Medical Imaging 2019

CALL FOR PAPERS

Submit abstracts by 8 August 2018

16–21 February 2019
Town & Country Resort and Convention Center
San Diego, CA, USA

www.spie.org/mi19call
Present your work in San Diego at Medical Imaging 2019
The multidisciplinary event for the advancement of imaging technologies

Why Medical Imaging is at home in California:

More than just a vacation destination – this state is rich in medical research and advances directly affecting next-generation technologies in medical imaging and analysis. The area offers a variety of clinical facilities for patient care, translational research and medical advancements thanks to the proximity of numerous university campuses, world-renowned medical research programs and hospitals. Some of these top ranked medical universities include University of California San Francisco, UC San Diego School of Medicine, David Geffen School of Medicine, and Stanford School of Medicine.

UC San Diego Health Sciences International is another strong research contributor and encompasses the University of California, San Diego School of Medicine, Skaggs School of Pharmacy and Pharmaceutical Sciences, UC San Diego Health – the system of patient services provided at UC San Diego Medical Center, Jacobs Medical Center, Moores Cancer Center, Shiley Eye Institute, and other primary and specialty practices located throughout San Diego, California.

Plan to present in San Diego and network with like-minded leaders gathering in one city.
Plan to Participate

The SPIE Medical Imaging meeting is the internationally recognized premier 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, to technology developments, scientific evaluation, and clinical application. The symposium covers the full range of medical imaging modalities including medical image acquisition, display, processing, analysis, perception, decision support, and informatics. Broad topics of interest include the following:

- imaging physics, systems analysis and modeling
- X-ray imaging and computed tomography
- ultrasonic acquisition and processing
- magnetic resonance imaging (MRI)
- molecular imaging
- digital pathology
- emerging image acquisition technologies
- tomographic image reconstruction
- quantitative imaging
- image processing and analysis
- computer-aided detection and diagnosis
- computational models
- image-guided therapies
- visual rendering of complex datasets
- visual perception and observer performance
- physiological and functional interpretation of image data
- clinical evaluations of new technologies
- image data management (storage, retrieval, transmission)
- medical informatics
- imaging for precision medicine
- machine learning
- deep learning

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

Symposium Chairs:

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

Georgia D. Tourassi  
Oak Ridge National Lab. (USA)
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Aaron D. Ward, The Univ. of Western Ontario (Canada)

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

New data laws are in effect

Unless you opt in to receive email from us, you will not receive any SPIE info about SPIE Medical Imaging.

www.spie.org/signup
2019 STUDENT PAPER AWARDS INFORMATION

ATTENTION STUDENTS

Submission instructions and eligibility requirements for the 2019 All Conference Best Student Paper Awards will be available in October 2018.

See 2018 Award Winners online: www.spie.org/awards2018

Submit your abstract today: www.spie.org/mi19call
Physics of Medical Imaging (MI101)

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

Conference Co-Chair: Hilde Bosmans, Katholieke Univ. Leuven (Belgium)

Program Committee: Shiva Abbasszadeh, Univ. of Illinois at Urbana-Champaign (USA); Adam M. Alessio, Univ. of Washington (USA); Kirsten Boedeker, Toshiba Medical Research Institute USA (USA); Mini Das, Univ. of Houston (USA); Mats E. Danielsson, KTH Royal Institute of Technology (Sweden); Maria Drangova, Roberts Research Institute (Canada); Rebecca Fahrig, Siemens Healthcare GmbH (Germany), Stanford Univ. School of Medicine (USA); Thomas G. Flohr, Siemens Healthcare GmbH (Germany); Arundhuti Ganguly, Varex Imaging Corp. (USA); Stephen J. Glick, U.S. Food and Drug Administration (USA); Univ. of Massachusetts Medical School (USA); Michael Grass, Philips Research (Germany); Marc Kachelrieß, Deutsches Krebsforschungszentrum (Germany); Karim S. Karim, Univ. of Waterloo (Canada); Hee-Joung Kim, Yonsei Univ. (Korea, Republic of); Patrick J. La Riviere, The Univ. of Chicago (USA); Quanzheng Li, Massachusetts General Hospital (USA); Joseph Y. Lo, Duke Univ. (USA); Peter B. Noël, Klinikum rechts der Isar der Technischen Univ. München (Germany); Frédéric Noo, The Univ. of Utah (USA); Jinyi Qi, Univ. of California, Davis (USA); John A. Rowlands, Thunder Bay Regional Research Institute (Canada); John M. Sabol, GE Healthcare (USA); Ioannis Sechopoulos, Radboud Univ. Medical Ctr. (Netherlands); Joseph W. Stayman, Johns Hopkins Univ. (USA); Anders Tingberg, Lund Univ. (Sweden); Yuxiang Xing, Tsinghua Univ. (China); John Yorkston, Carestream Health, Inc. (USA); Lifeng Yu, Mayo Clinic (USA); Wei Zhao, Stony Brook Medicine (USA)

This conference will cover all aspects of image formation in medical imaging, including systems using ionizing radiation (x-rays, gamma rays) or non-ionizing techniques (ultrasound, optical, thermal, magnetic resonance, or magnetic particle imaging). Papers of a theoretical nature or papers reporting new experimental results are invited. Topics of particular interest include novel methods for image formation, experimental methods and results regarding image performance, algorithms for image reconstruction and correction, detector materials and electronic design, analytical and computer modeling of imaging systems, and physics of contrast media. Work directed toward the imaging of human subjects, small animals, or tissue specimens are welcome. The conference will also cover dedicated approaches for various imaging applications resulting from the above mentioned general imaging framework, for example cardiovascular or neuroimaging applications.

Original papers are especially requested in the following areas:

**IMAGING SCIENCE**
- Physics of signal detection, image formation and signal degradation
- Object characterization and contrast mechanisms
- Characterization of detector and system performance (MTF, NPS, DQE, task- and observer-based)

**TECHNOLOGY**
- Novel medical imaging systems and methods including contrast media / nanoparticles
- Properties of scintillating, photoconductive, or other sensor materials
- Novel sources of radiation
- Image reconstruction methods (e.g., for CT, tomosynthesis, SPECT and PET, optical imaging, MRI, etc.)
- Machine learning approaches to image formation
- Multi-energy (spectral) x-ray and CT imaging
- Computer simulation of imaging systems including models for radiation sources, imaged objects, physical interactions, and detectors
- Phantoms (physical and numerical)
- Photon counting
- Proton based imaging
- Radiation (e.g., optical) and signal transport
- Radiation dose, dosimetry, and dose effects (risk), as well as possible stratification

**DEVICES**
- Advanced multi-slice or cone beam CT systems
- Advanced radiographic, fluoroscopic, or angiographic systems (including phase contrast and diffraction)
- Ultrasound, MRI, optical, thermal, magnetic particle imaging (and other non-ionizing radiation systems)
- Small animal imaging systems
- Nuclear medical imaging methods
- Multi-modality imaging devices
- Low-cost imaging devices with global health applications

**APPLICATIONS**
- Cardiovascular imaging
- Neuroimaging
- Mammographic imaging
- Interventional imaging
- Imaging applications in therapy (e.g., radiation therapy, surgery, in-vivo verification)
- Advanced applications (clinical, translational, preclinical, basic science, biomarkers)
- Novel medical imaging for precision medicine applications
CALL FOR PAPERS

TOPIC AREAS: FOR THIS CONFERENCE ONLY

During the submission process, you will be asked to choose three different topics to assist in the review process.

- ALG - Algorithmic developments, simulations, calibration, classification, etc. (for reconstruction and machine learning use dedicated categories)
- CARD - Cardiovascular imaging
- CLIM - Clinical evaluation
- CON - Physics of contrast enhancement using contrast media / nanoparticles
- CT - All conventional and multi-energy CT topics (for cone beam use dedicated category)
- CTCB - Cone beam CT
- DET - Detector technology; scintillators, photoconductors, diodes, TFT
- DIAG - Diagnostic imaging
- DOSE - Radiation dose, dosimetry, and dose effects
- IGI - Image guided interventions
- IMG - Imaging methods including optical, MR, ultrasound, etc. (for x-ray, CT, or nuclear based methods use dedicated categories)
- MAM - Imaging of the breast (any device)
- METR - Measurement methods (MTF, NPS, DQE, eDQE, gDQE, Spectra, ...)
- ML - Machine Learning applied to imaging physics (reconstruction, corrections, evaluations, etc...)
- MULTI - Multi modality imaging
- NEURO - Neuroimaging
- NUC - Nuclear medical imaging innovations
- ONC - Oncology
- OTHER - Other methodology, systems or applications

- PCI - Photon counting imaging
- PER - Observer or perception-based performance evaluations of systems
- PHS - Phase contrast imaging
- PHT - Work involving development of phantoms or anatomical simulation models
- PRI - Proton based imaging
- RECON - Image reconstruction including CT, SPECT, PET, OCT and tomosynthesis
- SMAX - Small animal or microscopic imaging
- TSY - Tomosynthesis
- XIM - X-ray imaging, x-ray sources, scatter reduction techniques
- XME - Multi-energy radiography or mammography

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ABSTRACTS DUE: 8 August 2018
AUTHOR NOTIFICATION: 15 October 2018
MANUSCRIPT DUE DATE: 23 January 2019

The contact author will be notified of acceptance by email.

PLEASE NOTE: Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a full-length manuscript for publication in the conference proceedings.
Image Processing (MI102)

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

Program Committee: Rafeef Abugharbieh, The Univ. of British Columbia (Canada); Mostafa Analoui, Livingston Securities LLC (USA); Brian B. Avants, Univ. of Pennsylvania (USA); Meritxell Bach-Cuadra, Univ. de Lausanne (Switzerland); Ulas Bagci, Univ. of Central Florida (USA); Olivier Colliot, ICM Brain & Spine Institute (France); Benoît M. Dawant, Vanderbilt Univ. (USA); Marielen de Bruijne, Erasmus MC (Netherlands); Alexandre X. Falcão, Univ. Estadual de Campinas (Brazil); Aaron Fenster, Roberts Research Institute (Canada); James Fishbaugh, NYU Tandon School of Engineering (USA); Alejandro F. Frangi, The Univ. of Sheffield (United Kingdom); Mona K. Garvin, The Univ. of Iowa (USA); James C. Gee, Univ. of Pennsylvania (USA); Benjamin Glover, Imperial College London (United Kingdom); Miguel Angel González Ballester, Univ. Pompeu Fabra (Spain); Hayit Greenspan, Tel Aviv Univ. (Israel); David R. Haynor, Univ. of Washington (USA); Tobias Heimann, Siemens AG (Germany); Christine P. Hendon, Columbia Univ. (USA); Ivana Išgum, Univ. Medical Ctr. Utrecht (Netherlands); Stefan Klein, Erasmus MC (Netherlands); Ender Konukoglu, ETH Zürich (Switzerland); Tianhu Lei, MD Imaging Research (USA); Karim Lekadir, Univ. Pompeu Fabra (Spain); Boudewijn P. F. Lelieveldt, Leiden Univ. Medical Ctr. (Netherlands); Natasha Lepore, The Univ. of Southern California (USA); Marius George Linguraru, Children’s National Medical Ctr. (USA); Murray H. Loew, The George Washington Univ. (USA); Cristian Lorenz, Philips Research (Germany); Frederik Maes, Katholieke Univ. Leuven (Belgium); Vincent A. Magnotta, The Univ. of Iowa Hospitals and Clinics (USA); Rashindra Manning, Radboud Univ. Medical Ctr. (Netherlands); Diana Mateus, Ecole Centrale de Nantes (France); Sunanda D. Mitra, Texas Tech Univ. (USA); Marc Modat, Kings College London (United Kingdom); Albert Montillo, Univ. of Texas Southwestern Medical Ctr. (USA); Kensaku Morii, Nagoya Univ. (Japan); Nassir Navab, Technische Univ. München (Germany), Johns Hopkins Univ. (USA); Mads Nielsen, Niels Bohr Institute (Denmark); Brian Nutter, Texas Tech Univ. (USA); Dzung L. Pham, Henry Jackson Foundation/USU (USA), National Institutes of Health (USA), Johns Hopkins Univ. (USA); Jerry L. Prince, The State Univ. of New Jersey (USA); Punam K. Saha, The Univ. of Iowa (USA); Olivier Salvado, Commonwealth Scientific and Industrial Research Organisation (Australia); Emine Saritas, Bilkent Univ. (Turkey); Lin Shi, The Chinese Univ. of Hong Kong (China); Marius Staring, Leiden Univ. Medical Ctr. (Netherlands); Martin A. Styner, The Univ. of North Carolina at Chapel Hill (USA); Kenji Suzuki, Illinois Institute of Technology (USA); Raphael Sznitman, Univ. Bern (Switzerland); Siachesahb W. Taha, Universitätsklinikum Freiburg (Germany); John W. Thomas, The Univ. of Pennsylvania (USA); Koen Van Leemput, Harvard Medical School (USA), Massachusetts General Hospital (USA); Tom K. Vercauteren, Univ. College London (United Kingdom); Tomaž Vrtovec, Univ. of Ljubljana (Slovenia); Wolfgang Wein, ImFusion GmbH (Germany)

Original papers are invited on all aspects of the processing and analysis of medical, small animal, or cellular images, with applications in medicine, biological, and pharmaceutical research. Of interest are algorithms applied to all imaging modalities, including x-ray, DSA, CT, MRI, neuroimaging, nuclear medicine, optical, ultrasound, macroscopic, and microscopic imaging. Papers dealing with the challenges of bringing advances in research laboratories into clinical application are particularly welcomed.

Papers typically involve research that includes one or more of the following categories (in alphabetical order):

- Adversarial learning
- Augmented/virtual reality
- Classification
- Compressed sensing, sparse reconstruction methods
- Computational anatomy and atlases
- Computer vision
- Deep learning
- Deformable geometry
- Diffusion MRI analysis
- Functional imaging and connectivity analysis
- Image representation and compression
- Image restoration and enhancement
- Image synthesis
- Imaging-genetics
- Machine learning (not deep learning)
- Model-based image analysis
- Motion/time series analysis
- Open software for medical image processing and translational research
- Population/clinical studies
- Quantitative image analysis/quantitative imaging biomarkers
- Radiomics
- Registration methodologies
- Segmentation methodologies
- Shape representation and analysis
- Statistical methodology
- Texture representation and analysis
- Validation, including creation of ‘ground truth’ image repositories
- Visualization methods
- Voxel/deformation/tensor-based morphometry
CALL FOR PAPERS

TOPIC AREAS: FOR THIS CONFERENCE ONLY

To assist the reviewers, choose up to three keywords in order of relevance from the following list.

• Augmented/virtual reality
• Classification
• Compressed sensing, sparse reconstruction methods
• Computational anatomy and atlases
• Computer vision
• Deformable geometry
• Diffusion MRI analysis
• Functional imaging and connectivity analysis
• Image representation and compression
• Image restoration and enhancement
• Image synthesis
• Imaging genetics
• Machine learning and pattern recognition
• Model-based image analysis
• Motion/time series analysis
• Open software for medical image processing and translational research
• Population/clinical studies
• Quantitative image analysis/quantitative imaging biomarkers
• Registration methodologies
• Segmentation methodologies
• Shape representation and analysis
• Statistical methodology
• Texture representation and analysis
• Validation, including creation of ‘ground truth’ image repositories
• Visualization methods
• Voxel/deformation/tensor-based morphometry

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Save the date

ABSTRACTS DUE:
8 August 2018

AUTHOR NOTIFICATION:
15 October 2018

MANUSCRIPT DUE DATE:
23 January 2019

PLEASE NOTE: Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a full-length manuscript for publication in the conference proceedings.
This conference will provide a forum for researchers involved in development and application of computer-aided detection and diagnosis systems. Original papers are requested on all aspects of CAD, including segmentation, pattern recognition, feature extraction, classifier design, machine learning and deep learning, workstation design, human interaction, radiomics, database construction, and system performance evaluation. CAD methods involving any medical imaging modality are encouraged, including but not limited to x-ray, CT, MRI, nuclear medicine, molecular imaging, optical, ultrasound, endoscopy, macroscopic and microscopic imaging, and multi-modality technologies.

**TOPIC AREAS: FOR THIS CONFERENCE ONLY**

During the submission process, you will be asked to choose no more than three topics (one Applications and up to two Topics) from the following list to assist in the review process.

Choose one topic from the following applications list:
- **Applications:** Brain
- **Applications:** Breast
- **Applications:** (Cardio-)Vascular, Vessel Tract
- **Applications:** Eye (including retina)
- **Applications:** Head and Neck
- **Applications:** Liver
- **Applications:** Lung
- **Applications:** Musculoskeletal
- **Applications:** Pediatrics/Fetal
- **Applications:** Precision Medicine
- **Applications:** Prostate
- **Applications:** Other Organ Systems
- **Applications:** Multiple Organ Systems
- **Applications:** Novel Applications

Choose up to two keywords from the following topics list:
- **Machine learning, including deep learning**
- **Segmentation**
- **Feature analysis**
- **Radiomics**
- **Quantitative imaging**
- **Detection**
- **Characterization**
- **Staging, treatment response assessment**
- **Risk assessment**
- **Content-based image retrieval and/or reference libraries**
- **Comparative evaluation and/or fusing CAD systems**
- **Training/testing and/or databases**
- **System quality and validation in CAD**
- **Visualization and human factors in CAD**
- **Other (please specify)**

**LIVE DEMONSTRATIONS WORKSHOP**

A workshop featuring real-time demonstrations of algorithms and systems will be held during the conference. This workshop is intended to be a forum for developers to exhibit their software, find new collaborators, and inspire the attendees. All participants of the SPIE Medical Imaging Symposium are invited to submit a proposal for a demonstration. More information will be provided at a later date.

**GRAND CHALLENGE**

A CAD grand challenge will be organized as part of the conference in conjunction with the American Association of Physicists in Medicine (AAPM) and the U.S. National Cancer Institute (NCI). This event evolved from the well-received LUNGx Grand Challenge conducted as part of the 2015 CAD Conference, the CAD Grand Challenge’s panel discussion held during the 2016 SPIE Medical Imaging Symposium and will extend the successful PROSTATEx Challenge conducted as part of the 2017 CAD Conference. More information on the CAD application and modality for the challenge will be provided at a later date; visit the website for details.
CALL FOR PAPERS

Image-Guided Procedures, Robotic Interventions, and Modeling (MI104)

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

Program Committee: Purang Abolmaesumi, The Univ. of British Columbia (Canada); Wolfgang Birkfellner, Medizinische Univ. Wien (Austria); Elvis C. S. Chen, Robarts Research Institute (Canada); Sandrine de Ribaupierre, Western Univ. (Canada); Gabor Fichtinger, Queen’s Univ. (Canada); George J. Grevera, Saint Joseph’s Univ. (USA); David Hawkes, Univ. College London (United Kingdom); David R. Haynor, Univ. of Washington (USA); William E. Higgins, The Pennsylvania State Univ. (USA); David R. Holmes III, Mayo Clinic (USA); Pierre Jannin, Univ. de Rennes 1 (France); David M. Kwartowitz, Grand Canyon Univ. (USA); Shuo Li, Western Univ. (Canada); Lena Maier-Hein, Deutsches Krebsforschungszentrum (Germany); Michael I. Miga, Vanderbilt Univ. (USA); Kensaku Mori, Nagoya Univ. (Japan); Parvin Mousavi, Queen’s Univ. (Canada); Jack H. Noble, Vanderbilt Univ. (USA); Maryam E. Rettmann, Mayo Clinic (USA); Frank Sauer, Siemens Healthineers (USA); Eric J. Seibel, Univ. of Washington (USA); Guy Shechter, Philips Healthcare (USA); Jeffrey H. Siewerdsen, Johns Hopkins Univ. (USA); Amber L. Simpson, Memorial Sloan-Kettering Cancer Ctr. (USA); Stefanie Speidel, Karlsruher Institut für Technologie (Germany); Satish E. Viswanath, Case Western Reserve Univ. (USA); Andrew D. Wiles, Northern Digital Inc. (Canada); Ivo Wolf, Hochschule Mannheim (Germany); Ziv R. Yaniv, National Library of Medicine (USA)

This conference is primarily concerned with applications of medical imaging data in the engineering of therapeutic systems. Original papers are requested in the following topic areas:

• Image-guided procedures
• Minimally invasive surgery
• Computer-assisted therapy and therapy planning
• Robotic interventions and surgical tools
• Localization technologies and navigation systems
• Tracking and calibration
• Intraoperative imaging
• Novel image-to-patient registration for surgery and intervention
• Mathematical modeling to guide and understand therapy
• Modeling of intraprocedural changes
• Modeling and analysis of procedures and procedure workflows
• Techniques in population-specific and patient-specific model generation
• Image-based models for characterization of tissue and disease properties
• Medical image-based simulation and training
• Validation/evaluation
• 3D visualization
• Novel interfaces for therapy and visualization of data
• Augmented, virtual, and enhanced reality
• Clinical applications and technology integration
• High performance computing for real-time modeling and/or large dataset visualization
• Machine learning and artificial intelligence for surgical/interventional applications
• Interventional/therapeutic assessment and prediction
• Surgical/interventional data science
• Safety and standards for image-guided and robotic procedures
• Other related areas.

Submissions that cross over between this conference and others at SPIE Medical Imaging, and which would be appropriate for combined sessions, are also welcomed.

AWARDS: Papers from student authors are particularly encouraged; there is a competition for the best student paper as well as a young scientist award.

TOPIC AREAS: FOR THIS CONFERENCE ONLY

During the submission process, you will be asked to choose no more than three topics from the following list to assist in the review process.

• Abdominal procedures
• Calibration
• Cardiac procedures
• Pelvic procedures
• Deep learning
• Diagnosis
• Disease characterization
• Endoscopic procedures
• Human factors
• Image-guided therapy
• Data integration for the clinic/OR
• Intraoperative imaging
• Localization and tracking technologies
• Machine learning and artificial intelligence for surgical/interventional applications
• Medical robotics
• Modeling
• Monitoring and feedback
• Multimodality display
• Neurosurgical procedures
• Registration
• Segmentation
• Stereoscopic display
• Surgical simulation
• Surgical/interventional data science
• Therapy planning
• Treatment planning
• Ultrasound guidance
• Validation/evaluation
• Virtual, augmented, and mixed reality
• Visualization
Image Perception, Observer Performance, and Technology Assessment (MI105)

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

Program Committee: Craig K. Abbey, Univ. of California, Santa Barbara (USA); Jongduk Baek, Yonsei Univ. (Korea, Republic of); François O. Bochud, Ctr. Hospitalier Univ. Vaudois (Switzerland); Jovan G. Brankov, Illinois Institute of Technology (USA); Yan Chen, Loughborough Univ. (United Kingdom); Brandon D. Gallas, U.S. Food and Drug Administration (USA); Howard C. Gifford, Univ. of Houston (USA); Stephen L. Hillis, The Univ. of Iowa (USA); Elizabeth A. Krupinski, Emory Univ. School of Medicine (USA); Matthew A. Kupinski, College of Optical Sciences, The Univ. of Arizona (USA); Maciej A. Mazurowski, Duke Univ. (USA); Mark F. McEntee, The Univ. of Sydney (Australia); Claudia R. Mello-Thoms, The Univ. of Sydney (Australia), Univ. of Pittsburgh (USA); Ljiljana Platiša, Univ. Gent (Belgium); Ingrid S. Reiser, The Univ. of Chicago (USA); Sian Taylor-Phillips, The Univ. of Warwick (United Kingdom); Pontus A. Timberg, Scania's Univ. Hospital (Sweden); David L. Wilson, Case Western Reserve Univ. (USA)

This conference focuses on a broad understanding of medical image perception, observer-performance assessment, and the application of these methods to the evaluation of medical technology. Areas of traditional interest include, but are not limited to, optimizing image acquisition, display and workstations, psychophysical and vision-science based models of human observer performance, perceptual factors that affect the diagnostic process, eye-movement studies, observer performance methodologies, human-computer interaction, medical decision-making strategies, statistical models for evaluation of observer performance, and observer variability assessment. The conference welcomes new areas of research related to medical image perception and observer performance assessment.

Original papers and posters are requested in the following areas:

• Technology assessment related to medical image perception & observer performance
• Diagnostic-performance evaluation methodologies (ROC, FROC and alternatives)
• Observer performance evaluation of new technologies (acquisition devices, CAD, display devices, etc.)
• Cognitive aspects of image interpretation
• Visual search of medical images
• Perceptual and performance factors in diagnostic workstation and environmental design
• Perceptual and performance factors in new modalities (e.g., digital pathology and telemedicine)
• Models of detection, discrimination, and localization
• The nature of reader expertise
• Sources of observer variance
• Human Factors

TOPIC AREAS: FOR THIS CONFERENCE ONLY

To assist the reviewers, choose up to three keywords in order of relevance from the following list.

• Image Display
• Image Perception
• Observer Performance Evaluation
• ROC Methodology
• Model Observers
• Technology Assessment
• Technology’s Impact
• Human Factors

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Biomedical Applications in Molecular, Structural, and Functional Imaging (MI106)

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

Program Committee: Amir A. Amini, Univ. of Louisville (USA); Juan R. Cebral, George Mason Univ. (USA); Alejandro F. Frangi, The Univ. of Sheffield (United Kingdom); Xavier Intes, Rensselaer Polytechnic Institute (USA); Ciprian N. Ionita, Univ. at Buffalo (USA); Vikram Kodibagkar, Arizona State Univ. (USA); Changhai 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); Axel Wismüller, Univ. of Rochester Medical Ctr. (USA); Baohong Yuan, The Univ. of Texas at Arlington (USA)

This conference will cover all aspects of observing, measuring, quantifying and modeling molecular, structural and functional parameters from biomedically relevant images.

Descriptions of work based on any imaging technology, including multidimensional and multimodality, are invited. Techniques, methods, and systems for evaluation and interpretation of structure-function relationships and interrelationships from images of intact, living tissues, are of particular interest. Work in emerging areas such as novel imaging probes, small animal imaging, optical or electrical impedance tomography, and multi-modality imaging is also of special interest.

Original papers are requested in, but not limited to, the following areas:

- Breast imaging
- Bone and skeletal imaging: micro-structure, orthopedic, finite-element models, and segmentation
- Biomechanical imaging and modeling
- Cardiac structure and function: perfusion, modeling, electrophysiology
- Electrical impedance, electrical impedance spectroscopy (EIS), terahertz or microwave imaging
- Functional neuroimaging and brain mapping, fMRI, rsfMRI, fcMRI, PET, SPECT, tractography, connectome
- Image processing, detection, segmentation, registration, and analysis for quantifying and modeling molecular, structural and functional parameters
- Machine learning, deep learning, deep convolutional neural networks in molecular, structural, and functional imaging
- Magnetic resonance imaging (MRI)
- MRI quantitation of fat, diffusion and CEST, MRI spectroscopy
- Multimodality imaging, hybrid imaging
- Nanoparticle, biosensors and magnetic particle imaging (MPI)
- Ocular imaging, segmentation
- Novel physiological imaging agents/probes; quantum dots, nanoparticles, radiopharmaceuticals
- Novel molecular and functional imaging technologies
- Nuclear medicine: PET, SPECT, molecular breast imaging (MBI), molecular brain imaging, scintigraphy, Cerenkov luminescence imaging
- Optical imaging, optical coherence tomography (OCT), diffuse optical tomography, NIRS
- Soft tissue imaging: deformation, quantification, segmentation, detection, analysis
- Preclinical and clinical imaging, small animal imaging, molecular imaging, fluorescence tomography, bioluminescence tomography, x-ray phase contrast tomography, photoacoustic tomography, Cerenkov luminescence imaging. X-ray fluorescence computed tomography (XFCT), X-ray luminescence computed tomography (XLCT)
- Physiologic modeling applied to imaging: metabolism, receptor-ligand binding
- Pharmacokinetic models applied to imaging
- Vessel and airway imaging: detection, segmentation, modeling, trees, reactivity, blood flow.

TOPIC AREAS: FOR THIS CONFERENCE ONLY

During the submission process, you will be asked to choose no more than three topics from the following list to assist in the review process.

- Breast imaging
- Bone and skeletal imaging
- Cardiac imaging
- Imaging agents/molecular probes
- Image processing, detection, segmentation, registration, and analysis for quantifying and modeling molecular, structural and functional parameters
- Magnetic particle imaging (MPI)
- Nanoparticle imaging
- Neuroimaging, neurochemistry, brain mapping, fMRI, brain PET, brain SPECT
- Novel imaging methods
- Machine learning, deep learning, deep convolutional neural networks in molecular, structural, and functional imaging
- Ocular imaging
- Optical imaging
- Pulmonary structure and function imaging: perfusion, ventilation, mechanics, segmentation
- Vascular imaging
Imaging Informatics for Healthcare, Research, and Applications (MI107)

Conference Chairs: Po-Hao Chen, The Univ. of Pennsylvania Health System (USA); Peter R. Bak, McMaster Univ. (Canada)

Program Committee: Tessa S. Cook, The Univ. of Pennsylvania Health System (USA); Thomas M. Deserno, RWTH Aachen Univ. (Germany); Steven C. Hori, The Univ. of Pennsylvania Health System (USA); Maria Y. Law, Hong Kong Sanatorium and Hospital (Hong Kong, China); Heinz 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); Shandong Wu, Univ. of Pittsburgh (USA)

Imaging informatics is a multidisciplinary field, and research in the field emphasized the development and evaluation of new and efficient means of extracting and transforming ever-increasing volumes of data to improve patient outcomes. In the era of advanced imaging modalities and data complexity, there is a need for more efficient workflow, accurate analytics, and more sophisticated 3D visualizations. Also, the growing demand for personalized, precision medicine requires the integration of clinical information, molecular and genomic data, imaging results, and pathology. Imaging informatics supports new technical solutions that can accommodate the needs of all imaging-rich clinical specialties, not just radiology, while keeping patient data both accessible to health professionals and safe from malicious agents. This track focuses on new methods for obtaining, transferring, managing, analyzing, and visualizing data for healthcare, biomedical, and educational applications. The conference will include but is not limited to the following themes.

THEME 1: CLOUD-BASED AND COLLABORATIVE USE OF BIG DATA

Modern medicine increasingly depends on efficient collaboration between radiologists, physicians, and patients. Collaboration is commonplace in the consumer market, where numerous social media platforms exist and are universally accessible. Additionally, the cloud and “big data” technologies have made data management, modeling, sharing, and collaboration possible at scale.

- Large-scale imaging data management
- Workflow management
- Systems integration and standards
- Quantitative analysis
- High-dimensional database for biomedical applications
- Image content-based indexing / searching
- Image-based patient-specific data modeling
- Crowdsourced image data analysis and modeling
- Image sharing
- Social media for medical imaging

THEME 2: ROBOTICS

The DICOM standard has broadened its scope of interoperability to include use cases within radiation oncology, optical imaging, and digital pathology. Furthermore, imaging has made the digital operating room possible via surgical PACS. Research topics that bridge the gaps between research, diagnosis, and treatment are encouraged.

- Workflow management for diagnostics and therapeutics
- Intelligent infrastructure and processes
- Decision management
- Interoperability

- Clinical quantitative and statistical assessment of therapeutic outcomes
- Imaging analysis and guidance for radiation therapy, chemotheraphy, or rehabilitation
- Real-time CAD integration and situation-aware robotic devices for therapeutics
- Intelligent surgical instruments
- Therapeutic navigated control
- Surgical cockpit systems

THEME 3: ARTIFICIAL INTELLIGENCE AND DEEP LEARNING

Advances in artificial intelligence (AI), especially deep learning and reinforcement learning are poised to change health care profoundly. However, integrating AI into the clinical environment requires integration with traditional PACS and the wider electronic health records (EHR) of the health system. Furthermore, integration with clinical medical imaging requires integration with the clinical providers’ existing workflow.

- Machine learning and deep learning
- Natural language processing
- Heuristic search
- Fuzzy logic
- Integration of AI with PACS and EHR
- Other prescriptive analytic algorithms in clinical practice

THEME 4: PRECISION MEDICINE AND TRANSLATIONAL RESEARCH

Precision medicine involves using detailed, patient-specific molecular, genetic and imaging information to diagnose and categorize disease, then guide treatment to improve clinical outcome. The combination of medical imaging, genomics, and molecular markers presents a new opportunity to link observations made at the cellular or molecular levels to macroscopic phenotypes. Research enhancing precision medicine is welcome.

- Correlative analytics of genomics, molecular markers, imaging, and clinical phenotypes
- Quantitative imaging
- Molecular imaging
- Molecular diagnostic and biomarkers
- Combined quantitative and functional imaging
- Imaging informatics for translational research
CALL FOR PAPERS

THEME 5: AUGMENTED REALITY, VIRTUAL REALITY, 3D PRINTING, AND OTHER ADVANCED VISUALIZATION
3D image data can be visualized and handled in actual three-dimensional space. Technology in augment-ed reality (AR) juxtaposes medical imaging data with the real world, while virtual reality (VR) can create simulated, immersive environments. 3D printing provides new ways to prototype personalized medical devices. New technical milestones or clinical applications involving the use of 3D objects, both physically printed or virtually visualized, are welcome.

• 3D model generation
  • Virtual reality for simulation and training
  • Augmented reality visualization
  • Software development
  • Device assessment

THEME 6: PACS-BASED MULTIMEDIA DATA
Image data generated in cardiology, endoscopy, ophthalmology, dermatology, and surgery has been widely used in screening, diagnosis, treatment, and rehabilitation, and often becomes part of the electronic medical record. Compared to radiology-centric imaging practices, the data acquisition methods, workflow operations and management of these non-radiological images are quite different.

• Multimedia data in clinical practices
  • Research and applications within image data acquisition
  • Image data transmission
  • Image data management
  • Multimedia systems integration and standardization
  • Quantitative analysis of clinical imaging
  • Translational informatics research of non-radiology imaging

THEME 7: ECONOMICS, REGULATIONS, AND INNOVATION
In the new regulatory environment, providers are rewarded by outperforming their peers in quality metrics. Today’s radiology practices also face a mounting pressure to create and measure value - right imaging choice to the right patient at the right time, all the while managing ever-increasing imaging volumes. This theme welcomes submissions on research and innovations tackling practical problems in the practice of clinical radiology such as:

• Data interoperability and integration
• Clinical decision support
• Business intelligence
• Quality improvement
• Patient safety
• Productivity enhancement
• Work environment monitoring
• Ergonomics

THEME 8: CYBERSECURITY AND BLOCKCHAINS
With ever-increasing volume, interconnectedness, and interoperability of imaging data, medical imaging systems are increasingly subject to cybersecurity risks which may harm the hardware and software. Maleficient attackers may steal millions of patient records with a single breach. Furthermore, tempering of imaging systems during diagnostic or therapeutic procedures can physically harm patients. Emerging technology such as blockchain and other distributed ledgers promise improved data security and improved access.

• Research in current and emerging cybersecurity threats to medical imaging
• Imaging data protection and encryption
• Imaging data recovery
• Application of blockchain technology
• Other distributed ledger technology

THEME 9: EDUCATIONAL TECHNOLOGY
The new generation of learning professional work through interconnected, immersive, and self-direct-ed environments, made possible through technology. Additionally, modern patients reviewing their own medical imaging and diagnostic reports can take a more active role in their medical decisions with proper technology providing timely and clear explanations. This theme welcomes research work and technical breakthroughs about the education of students, patients, and other healthcare professionals.

• Context-sensitive reference tool
• Massive-online classroom
• Simulations and immersive learning environment
• Educational multimedia database and repository
• Reference tool

TOPIC AREAS (FOR THIS CONFERENCE ONLY):
During the submission process, you will be asked to choose no more than three topics from the following list to assist in the review process:

• Applied big data and cloud-based technologies
• Image sharing and collaboration
• Artificial Intelligence and deep learning
• Precision medicine, correlative analytics, and translational research
• 3-D printing, augmented reality, and virtual reality for medical applications
• PACS and clinical multimedia data for non-radiology images
• Economics, regulations, and practice innovation in medical imaging
• Cybersecurity, data protection, and blockchain technology
• Educational technologies
Ultrasonic Imaging and Tomography (MI108)

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

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

This conference provides a forum for in-depth discussions related to medical ultrasound engineering, imaging and clinical applications. We are soliciting original contributions related to the following topics: physics of ultrasound wave propagation, image reconstruction techniques, hardware and system design, novel transducer technologies, ultrasound image analysis strategies, ultrasound functional imaging, contrast agents and biological and biomedical applications of new ultrasound imaging modalities.

A joint session with the Image-Guided Procedures, Robotic Interventions, and Modeling conference will be held in order to have a high-level discussion on the state-of-the-art in ultrasound guidance of surgical interventions.

TOPIC AREAS: FOR THIS CONFERENCE ONLY

During the submission process, you will be asked to choose no more than three topics from the following list to assist in the review process.

- Physics and computer simulations
- Transducer technologies
- Beamforming techniques
- Ultrasound tomography and reconstruction
- Tissue characterization
- Elastography
- Motion and deformation imaging
- Blood flow imaging
- Contrast imaging
- Ultrastat imaging
- Shear-wave imaging
- High frequency imaging
- Ultrasound image analysis
- Photoacoustic imaging
- Acoustic microscopy
- Ultrasound therapeutics
- Ultrasound procedure guidance
- New applications of ultrasound in medicine and biology

Submit your abstract today: www.spie.org/mi19call

ABSTRACTS DUE: 8 August 2018
AUTHOR NOTIFICATION: 15 October 2018
MANUSCRIPT DUE DATE: 23 January 2019

PLEASE NOTE: Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a full-length manuscript for publication in the conference proceedings.
This conference will address digital pathology, from acquisition of pathology data to its management, analysis, and interpretation by observers. The use of digital pathology data, by both the human and computer, is growing in importance with the recent advances in whole slide scanners and novel instrumentation for multispectral, multiparametric tissue imaging. There is evidence that digital pathology can improve diagnosis and grading of cancer and other pathology tasks, but there are still limitations and challenges that must be addressed before it can be fully incorporated in the clinical workflow.

Although there has been great progress in the development and application of digital pathology over recent years, there are a number of significant computational challenges specific to pathology imaging that distinguish it from its radiological counterpart. There are also unique challenges in terms of how digitized pathology specimens and correlated data are presented to, modified and interpreted by clinicians and computers.

We invite submissions that address specific problems related to image acquisition, display, interpretation, computer-aided diagnosis, and quantitative image analysis of pathology specimens. We particularly welcome contributions that identify and address challenges encountered in digital pathology imaging as well as in new approaches for image capture and analysis.

**TOPIC AREAS: FOR THIS CONFERENCE ONLY**

During the submission process, you will be asked to choose no more than three topics from the following list to assist in the review process.

**IMAGE ACQUISITION, STORAGE AND DISPLAY**
- Acquisition, storage, display and processing of digital microscopy images
- Image mosaicking of nontraditional near-real-time microscopy (OCT, confocal)
- Multispectral imaging
- High-dimensional multiplexed staining and imaging of tissues
- Multi-focus volume imaging
- Compression
- Methodologies for the objective technical assessment of digital pathology systems including color calibration
- Whole slide imaging
- Strategies for data storage and remote processing

**QUANTITATIVE IMAGE ANALYSIS**
- Computer-aided diagnosis, prognosis and predictive analysis
- Automated quantification of tissue biomarkers
- Grading and classification of pathology images
- Segmentation of cellular and tissue structures
- Shape analysis and morphology in pathology imaging
- Architectural feature extraction and quantification
- Multispectral- and volume-based segmentation
- Content-based image retrieval
- High-performance computing for whole-slide tissue image analysis
- Multi-stain and multiplexed image analysis
- Machine learning trends in digital pathology: handcrafted features versus deep learning

**INFORMATION FUSION**
- Radiology-pathology registration and fusion
- Registration of multiple stained tissue microscopy images
- Integration of digital image features with ‘omics’ data for fused diagnostics

**DIGITAL PATHOLOGY AND THE PATHOLOGIST**
- Observer performance, human factors, reading strategies, and diagnostic interpretation issues
- Remote consultation
- Metrics, variability and standardization issues unique to digital pathology
- Methodologies for the objective technical assessment of digital pathology systems
- Optical probe tracking and visualization tools
- PACS and new DICOM standards for histopathology
- Making the case for clinical digital pathology systems in pathology practice

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**CALL FOR PAPERS**

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

**Program Committee:** Selim Aksoy, Bilkent Univ. (Turkey); Ulysses J. Ballis, Univ. of Michigan Health System (USA); Rohit Bhardwaj, Univ. of Illinois at Urbana-Champaign (USA); Ulf-Dietrich Braumann, Hochschule für Technik, Wirtschaft und Kultur Leipzig (Germany); Weijie Chen, U.S. Food and Drug Administration (USA); Wei-Chung Cheng, U.S. Food and Drug Administration (USA); Eric Cosatto, NEC Labs. America, Inc. (USA); Scott Doyle, Rutgers, The State Univ. of New Jersey (USA); Michael D. Feldman, The Univ. of Pennsylvania Health System (USA); David J. Foran, Rutgers Cancer Institute of New Jersey (USA); Marios A. Gavriilides, U.S. Food and Drug Administration (USA); Tom R. L. Kimpe, Barco N.V. (Belgium); Elisabeth Kuzmiak, Emory Univ. School of Medicine (USA); Richard M. Levenson, Univ. of California, Davis (USA); Olivier Lezoray, Univ. de Caen Basse-Normandie (France); Geert Litjens, Radboud Univ. Medical Ctr. (Netherlands); Anant Madabhushi, Case Western Reserve Univ. (USA); Derek R. Magee, Univ. of Leeds (United Kingdom); Anne L. Martel, Sunnybrook Research Institute (Canada); Erik Meijering, Erasmus MC (Netherlands); James P. Monaco, Inspirata, Inc. (USA); Mehdi Moradi, IBM Research (USA); Bahram Parvin, Lawrence Berkeley National Lab. (USA); Josien P. W. Pluim, Image Sciences Institute (Netherlands); Nasir M. Rajpoot, The Univ. of Warwick (United Kingdom); Gustavo Kunde Rohde, Carnegie Mellon Univ. (USA); Berkman Sahliner, U.S. Food and Drug Administration (USA); Chukka Srinivas, Ventana Medical Systems, Inc. (USA); Darren Treanor, Univ. of Leeds (United Kingdom); Jeroen van der Laak, Radboud Univ. Nijmegen Medical Ctr. (Netherlands); Martin J. Yaffe, Sunnybrook Research Institute (Canada); Bülent Yener, Rensselaer Polytechnic Institute (USA)
Pavan Chandra Konda presented “Scheimpflug multi-aperture Fourier ptychography: coherent computational microscope with gigapixels/s data acquisition rates using 3D printed components” at SPIE Photonics West 2017. Authored by Pavan Chandra Konda; Jonathan M. Taylor; Andrew R. Harvey; doi: 10.1117/12.2251884; CID 100760R.

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The website will be kept current with any updates.

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A limited number of SPIE student travel grants will be awarded based on need. Applications must be received no later than 3 December 2018. Eligible applicants must present an accepted paper at this meeting. Offer applies to undergraduate/graduate students who are enrolled full-time and have not yet received their PhD.

REGISTRATION
SPIE Medical Imaging registration will be available October 2018

All participants, including invited speakers, contributed speakers, session chairs, co-chairs, and committee members, must pay a registration fee. Authors, coauthors, program committee members, and session chairs are accorded a reduced symposium registration fee.

Fee information for conferences, courses, a registration form, and technical and general information will be available on the SPIE website in October 2018.

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Norbert Pelc, Editor-in-Chief,
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- Please also submit a 100-word text summary suitable for early release. If accepted, this summary text will be published prior to the meeting in the online or printed programs promoting the conference.
- Identify the topics appropriate to the specific conference. During the submission process you will be asked to choose no more than three topics from a predefined list and/or add a topic not included on the list. (See individual conference Call for Papers for topic categories.)
- Prepare your 2-4 page supplemental MS Word or PostScript file. Download supplemental file instructions. For full consideration this file must include the paper title, authors, 250-word abstract text, and the following supplemental information:
  - Description of purpose
  - Method(s)
  - Results
  - New or breakthrough work to be presented
  - Conclusions
  - Whether the work is being, or has been, submitted for publication or presentation elsewhere, and, if so, indicate how the submissions differ.
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REVIEW, NOTIFICATION, AND PROGRAM PLACEMENT INFORMATION

- To ensure a high-quality conference, all submissions will be assessed by the Conference Chair/Editor for technical merit and suitability of content.
- Conference Chair/Editors reserve the right to reject for presentation any paper that does not meet content or presentation expectations.
- The contact author will receive notification of acceptance and presentation details by e-mail the week of 15 October 2018.
- Final placement in an oral or poster session is subject to the Chairs’ discretion.

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- Imaging Informatics for Healthcare, Research, and Applications
- Ultrasonic Imaging and Tomography
- Digital Pathology

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