch screening mammography, Craig K. Abbey, Univ. of California, Santa Barbara (USA); Michael A. Webster, Univ. of Nevada, Reno (USA); Tanya Geerts, Dan van der Vaal, Eric Tetteroo, Ruud Pijnappel, Mireille J. M. Broeders, Ioannis Sechopoulos, UHB (Netherlands) .... [11314-14]
3:50 pm: Breast density in Saudi Arabia: intra- and inter-reader variability in breast density assessed visually in screening mammograms using BI-RADS categories and visual analogue scales, Arej S. Alotibi, The Univ. of Manchester (UK) and King Saud Univ. (Saudi Arabia); Abdulrahman AlNasem, Abeer Almousa, King Fahad Medical City (Saudi Arabia); Khaled Azimami, Abdulrahman AlNasem, King Saud Univ. (Saudi Arabia); Badr Alhathari, Mohammed Zayed, King Khalid Univ. Hospital (Saudi Arabia); Taghirol Amalshoog, King Fahad Medical City (Saudi Arabia); Saud Alnasser, Khurs Aldossari, Mohamed Zayed, King Khalid Univ. Hospital (Saudi Arabia); Iman Altiazhari, King Fahad Medical City (Saudi Arabia); Elaine Harkness, Susan Astley, The Univ. of Manchester (UK) .... [11316-15]
4:10 pm: Repeatability profiles towards consistent sensitivity and specificity levels for machine learning on breast DCE-MRI, Amy Van Dusen, Michael Viecelli, Wheaton College (USA); Karen Drukker, Hirokay Abe, Marylou L. Giger, The Univ. of Chicago (USA); Heather K. M. Thorpe, Wheaton College (USA) and The Univ. of Chicago .... [11316-16]
4:30 pm: Investigating the potentials of a gist-sensitive computer-aided detection tool, Ziba Ganderkonar, Ernest Ego, Sarah Lewis, Mouyad Suleiman, Krissia Tapia, Tong Li, Sayedmehr Tavakoli Taba, Phuong Dung Trieu, Patrick Brennan, The Univ. of Sydney (Australia) .... [11316-17]
5:10 pm: A machine learning approach for abdominal aortic aneurysm severity assessment using geometric, biomechanical, and patient-specific clinical historical features, Gozal Jalalshahmadi, Maria Helgura, Cristina A. Linte, Rochester Institute of Technology (USA) .... [11317-38]

Deep Learning: Segmentation
3:30 pm: Spatial information-embedded fully convolutional networks for multi-organ segmentation with improved data augmentation and instance normalization, Chen Shen, Chenglong Wang, Nagoya Univ. (Japan); Holger R. Roth, NVIDIA Corp. (USA); Masahiro Oda, Yuhiyuki Hayashi, Nagoya Univ. (Japan); Kazunori Masumi, Aichi Cancer Ctr. (Japan); Kansuori Mori, Nagoya Univ. (Japan) .... [11313-41]
3:50 pm: Identification of kernels in a convolutional neural network: connections between the level set equation and deep learning for image segmentation, Jonas Acton, Beatrice Riviere, Rice Univ. (USA); David T. Puentes, The Univ. of Texas M. D. Anderson Cancer Ctr. (USA) .... [11313-42]
4:10 pm: RedNet: influence of decoder size for binary segmentation tasks in medical imaging, Joost van der Putten, Fons van der Sommen, Roeland Vullings, Elmar van der Wildt, Technische Univ. Eindhoven (Netherlands) .... [11313-43]
4:30 pm: Unified multi-scale feature abstraction for medical image segmentation, Xi Fang, Rensselear Polytechnic Institute (USA); Bo Du, Wuhan Univ. (China); Sheng Xu, Bradford J. Wood, National Institutes of Health (USA); Pingkun Yan, Rensselear Polytechnic Institute (USA) .... [11313-44]
5:10 pm: Observer variation-aware medical image segmentation by combining deep learning and surrogate-assisted genetic algorithms, Arkady Dushatsky, Ctr. Wiskunde & Informatica (Netherlands); Adrienne M. Mendrik, Netherlands Cancer Institute (Croatia); Marijana Popovic Hadžija, Mirko Hadžija, Gorana Aralica, Arijana Pacic, Univ. Hospital Dubrava (Croatia); Dario Sitnik, Institut Ruder Boškovic (Croatia); J. Hartman, Liron Pantanowitz, Univ. of Pittsburgh Medical Ctr. (USA); Metin N. Gurcan, Wake Forest Univ. School of Medicine (USA) .... [11313-38]
5:30 pm: Radiomic biomarker of 4D functional tumor heterogeneity predicts breast cancer recurrence in pre-treatment dynamic FDG-PET, Rhea Chelstia, Vinaya Vembanath, Austin Pantel, Univ. of Pennsylvania (USA); Lanell Peterson, Mark Mark, Univ. of Washington (USA); Joel Karp, David Mankoff, Despina Kontos, Univ. of Pennsylvania (USA) .... [11313-37]
5:10 pm: A machine learning approach for abdominal aortic aneurysm severity assessment using geometric, biomechanical, and patient-specific clinical historical features, Gozal Jalalshahmadi, Maria Helgura, Cristina A. Linte, Rochester Institute of Technology (USA) .... [11317-38]
TUESDAY/WEDNESDAY POSTER SESSION
Location: Texan Ballroom, 4th Floor - Salon D
Poster presentations from the following conferences will be included: Physics of Medical Imaging; Computer-Aided Diagnosis; Image-Guided Procedures, Robotic Interventions, and Modeling; Imaging Informatics for Healthcare, Research, and Applications; and Ultrasound Imaging and Tomography.

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.

To see Poster Presentation Guidelines for additional information.

CONFEREECE 11313 Conference Image Processing

Identifying the common and subject-specific functional units of speech movements via a joint sparse non-negative matrix factorization framework, Jonyghe Woo, Fangxiu Xing, Massachusetts General Hospital, Harvard Medical School (USA); Jerry L. Prince, Johns Hopkins Univ. (USA); Timothy Reese, Van Wedeen, Georges El (USA); Bennett A. Landman, Vanderbilt Univ. (USA); Yuankai Huo, Vanderbilt Univ. (USA); Kim L. Wilting, Vanderbilt Univ. (USA); R. Savona, Richard G. Abramson, Vanderbilt Univ. (USA); Riqiang Gao, Vanderbilt Univ. (USA); Michael A. Elgohari, The Univ. of Texas M.D. Anderson Cancer Ctr. Wiskunde & Informatica (Netherlands); Tanja de Jonge, Monika Grewal, Timo M. Deist, Ctr. Wiskunde & Informatica (Netherlands); Peter A. N. Bosman, Ctr. Wiskunde & Informatica (Netherlands); Tanja Alderliesten, Amsterdam UMC (Netherlands).

Enhancing infant segmentation performance using domain-specific attention in Acute Ischemic Stroke patients, Manikanda Krishnan S, Vinivasa Rao Kundetti, Anun H. Sharathy, Philips Research (India); Shankar Prasad Gorthi, Kasarba Medical College (India) ......... [11313-77] A grid-line suppression technique based on deep convolutional neural networks, Kyongwoo Kim, Hyungjoo Kim, JP Healthcare Co., Ltd. (Korea), Seo Yeon Lim, Korea University (Korea); (Korea, Republic of), Joohyun Park, Handong Global Univ. (Korea, Republic of); Donghyun Kim, Hyeoned Kim, Handong Global Univ. (Korea, Republic of) ......... [11313-78] An unsupervised deep learning approach for landmark detection and matching in medical images, Monika Grewel, Timo M. Deist, Ctr. Wiskunde & Informatica (Netherlands); Jan Wieriera, Amsterdam UMC (Netherlands); Peter A. N. Bosman, Ctr. Wiskunde & Informatica (Netherlands); Tanya Alderliesten, Amsterdam UMC (Netherlands) ......... [11313-79] Deformable MRI-CT image registration with unsupervised deep learning, Qiyi Mai, Justin W. L. Wu, University of Waterloo (Canada) ......... [11313-80] High-resolution magnetic resonance imaging reconstruction using deep attention networks, Xiuhe Hu, Yeango Li, Yubo Fu, Hui Mao, Walter J. Curran, Tian Liu, Xiaofeng Yang, Emory Univ. (USA) ......... [11313-90] A target-oriented and multi-patch based framework for image quality assessment on carotid artery MRI, Hongjian Jiang, Li Chen, Dongxiao Zhou, Handong Global Univ., Shijiazhuang Tiedao University, Shijiazhuang Tiedao University School of Medicine (China); Hiroko Watanabe, University of Washington (USA); Xihai Zhao, Rui Li, Tsinghua Univ. (China); Chun Yuan, University of Washington (USA) ......... [11313-81] Convolutional neural network-based ordinal regression for brain age prediction from raw MRI scans, Keonia Sokolovka, Gareth Barker, King’s College London (UK); Giovani Montana, The University of Warwick (UK) ......... [11313-82] Assessment of deep learning in segmentation of fluorescent microscopy images of stem cell colonies, Dorna Zaeri, David Chapman, Yaacov Yeshua, Miltton Halem, University of Maryland, Baltimore County (USA) ......... [11313-83] Automatic epidermal fat segmentation in cardiac CT imaging using 3D deep attention U-Net, Bangjun Guo, Yang Li, Tonghe Wang, Tian Liu, Walter J. Curran, Long Jiang Zhang, Xiaofeng Yang, Emory Univ. (USA) ......... [11313-94] FunSyn-Net: enhanced residual variational auto-encoder and image-to-image translation network for Fundus Image Synthesis, Sourya Sengupta, Univ. of Waterloo (Canada); Akhaya Ahaswee, Indian Institute of Technology (Indian School of Mines) Dhanbad (India); Tanny Gulat, Manipal Institute of Technology (India); Vasudevan Lakshmikantharan, Univ. of Waterloo (Canada) ......... [11313-93] Deep similarity learning using a Siamese ResNet trained on similarity labels from disparity maps of cerebral MRA MIP pairs, Christian Neumann, Hochschule Niederrhein (Germany); Klaus D. Tønnes, Technical Univ. of Denmark (Denmark); Regina Pohte-Fritschl, Hochschule Niederrhein (Germany) ......... [11313-94] Validation and optimization of multi-organ segmentation on clinical imaging archives, Ogusia Tung, Xuchen Xu, Yuchen Xue, Zhichao Yuan, M. D. Anderson Cancer Ctr. Wiskunde & Informatica (Netherlands); Tanja de Jonge, Monika Grewal, Timo M. Deist, Ctr. Wiskunde & Informatica (Netherlands); Richard G. Abramari, Vanderbilt Univ. (USA); Yuankai Huo, Bennett A. Landman, Vanderbilt Univ. (USA) ......... [11313-95] A quasi-conformal mapping-based data augmentation technique for improving deep learning performance on brain segmentation, Min Zhang, Brigham and Women's Hospital, Harvard Medical School (USA); Dongsheng An, Stony Brook Univ. (USA); Geoffrey S. Young, Brigham and Women's Hospital (USA); Xianteng Gu, Stony Brook Univ. (USA); Xiaoyin Xu, Brigham and Women’s Hospital (USA) ......... [11313-96] MRI correlates of chronic symptoms in mild traumatic brain injury, Cailey L. Kerley, Kurt G. Schilling, Justin Baber, Beth Ann White, Matthew A. Dobson, Adam W. Anderson, Bennett A. Landman, Tonia S. Rex, Vanderbilt Univ. (USA) ......... [11313-97] Development of a 3D carotid atlas for quantification of local volume change, Xueli Chen, Xian Zhou, City of Hope National Medical Center, Shanghai, China; John David Spence, Stroke Prevention & Atherosclerosis Research Ctr., Roberts Research Institute (Canada); Bernard Chiu, City of Hope, City of Hong Kong (Hong Kong, China) ......... [11313-98] Integrating deep transfer learning and radiomics features in Glialblastoma multiforme patient survival prediction, Wei Han, Brigham and Women's Hospital (USA) ......... [11313-99] An unsupervised deep learning approach for 4DCT deformable image registration, Yabo Fu, Yang Li, Yinguo Liu, Tian Liu, Xiaofeng Yang, Emory Univ. (USA); Walter J. Curran, Kristin Higgins, Emory Univ. (USA) ......... [11313-100] Cone-beam Computed Tomography (CBCT) and MRI Co-registered by CBCT-based synthetic CT, Yubo Fu, Yang Li, Yinguo Liu, Tonghe Wang, Walter J. Curran, Tian Liu, Pretesh Patel, Xiaofeng Yang, Emory Univ. (USA) ......... [11313-101] Imposing implicit feasibility constraints on a variational model for statistical generative model, Yuqi Sang, Univ. of California, Los Angeles (USA); Xianglei Xing, Harker Engineering Univ. (China) and Univ. of California, Los Angeles (USA); Ying Nian Wu, Dan Ruan, Univ. of California, Los Angeles (USA); Yao Rong, Los Angeles (USA) ......... [11313-102] Local structure orientation: a new method for histology and MRI coregistration, Wadha Alaymi, The Univ. of Sydney (Australia) ......... [11313-103]
Infarct region segmentation in rat brain T2 MR images after stroke based on fully convolutional networks, Herring-Huang Chang, National Taiwan Univ. (Taiwan); Shin-Joe Yeh, National Taiwan Univ. Hospital (Taiwan); Ming-Chang Chuang, National Yang-Ming Univ. (Taiwan); Sung-Tsang Heiseh, National Taiwan Univ. Hospital (Taiwan). [11317-84]

Left ventricular myocardium segmentation in coronary computed tomography angiography using 3D deep attention u-net, Bangjun Guo, XiuXiu He, Yang Liu, Tonghe Wang, Xiaofeng Yang, The Winship Cancer Institute of Emory Univ. (USA). [11317-85]

Full automated classification of glomerular lesions in lupus nephritis, Brandon Ginley, Univ. at Buffalo (USA); Kuang-Yu Jen, Univ. of California, Davis (USA); Ari Rosenberg, Giovanni Maria Rossi, Johns Hopkins Univ. (USA); Sanjay Jain, Washington Univ. School of Medicine in St. Louis (USA); Pinaki Sarder, Univ. at Buffalo (USA). [11317-89]

Light-field phase imaging microscopy via Phycopigment Modulation Engine (PME), Chieh Bian, Shaowei Jiang, Guoan Zheng, Univ. of Connecticut (USA). [11317-90]

Using a 22-layer U-Net to perform segmentation of squamous cell carcinoma on digitalized head and neck histological images, Amol Mavuduru, Univ. at Buffalo (USA); Brahm H. Segal, Roswell Park Comprehensive Cancer Ctr. (USA). [11317-92]

Predicting MYC translocation in H&E specimens of diffuse large B-cell lymphoma through deep learning, Zaneta Swiderska-Chadaj, Konnie Hebeda, Samuel P. Border, Univ. at Buffalo (USA). [11317-93]

Searchung histology patterns in gastric glands for predicting gastric cancer survival, Eduardo Romero Castro, Ricardo Alexander Moncayo Martinez, Sunny Catalina Alfonso, Angel Yobany Sanchez Merchan, Univ. Nacional de Colombia Sede Bogota (Colombia). [11317-95]

Characterization of color normalization methods in digital pathology whole-slide imaging, Dorsa Ziaei, Univ. of Maryland, Baltimore County (USA); Wei-Chung Cheng, U.S. Food and Drug Administration (USA); Samuel Lam, Univ. of Maryland, College Park (USA); Weizhe Li, Weijie Chen, U.S. Food and Drug Administration (USA). [11317-99]

The presence and location of podocytes in glomeruli as affected by diabetes mellitus, Kathryn E. Maraszek, Bransa Sano, John E. Tomaszewski, Pinaki Sarder, Univ. at Buffalo (USA). [11317-97]

Improved instance segmentation of immune cells in human lupus nephritis biopsies with Mask R-CNN, Madeleine S. Durkee, Adam Sibley, Junting Ai, Rebecca Abraham, Vladimir M. Liatorsi, Marcus R. Clark, Maryellen L. Giger, The Univ. of Chicago (USA). [11317-102]

Color-multiplexed single-shot dynamic focus tracking based on LED-array illumination for whole slide imaging, Shaowei Jiang, Zichao Bian, Guoan Zheng, Univ. of Connecticut (USA). [11317-103]
**CONFERENCE 11313**
**ROOM: SALON C**
Monday–Thursday 17–20 Feb. 2020
Proceedings of SPIE Vol. 11313

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**SESSION 10**
**ROOM: SALON C**
**THU 8:00 AM TO 9:40 AM**
**Segmentation: Anatomy**

8:00 am: Combining deep learning and model-based segmentation for labeled spine CT segmentation. Christian Buenger, Matthias Lena, Jens von Berg, Astrid Franz, Tobias Kliner, Cristian Lorenz, Philips Research (Germany). [11313-47]

8:20 am: Combining model- and deep-learning-based methods for the accurate and robust segmentation of the intra-cochlear anatomy in clinical head CT images. Yubo Fan, Vanderbilt Univ. (USA); Dongqing Zhang, Google (USA); Jianing Wang, Jack H. Noble, Benoit M. Dawant, Vanderbilt Univ. (USA). [11313-48]

8:40 am: Multi-class semantic segmentation of pediatric chest radiographs. Gregory Hoiste, Michigan State Univ. (USA); Ryan Sullivan, Purdue Univ. (USA); Michael Bindschadler, Nicholas Nagy, Univ. of Washington (USA); Adam Alexios, Michigan State Univ. (USA). [11313-49]

9:00 am: Exploiting clinically available delineations for CNN-based segmentation in radiation therapy treatment planning. Louis D. van Harten, Jelmer M. Wolterink, Joost J. C. Verhoeff, Ivana Klinder, Cristian Lorenz, Philips Research (Germany); Matthias Buerger, Matthias Lenga, Jens von Berg, Astrid Franz, Tobias Kliner, Cristian Lorenz, Philips Research (Germany). [11313-50]

9:20 am: Anatomy segmentation evaluation with sparse ground truth data. Jieyu Li, Shanghai Jiao Tong Univ. (China) and Univ. of Pennsylvania (USA); Jayaram K. Udopya, Yubing Tong, Univ. of Pennsylvania (USA); Lisheng Wang, Shanghai Jiao Tong Univ. (China); Drew A. Torigian, Univ. of Pennsylvania (USA). [11313-51]

Coffee Break. [11313-52]

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**CONFERENCE 11316**
**ROOM: BRIARGROVE**
Wednesday–Thursday 19–20 Feb. 2020
Proceedings of SPIE Vol. 11316

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**SESSION 5**
**ROOM: BRIARGROVE**
**THU 8:20 AM TO 9:40 AM**
**ROC Methodology**

Session Chairs: Robert M. Nicklow, Univ. of Pittsburgh (USA); Craig K. Abbey, Univ. of California, Santa Barbara (USA)


8:40 am: Efficiently calculating ROC curves, AUC, and uncertainty from 2AFC studies with finite samples. Frank W. Samuelson, U.S. Food and Drug Administration (USA); Dylan H. Shi, Yubing Tong, Univ. of Washington, College Park (USA). [11316-19]

9:00 am: Simulation of multi-reader multi-case study data with realistic ROC performance characteristics. Xiaochen Zhu, George Mason Univ. (USA); Weijie Chen, U.S. Food and Drug Administration (USA). [11316-20]

9:20 am: Determining Roe and Metz model parameters for simulation MRMC data based on read-data or conjectured parameter estimates. Stephen L. Hills, The Univ. of Iowa (USA). [11316-21]

Coffee Break. [11316-22]

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**CONFERENCE 11317**
**ROOM: RIVER OAKS**
Tuesday–Thursday 18–20 Feb. 2020
Proceedings of SPIE Vol. 11317

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**SESSION 9**
**ROOM: RIVER OAKS**
**THU 8:00 AM TO 9:40 AM**
**Novel Imaging Methods**

Session Chairs: Nancy L. Ford, The Univ. of British Columbia (Canada); David L. Wilson, Case Western Reserve Univ. (USA)

8:00 am: Initial investigations of x-ray particle imaging velocimetry (X-PIV) in 3D printed phantoms using 1000 fps High-Speed Angiography (RSA). Jordan M. Krebs, Allison Shields, Abhinandan Sharma, Lauren M. Shepard, Ciprian N. Ionita, Daniel Bednarek, Stephen Rudin, Canon Stroke and Vascular Research Ctr. (USA). [11317-39]

8:20 am: Micro-CT imaging technique to characterize diffusion of small molecules. Tia Kharazai, Western Univ. (Canada); Chris J. D. Norley, Hristo N. Nikolov, Roberts Research Institute (Canada); Santagato F. Cobos, Western Univ. (Canada); David W. Holdsworth, Roberts Research Institute (Canada). [11317-40]


9:00 am: Co-registration of pre- and post-stent intravascular OCT images for validation of finite element model simulation of stent expansion. Yazan Gharabeh, Juhanne Lee, David Prabhu, Case Western Reserve Univ. (USA); Pengfei Dong, Univ. of Nebraska-Lincoln (USA); Vladislav Zimmin, Harrington Heart & Vascular Institute, Univ. Hospitals of Cleveland (USA); Hiram G. Bezerina, Univ. Hospitals of Cleveland (USA); Liming Gu, Univ. of Nebraska-Lincoln (USA); David L. Wilson, Case Western Reserve Univ. (USA). [11317-42]


Coffee Break. [11317-44]

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**CONFERENCE 11320**
**ROOM: SALON A**
Wednesday–Thursday 19–20 Feb. 2020
Proceedings of SPIE Vol. 11320

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**SESSION 3**
**ROOM: SALON A**
**THU 8:00 AM TO 9:40 AM**
**Segmentation of Cellular and Tissue Structures**

8:00 am: Multi-class semantic cell segmentation and classification of apleisia in bone marrow histology images. Leander van Eekelen, Hans Pickkers, Konnie M. Hebeda, Geert Lijtjes, Radboud Univ. Med. Ctr. (Netherlands). [11320-10]


8:40 am: A deep learning approach to assess the predominant tumor growth pattern in whole-slide images of lung adenocarcinoma. Francisco Clompi, Radboud Univ. Med. Ctr. (Netherlands); Zaneta Swiderska-Chadaj, Radboud Univ. Med. Ctr. (Netherlands) and Warsaw Univ. of Technology (Poland); Karolina Nucyznska, Silesian Univ. of Technology (Poland); Bartomiej Grala, Military Institute of Medicine (Poland); Katrien Grünberg, Lieke van der Woude, Monika Looijen-Salamon, Radboud Univ. Med. Ctr. (Netherlands); Ann E. Wals, Cedars-Sinai Med. Ctr. (USA); Tomasz Markiewicz, Warsaw Univ. of Technology (Poland) and Military Institute of Medicine (Poland); Arkadiusz Gertych, Cedars-Sinai Med. Ctr. (USA). [11320-12]

9:00 am: Segmentation of mycobacterium tuberculosis bacilli clusters from acid-fast stained lung biopsies: a deep learning approach. Thomas E. Tavolara, Khalid M. K. Niazi, Wake Forest Univ. School of Medicine (USA); Billian Beauer, Tufts Univ. (USA); Merin N. Gurcan, Wake Forest Univ. School of Medicine (USA). [11320-13]

9:20 am: Generative modeling for renal microanatomy. Leema K. Murali, Brandon Ginley, Brendan Lutwick, John E. Tomaszewski, Pinaki Sarder, Univ. at Buffalo (USA). [11320-14]

Coffee Break. [11320-15]
SESSION 7
ROOM: BRIARGROVE  
THU 1:20 PM TO 3:00 PM
Model Observers II
Session Chairs: Matthew A. Kupinski, Wyant College of Optical Sciences (USA); Pontius A. Timberg, Scania Univ. Hospital (Sweden)
1:20 pm: Human observer templates for lesion discrimination tasks. Craig K. Avery, 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).
1:40 pm: Foveated model observer to predict human search performance with virtual digital breast tomosynthesis phantoms. Miguel A. Lago, Univ. of California, Santa Barbara (USA); Bruno B. Barufaldi, Predrag R. Bakić, Univ. of Pennsylvania (USA); Craig K. Avery, Univ. of California, Santa Barbara (USA); Andrew D. A. Maidment, Univ. of Pennsylvania (USA); Miguel P. Eckstein, Univ. of California, Santa Barbara (USA).
2:00 pm: Learning numerical observers using unsupervised domain adaptation. Shenghua He, Weimin Zhou, Washington Univ. in St. Louis (USA); Hua Li, Mark Anastasio, Univ. of Illinois (USA).
2:40 pm: Convolutional neural network-based anthropomorphic model observer for breast cone-beam CT images. Byungyon Kim, Minah Han, Jongduk Baek, Yonsei Univ. (Korea, Republic of).

SESSION 11
ROOM: RIVER OAKS  
THU 1:20 PM TO 3:00 PM
Bone and Skeletal Imaging, Segmentation, Registration, and Decision-making
Session Chairs: Axel Wismüller M.D., Univ. of Rochester Medical Ctr. (USA); Nancy L. Ford, The Univ. of British Columbia (Canada)
1:40 pm: CT-based characterization of transverse and longitudinal trabeculae and its applications. Xiali Zhao, Elena M. Letuchy, Steven M. Levy, James C. Torner, Punam K. Saha, The Univ. of Iowa (USA).
2:00 pm: Graph Laplacian learning based Fourier Transform for brain network analysis with resting state fMRI. Junqi Wang, Tulane Univ. Health Sciences Ctr. (USA); Julia M. Stephen, The Mind Research Network (USA); Tony W. Wilson, Univ. of Nebraska Medical Ctr. (USA); Vince D. Calhoun, Ctr. for Translational Research in Neuroimaging and Data Science (USA) and Georgia State Univ. (USA) and Georgia Institute of Technology (USA) and Georgia State Univ. (USA) and Georgia Inst. of Technology (USA) and Georgia State Univ. (USA) and Georgia State Univ. (USA).
2:20 pm: Evaluation of intensity-based deformable registration techniques of multi-parametric MRI for radiomics analysis of the prostate. Stephanie Alley, Polytechnique Montréal (Canada); Andreas Fedorov, Brigham and Women’s Hospital (USA); Cynthia Menard, Ctr. Hospitalier de l’Univ. de Montréal (Canada); Samuel Kadoy, Polytechnique Montréal (Canada).
2:40 pm: Automatic measurement of extra-axial CSF from infant MRI data. Arthur Le Maout, Han Bit Yoon, SunHeung Kim, Mahmoud Mostapha, Mark Shen, Juan C. Prieto, Martin A. Shyner, The Univ. of North Carolina at Chapel Hill (USA).
Coffee Break.

SESSION 5
ROOM: SALON A  
THU 1:20 PM TO 3:00 PM
Integration of Multimodal and Spatial Information
1:20 pm: Discovering correspondences between molecular profiles and morphological features via deep learning. Richard Chen, Faisal Mahmood, Harvard Medical School (USA) and Brigham and Women’s Hospital (USA).
1:40 pm: Multimodal fusion of histology and molecular features for improved survival outcome prediction. Richard J. Chen, Harvard Medical School (USA) and Brigham and Women’s Hospital (USA); Max Lu, Brigham and Women’s Hospital (USA); Faisal Mahmood, Harvard Medical School (USA) and Brigham and Women’s Hospital (USA).
2:00 pm: Histographs: graphs in histopathology. Deepak Anand, Shrey Gadiya, Indian Institute of Technology Bombay (India); Amit Sethi, Indian Institute of Technology Bombay (India) and Univ. of Illinois at Chicago (USA).
2:20 pm: Deep learning-based automated hot-spot detection and tumor grading in human gastrointestinal neuroendocrine tumor. Darshana Govind, Univ. at Buffalo (USA); Xiang-Yu Jen, Univ. of California, Davis (USA); Pinaki Sarder, Univ. at Buffalo (USA).
2:40 pm: Computer extracted features related to the spatial arrangement of tumor-infiltrating lymphocytes predict overall survival in epithelial ovarian cancer. Sepideh Azarianpour, German Corredor, Kaustav Bera, Patrick Leo, Nathaniel Braman, Pingfu Fu, Case Western Reserve Univ. (USA); Haidar Mahdi, Cleveland Clinic (USA); Anant Madabhushi, Case Western Reserve Univ. (USA).
Coffee Break.

END OF 11313 CONFERENCE
END OF 11316 CONFERENCE
CONF. 11317 continued page 61
CONF. 11320 continued page 61
Ciprian N. Ionita, Univ. at Buffalo (USA) and Canon Stroke and Vascular Research Ctr. (USA); Frank J. Rybicki, Univ. of Cincinnati, Buffalo (USA); Erin Angel, Canon Medical Systems USA, Inc. (USA) and Canon Stroke and Vascular Research Ctr. (USA); Vijay phantoms, Kelsey N. Sommer, Lauren M. Shepard, Univ. at Buffalo fractional flow reserve using patient specific coronary imaging. (Switzerland) ..................................... [11320-31]

Vincent Andrearczyk, Henning Müller, HES-SO Valais-Wallis Heart & Vascular Institute, Univ. Hospitals of Cleveland (USA); David L. Wilson, Case Western Reserve Univ. (USA) .......................... [11317-55]

Time course study of a gold nanoparticle contrast agent. Sameer El ketara, Nancy L. Ford, The Univ. of British Columbia (Canada), ........................................... [11317-60]

3:30 pm: Conditional generative adversarial network for synthesizing hyperspectral images of breast cancer cells from digitized RGB histology. Martin Halick, Georgia Institute of Technology & Emory Univ. School of Medicine (USA); Samuel Ortega, Himar Fabelo, Univ. de Las Palmas de Gran Canaria (Spain); Carlos Lopez, Marylene Lejaune, Hospital de Tortosa Verge de la Cinta (Spain); Gustavo M. Callico, Univ. de Las Palmas de Gran Canaria (Spain); Baowei Fei, The Univ. of Texas at Dallas (USA) .......................... [11320-30]

5:10 pm: Hyperspectral microscopic imaging for detection of head and neck squamous cell carcinoma using histologic image and machine learning. Ling Ma, Martin Halick, Ximing Zhou, James D. Dormer, Baowei Fei, The Univ. of Texas at Dallas (USA) .......................... [11320-31]
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<thead>
<tr>
<th>Product Order Number</th>
<th>Volume Title/Volume Editors</th>
</tr>
</thead>
<tbody>
<tr>
<td>DL 11312</td>
<td>Medical Imaging 2020: Physics of Medical Imaging Hilde Bosmans, Guang-Hong Chen</td>
</tr>
<tr>
<td>DL 11313</td>
<td>Medical Imaging 2020: Image Processing Bennett A. Landman, Ivana Išgum</td>
</tr>
<tr>
<td>DL 11314</td>
<td>Medical Imaging 2020: Computer-Aided Diagnosis Horst K. Hahn, Maciej A. Mazurowski</td>
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<tr>
<td>DL 11315</td>
<td>Medical Imaging 2020: Image-Guided Procedures, Robotic Interventions, and Modeling Baowei Fei, Cristian A. Linte</td>
</tr>
<tr>
<td>DL 11316</td>
<td>Medical Imaging 2020: Image Perception, Observer Performance, and Technology Assessment Frank W. Samuelson, Sian Taylor-Phillips</td>
</tr>
<tr>
<td>DL 11317</td>
<td>Medical Imaging 2020: Biomedical Applications in Molecular, Structural, and Functional Imaging Barjor Gimi, Andrzej Krol</td>
</tr>
<tr>
<td>DL 11318</td>
<td>Medical Imaging 2020: Imaging Informatics for Healthcare, Research, and Applications Thomas M. Deserno, Po-Hao Chen</td>
</tr>
<tr>
<td>DL 11319</td>
<td>Medical Imaging 2020: Ultrasonic Imaging and Tomography Nicole V. Ruster, Brett C. Byram</td>
</tr>
<tr>
<td>DL 11320</td>
<td>Medical Imaging 2020: Digital Pathology John E. Tomaszewski, Aaron D. Ward</td>
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</table>

Online Proceedings Collections

<table>
<thead>
<tr>
<th>Product Order Number</th>
<th>Collection Title/Included Volumes</th>
</tr>
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<tbody>
<tr>
<td>DLC777</td>
<td>Medical Imaging 2020 Includes Volumes 11312, 11313, 11314, 11315, 11316, 11317, 11318, 11319, 11320</td>
</tr>
</tbody>
</table>
**Courses**

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SPIE Medical Imaging offers focused, face-to-face instruction from some of the leading minds in medical imaging research and applications.

<table>
<thead>
<tr>
<th>SATURDAY</th>
<th>SUNDAY</th>
<th>MONDAY</th>
<th>TUESDAY</th>
<th>WEDNESDAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC086 Fundamentals of Medical Image Processing and Analysis (Deserno)</td>
<td>SC1262 Adversarial Networks: From Architecture to Practical Training (Wenzel)</td>
<td>SC987 Spectral CT Imaging (Schmidt, Flohr, Grant)</td>
<td>SC1295 From Analytic to Clinical Validation: Moving AI/ML into Practice (Hsu, Brown, Nishikawa, Krupinski)</td>
<td>THURSDAY</td>
</tr>
<tr>
<td>8:30 am to 5:30 pm, $565 / $660, p. 64</td>
<td>8:30 am to 12:30 pm, $325 / $380, p. 66</td>
<td>8:30 am to 12:30 pm, $325 / $390, p. 66</td>
<td>8:30 am to 5:30 pm, $565 / $660, p. 67</td>
<td></td>
</tr>
<tr>
<td>SC1296 High Performance Computing for Medical Imaging on Graphics Processing Units (GPU) with CUDA (Caucci)</td>
<td>1:30 pm to 5:30 pm, $325 / $380, p. 68</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8:30 am to 5:30 pm, $595 / $690, p. 65</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SC1235 Introduction to Medical Image Analysis Using Convolutional Neural Networks (Wenzel)</td>
<td>SC1292 Technological Assessment of X-Ray Based Breast Imaging Systems Using Anthropomorphic Phantoms (Glick, Bosmans, Badal)</td>
<td>SC1183 Modern Diagnostic X-ray Sources (Behling)</td>
<td>SC1239 Virtual Clinical Trials: An In-depth Tutorial (Maidment, Bakic, Barufaldi)</td>
<td></td>
</tr>
<tr>
<td>8:30 am to 5:30 pm, $325 / $380, p. 66</td>
<td>8:30 am to 12:30 pm, $325 / $380, p. 66</td>
<td>1:30 pm to 5:30 pm, $325 / $380, p. 66</td>
<td>8:30 am to 12:30 pm, $335 / $390, p. 65</td>
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</tr>
<tr>
<td>SC1292 Photonic Counting CT (Danielsson, Sjödin)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1:30 pm to 5:30 pm, $325 / $380, p. 66</td>
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Courses

Fundamentals of Medical Image Processing and Analysis

SC086 • Course Level: Intermediate • CEU: 0.7
$565 Members • $254 Student Members • $660 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 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 (1987), 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 (IADMF), 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 (IMA).

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
$325 Members • $182 Student Members • $360 Non-Members USD Saturday 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:
- 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.

Martin Sjölin has worked with the development of spectral-counting x-ray detectors since 2011. He has worked on several topics related to photon-counting spectral detectors, including: energy calibration, geometric calibration, count-rate performance, sampling and digital data compression. Martin received his PhD from KTH Royal Institute of Technology, Sweden, in 2016 with the thesis “Methods of image acquisition and calibration for x-ray computed tomography”. His current research is focused on the design and development of spectral photon-counting detectors suitable for clinical CT.

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
$325 Members • $182 Student Members • $380 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 detail application, non-destructive testing and material analysis 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 via several publications by the lecturer, see [1-13], 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 work with 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. Recent technology and application will be treated. Last but not least, the lecture may spark fascination for these vacuum electronic light sources off the scientific mainstream.

LEARNING OUTCOMES

This course will enable you to:
• see rare historic artifacts and pictures from various vendors and other sources
• 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
• know latest developments for spectral imaging and dark field imaging
• 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 such as bearings, cathodes, vacuum frame, and housing
• explain methods for heat management
• treat unwanted side-effects like vacuum discharges, off-focal radiation and others, and propose remedies
• summarize the peculiarities of bremstrahlung 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 patte, oro’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
• look out into future application of X-ray tubes, e.g. for phase contrast imaging, dark-field imaging, spectral imaging with various concepts
• touch 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 electron-ic 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 manufacturers, developing 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 (Diploma), Fellow Scientist of the Philips group and a veteran in the field of medical imaging. During his 39-year tenure in this industry, he headed vacuum technology development, customer specific product development, 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 bearings was developed under his project leadership. Rolf Behling currently heads Philips’s advanced development of X-ray tubes and X-ray generators at Philips Healthcare in Hamburg, Germany. He is a part-time lecturer at the University of Hamburg, and has contributed numerous patents, talks and publications in the field of vacuum technology and medical imaging.

Introduction to Medical Image Analysis Using Convolutional Neural Networks

SC1235 • Course Level: Introductory • CEU: 0.7
$595 Members • $306 Student Members • $690 Non-Members USD
Friday 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. Simple methods to explain predictions and assess network uncertainty will be discussed briefly as well. Participants will work in a prepared online environment providing selected deep learning toolkit installations, example data, and fully functional skeleton code as a basis for own experiments.

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 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
• improve and optimize resulting model performance using simple visual analytics

INTENDED AUDIENCE

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

INSTRUCTOR

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

ATTENDEE TESTIMONIAL:

Great presentation, great hands-on material very knowledgeable instructors.

Courses
Adversarial Networks: From Architecture to Practical Training

SC1262 • Course Level: Intermediate
CEU: 0.4 • $325 Members • $182 Student Members • $380 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 most important concepts of generative adversarial networks (GANs) and show example applications to medical data. GANs are powerful appearance models, but 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. We will introduce GANs conceptually and from a Variational Inference perspective, give an overview of their development towards the state of the art, and explain specific architectural decisions and developments that have been proposed to stabilize their training. We will show code examples and illustrate the course content with live demonstrations on example data, so that the participants gain some first-hand experience on the subject. The course is not designed as a hands-on workshop, though.

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

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

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

ATTENDEE TESTIMONIAL:
Excellent course and presenters. Great topic and material.

Technological Assessment of X-Ray Based Breast Imaging Systems Using Anthropomorphic Phantoms

SC1292 • Course Level: Introductory • CEU: 0.4 • $325 Members • $182 Student Members • $380 Non-Members USD
Saturday 8:30 am to 12:30 pm

Development of new breast X-ray imaging technologies or improvements to hardware or software of current systems usually require the accurate assessment of image quality. Image quality assessment methods are also required for quality control (QC) of clinical systems, for example as required by the U.S. Mammography Quality Standards Act (MQSA) program. The gold standard for assessment of image quality is human reader studies assessing diagnostic performance over a cohort of representative clinical images. These clinical trials are often difficult and expensive to perform, and therefore researchers have been studying alternative approaches that can assess diagnostic task performance without imaging patients.

This short course will discuss methods for objectively assessing task performance of breast imaging systems without conducting a clinical trial. One approach that will be discussed is the in silico modeling of a clinical trial. This approach involves complete computer modeling of each step in the imaging chain including: 1) modeling of breast and relevant breast lesions, 2) modeling of the imaging system, and 3) modeling of the observer. Another more experimental approach that will also be discussed involves: 1) development of anthropomorphic physical phantoms with diagnostic features, 2) imaging of these phantoms on breast imaging commercial or prototype systems, and 3) assessment of task performance with either model or human observers.

For maximum efficiency, the proposed in silico and experimental approaches require the development of computer or model observers that can emulate either ideal or human observer task performance. This short course will discuss the use of new machine learning algorithms that can be used to model observer performance in the assessment of breast imaging technology.

This course will describe and make attendees aware of useful open-source software tools that can be downloaded.

LEARNING OUTCOMES
This course will enable you to:
• Summarize new methods for generating both digital and physical anthropomorphic breast phantoms that can be used for objective technology assessment.
• Identify new open-source software that can be used to generate digital breast phantoms.

Courses
INTENDED AUDIENCE

Scientists, engineers, technicians, or managers who wish to learn more about how to objectively assess breast imaging technology. Anyone who wants to learn more about: 1) optimizing new breast imaging systems, 2) new approaches to modeling observers for breast phantom images. These include both conventional and machine-learning-based model observers. List advantages and disadvantages of various model observers. Describe a new approach for objectively assessing breast imaging systems. Explain how to use machine learning model observers to assess task performance achieved with various breast imaging modalities. Describe and learn about an in silico clinical trial conducted by the FDA to compare task performance with full-field digital mammography and digital breast tomosynthesis.

INSTRUCTOR

Stephen Glick is a Research Biomedical Engineer in the Division of Imaging, Diagnostics, and Software Reliability at the U.S. Food and Drug Administration. He received the Ph.D. degree in Biomedical Imaging, Diagnostics, and Software Reliability at the U.S. Food and Drug Administration. Dr. Glick earned his Ph.D. in Nuclear Engineering from the Universitat Politècnica de Catalunya in Barcelona, Spain, working in the research group developing the Monte Carlo code PENEOPE. He has specialized in the application of Monte Carlo radiation transport simulation methods in medical imaging, and is the main developer of MC-GPU, the first GPU-accelerated Monte Carlo code for the simulation of x-ray imaging devices.

This course will enable you to:

- Summarize an approach for in silico Monte Carlo modeling of breast imaging systems.
- Describe and learn about approaches to validate modeling tools.
- Identify open-source Monte Carlo software available for in silico modeling of breast imaging systems.
- Describe various approaches to modeling observers for breast phantom images. These include both conventional and machine-learning-based model observers.
- List advantages and disadvantages of various model observers.
- Describe a new approach for objectively assessing breast imaging detectors.
- Explain how to use machine learning model observers to assess task performance achieved with various breast imaging modalities.
- Describe and learn about an in silico clinical trial conducted by the FDA to compare task performance with full-field digital mammography and digital breast tomosynthesis.

LEARNING OUTCOMES

This course will enable you to:

- Describe the process of analytic and clinical validation, elucidating the steps involved and the considerations in designing an evaluation.
- Explain basic concepts (e.g., training/testing/validation, cross-validation) and metrics (e.g., precision/recall) related to algorithm evaluation.
- Choose the appropriate study design and metrics for comparing algorithms, depending on data, model, and objective.
- Interpret various metrics to determine whether one algorithm is superior over others for a specific task.
- Identify sources of potential biases that may influence model performance due to characteristics of the training or target populations.
- Identify potential steps in moving beyond an algorithm paper to deploying AI/ML in clinical practice.
- Identify appropriate methods to assess the impact of AI techniques and tools on observer accuracy.

INTENDED AUDIENCE

Data scientists, health information technology practitioners, and clinician informaticists who wish to learn about the process of evaluating prediction models and the considerations involved in assessing the suitability and impact of adopting a model in a clinical environment. Basic biostatistics (hypothesis testing, statistical tests) and a working knowledge of machine learning concepts (how models are constructed, types of machine learning algorithms) are assumed.

INSTRUCTOR

William Hsu PhD is an Associate Professor of Radiological Sciences at the University of California, Los Angeles and a member of the Medical & Imaging Informatics group. Dr. Hsu’s research interest is in data integration and machine and reinforcement learning with applications in improving diagnostic decisions to support to improve early detection of cancers. He has developed and evaluated many machine learning-based algorithms that utilize clinical, imaging, and molecular data as inputs. In his role as a Deputy Editor for the Radiology: Artificial Intelligence journal, he has developed an interest in improving the transparency and consistency of reporting of model evaluations.

Matthew Brown PhD is a Professor of Radiological Sciences at the University of California, Los Angeles and the Director of the Center for Computer Vision and Imaging Biomarkers (CVIB) at UCL. Dr. Brown’s research interests include medical image segmentation, quantitative analysis, and imaging biomarker development. He is a co-founder of MedQIA, a company that provides image analysis services for clinical trials to the biotech, pharma, and medical device industries.

Robert Nishikawa PhD is Professor of Radiology at the University of Pittsburgh. He has research interests in developing quantitative imaging techniques for breast imaging; image quality assessment; and evaluation of imaging technologies, specifically, the clinical effectiveness of computer aids for radiologists. He has over 200 scientific publications and has been a consultant for several medical imaging companies on digital imaging and computer-aided diagnosis. He is a fellow of SPIE, AAPM, AIMBE, and the Society of Breast Imaging.

Elizabeth Krupinski PhD is an Experimental Psychologist with research interests in medical image perception, observer perfor-
Courses

High-Performance Computing for Medical Imaging on Graphics Processing Units (GPU) with CUDA

SC1296 • Course Level: Introductory • CEU: 0.4
$325 Members • $182 Student Members • $380 Non-Members USD
Sunday 1:30 pm to 5:30 pm

This course covers the basic principles of graphics processing unit (GPU) programming with CUDA. To become familiar with the programming model, we will start with a simple example, to be followed by more in-depth topics related to GPU programming. Some applications to medical imaging will be presented. Anyone who wants to know how to parallelize their code and make it run 10 times faster by harnessing the massively parallel capabilities of modern GPUs, will benefit from taking this course.

LEARNING OUTCOMES
This course will enable you to:
• design efficient general-purpose CUDA code tailored to the parallel capabilities of modern GPUs
• be able to learn on your own, understand, and use advanced material on CUDA programming
• analyze and debug existing CUDA code
• modify code samples and use them as building blocks for more complex applications

INTENDED AUDIENCE
Scientists, engineers, or technicians who wish to learn CUDA and GPU programming. Knowledge of the C programming language is assumed.

INSTRUCTOR
Luca Caucci is an assistant professor in the Department of Medical Imaging at the University of Arizona. He earned his PhD in Optical Sciences from the University of Arizona. Dr. Caucci’s research interests include emission computed tomography, list-mode data processing, photon-processing detectors, signal detection, parameter estimation, adaptive imaging, parallel computing, and digital radiology.

Spectral CT Imaging

SC987 • Course Level: Intermediate • CEU: 0.4
$325 Members • $182 Student Members • $380 Non-Members USD
Monday 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
This course will enable you to:
• describe the system properties of a spectral CT system
• compare different system approaches to acquire spectral CT data, such as dual source CT, kV switching and energy-resolving detectors
• summarize various algorithms for spectral CT reconstructions and spectral CT image postprocessing
• list the relevant clinical applications of spectral CT
• explain the main challenges of spectral CT techniques

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

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

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

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

Registration

ONSITE REGISTRATION HOURS / BADGE PICK-UP
Texan Foyer, 4th Floor
Saturday 15 February ......................... 7:15 AM - 4:00 PM
Sunday 16 February .......................... 7:15 AM - 4:00 PM
Monday 17 February .......................... 7:30 AM - 4:00 PM
Tuesday 18 February .......................... 7:30 AM - 4:00 PM
Wednesday 19 February ...................... 7:30 AM - 4:00 PM
Thursday 20 February ....................... 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 29 January 2020. 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
David Mitzner Room, 4th Floor
Sunday .................. 7:00 AM - 5:00 PM
Monday through 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.

Save money—Register by 24 January
**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, courses, and more. Free Conference App available for iPhone and Android phones. Check out the SPIE App.

**SPIE BOOKSTORE**
Texan Foyer, 4th Floor
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**
SPIE Registration Desk, Texan Foyer, 4th Floor
Browse course offerings or learn more about SPIE courses available in portable formats such as Online and customized, In-company courses.

**SPIE LUGGAGE & COAT CHECK**
Hotel Front Desk
Complimentary luggage, package, and coat storage are available. Please note hours; no late pickup available.

**BUSINESS CENTER**
Marriott Marquis Houston Lobby
Services include copy service, fax service, notary services, overnight delivery/pickup, network/internet printing, and post/parcel.

**RESTAURANT & CITY INFORMATION**
Restaurant and City information available at Hotel Concierge in the Marriott Marquis Houston Lobby.

**CHILD CARE SERVICES**
Mom’s Best Friend – Hotel Child Care - 281.578.2584 or 713.776.2669
NOTE: SPIE does not imply an endorsement nor recommendation of these services. They are provided on an “information only” basis for your further analysis and decision. Other services may be available.

**URGENT MESSAGE LINE**
An urgent message line is available during registration hours: +1.360.685.5529

**LOST AND FOUND**
Registration Desk, Texan Foyer 4th Floor - open during registration hours
Found items will be kept at the Registration Desk until 1 pm on Thursday and then turned over to Marriott Marquis security. At the end of the meeting, all found items will be turned over to the Marriott Marquis.

**Food and Beverage Services**

**COFFEE BREAKS**
Texan Foyer, 4th Floor
Complimentary coffee will be served all day in the Texan Foyer.

**SPIE-HOSTED LUNCHES**
Texan Ballroom Salon F, 4th Floor
SPIE-hosted lunches will be included in registration packets for all conference registrants Monday through Wednesday.
Monday through Wednesday ......................... 12:10 - 1:20 PM

**FOOD & REFRESHMENTS FOR PURCHASE**
The Marriott Marquis has several onsite dining and food options. See website for details.
If you book your room by **Monday January 6, 2020** you will be entered to win:

**Grand Prize** - one of (5) $100 Marriott Gift Cards, or

**Second Prize** - one of (4) Gift Certificates (for future two-night stay at the Marriott Marquis Houston*)

*Subject to availability and other restrictions

Winning registrants must attend Medical Imaging 2020 and book their hotel room through the hotel link provided. Winners are notified during the conference and claim their prize onsite.

A block of rooms at special conference rates has been reserved for event attendees. The conference rates cannot be guaranteed after the room block has been filled. Please do not contact SPIE to book your hotel room.

**MARRIOTT MARQUIS HOUSTON**

1777 Walker Street • Houston, TX

This AAA Four-Diamond hotel has incredible views and is located downtown near the Houston Zoo, Space Center Houston, The Galleria and much more.

Receive **FREE internet** and **25% off parking** when you book in the SPIE hotel block.

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**Car Rental**

Hertz Car Rental is the selected as the official car rental agency for this Event. To reserve a car, identify yourself as a Medical Imaging conference attendee using the Hertz Meeting Code CV# 029B0025. Discount rates apply for rentals up to one week prior through one week after the conference dates. Note: When booking from International Hertz locations, the CV # must be quoted with the letters CV before the number, i.e. CV029B0025.

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 a Hertz Reservation Center or travel agent
- Outside of these areas call 1-405-749-4434

**Airport Information**

- **George Bush Intercontinental Airport** - (IAH) is located approximately 20 miles SW of the hotel.
- **William P Hobby Airport** - (HOU) is located approximately 9 miles NW of the hotel.
- **Ellington Field** - (EFD) is located approximately 17.5 miles NW of the hotel.

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**General Information**

**General Information**

**Hotel**

If you book your room by **Monday January 6, 2020** you will be entered to win:

**Grand Prize** - one of (5) $100 Marriott Gift Cards, or

**Second Prize** - one of (4) Gift Certificates (for future two-night stay at the Marriott Marquis Houston*)

*Subject to availability and other restrictions

**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.
SPIE Event Policies

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.

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.

Anti-Harassment Policy

It is SPIE policy that all employees, volunteers, and participants are entitled to respectful treatment. Any form of bullying, discrimination, harassment, sexual or otherwise, is unacceptable and will not be tolerated. This policy applies to all locations and situations where SPIE business is conducted and at all SPIE-sponsored activities and events.

Read complete policy http://spie.org/harassment

Attendee Registration and Admission Policies

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 of 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.

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.

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.

Read complete Code: http://spie.org/conduct

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.

Family-Friendly Policy

Conference Events: All conference technical and networking events require a badge for admission. Registered attendees may bring children with them if 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.

Exhibition Hall: Everyone who attends the exhibition must be registered and have a badge. Badges for children are free and available onsite at the registration desk. Children under 14 years of age must be accompanied by an adult at all times. Guardians are asked to help maintain a professional, disturbance-free exhibition environment. Children under 18 are not allowed in the exhibition area during exhibition move-in and move-out.

Identification Requirement

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.
**Laser Pointer Safety 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, you must have it tested at Speaker Check-in.

**No-Smoking Policy**

Attendees will observe all non-smoking regulations that are publicly posted by the facilities used by the event.

**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.

**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.

**Unsecured Items**

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**

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 kinds of computer damage.

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Fax: +44 29 2089 4750
info@spieurope.org • www.SPIE.org

**Reporting of Unethical or Inappropriate Behavior**

Onsite at an SPIE meeting, contact any SPIE Staff with concerns or questions. 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 meeting 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.

**Unauthorized Solicitation**

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.

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