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• Hyperspectral Imaging
• Computational Image Processing
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• Compressive Sensing
• Wireless Sensing
• 3D Imaging and Visualization
• Spectroscopy
• Biomedical/Physiological “Wearable” Sensors
• Autonomous Air and Ground Sensing
• Advanced Photon Counting Techniques
• Sensor Fusion
• Thermosense
• Quantum Information and Computing
• Augmented Reality & Virtual Reality
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• Terahertz Device and Systems
• Sensors for Next-Generation Robotics
• Adv. Environmental, Chemical & Biological Sensing

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• Automotive/Transportation
• Communication/Networking
• Agriculture and Food/Water Safety
• Pharmaceutical/Biotech
• Healthcare/Medical Devices
• Unmanned Autonomous Systems (UAS)
• Cyber Physical Systems (CPS)/Internet of Things
• Manufacturing
• Oil, Gas, Petrochemical
• Environmental Monitoring
• Infrastructure
• Energy Harvesting
• Harsh Environments

Submit abstracts by 9 October 2017

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We invite you to participate in SPIE Commercial + Scientific Sensing and Imaging 2018, the leading meeting for scientists, researchers and engineers from industry, government agencies, and academia throughout the world. Leading the world with photonics innovations for a smarter world.

SPIE Defense + Commercial Sensing is moving to Orlando in 2018, as part of the 3-city rotation plan among Anaheim, Orlando, and Baltimore. We look forward to welcoming both new and existing participants as we return to Orlando this next year and continue building on the fast-emerging sensing technologies.

The Southeast is a fast-growing area with a high number of aerospace contractors and an evolving focus in the world of smart sensors, smallsats, drones, and augmented reality. Corridor universities - the University of Central Florida, the University of South Florida and the University of Florida are driving high tech industry and innovation in the region. The Space Coast is growing again. Plus, the warm, sunny weather makes this another popular destination for attendees to bring their families.

Along with sharing your latest research, you will have a chance to see the latest products from leading companies on the exhibition floor, and network with leaders in the sensing and imaging industry. We urge your participation by submitting your abstract, and encourage your colleagues to do the same. We look forward to a closer and stronger partnership with you during Commercial + Scientific Sensing and Imaging (CSSI) 2018. Plan to join us in Orlando!

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Harris Corp. (USA)

**Symposium Co-Chair:**

Jay Kumler  
JENOPTIK Optical Systems, LLC (USA)

**2018 Plenary Speaker:**

Dr. Morley O. Stone  
Chief Technology Officer, Air Force Research Lab. (USA)
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Collocated symposium
DEFENSE + SECURITY 2018
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Fiber Optic Sensors and Applications (S1101)

Conference Chairs: Alexis Mendez, MCH Engineering LLC (USA); Christopher S. Baldwin, Weatherford International Ltd. (USA); Henry H. Du, Stevens Institute of Technology (USA)

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This conference covers all aspects of fiber optic sensor technology based on conventional optical fibers and specialty optical fibers including photonic crystal fibers and metalized fibers for aerospace, civil structures, defense, oil and gas, nuclear and conventional energy, medical, and environmental applications. Major R&D efforts in fiber optic sensor technology have been conducted since the mid-1970s, which have led to the development, among many others, of fiber optic acoustic sensors based on the Mach-Zehnder and Michelson interferometers; fiber rotation and derivative sensors based on the Sagnac interferometer; discrete point sensors based on Fabry-Perot and fiber Bragg gratings; as well as distributed sensing techniques based on Rayleigh, Raman, and Brillouin scattering techniques. Today, fiber optic sensors enjoy widespread use in a broad variety of applications and fields ranging from structural sensing and health monitoring of composites and structures in civil and aeronautic areas; to various downhole sensing applications for oil and gas reservoir monitoring; to high-voltage and high-current sensing systems for the power industry; and to a wide range of chemical sensing applications; to name just a few. These diverse commercial sensing applications are continuing to experience growth in market share, but the industries are still looking for further advancements to improve sensing performance, ease system integration, and lower overall cost. Development of new components and technologies are continually expanding to support enhancement and extensions of existing fiber optic sensor technology, as well as to allow totally new innovations. New innovations, such as active optical fibers, offer the prospect of new light sources as well as new fiber optic sensing applications.

Traditionally, sessions are held for each of the main fiber optic sensing techniques (depending on the number of submissions). These include Bragg gratings, interferometric sensing, distributed sensing, specialty optical fibers, and the potential for application focused sensing. Below is a list of special focus areas being planned for the 2018 conference.

SPECIAL SESSION ON “FIBER OPTIC SENSORS FOR SPACE APPLICATIONS”

A special session is being planned on fiber optic sensors for space applications. In late 1970s serious efforts began in the development of fiber optic gyros that have been used for aircraft, rockets, satellites and all the Spirit, Opportunity and Curiosity rovers on Mars. Fiber optic smart structures began in the mid-1980s as an effort to support health monitoring for aircraft and spacecraft structures and has spread widely into civil structures and other applications. Speakers from government and industry are encouraged to provide overviews of their programs and discuss how fiber optic sensing is used for their applications.

SPECIAL SESSION ON “FIBER OPTIC SENSORS FOR ELECTRIC POWER APPLICATIONS”

Fiber optic sensors have been used in electric power monitoring applications for the past few decades taking advantage of the immunity to electro-magnetic interference. Fiber optic sensors have been designed and developed to monitor temperature, current, voltage, and vibration in these applications. Papers are solicited that cover the history and current status of fiber optic sensing in electric field.
CALL FOR PAPERS

SPECIAL SESSION ON “FIBER OPTIC SENSORS AND APPLICATIONS FOR HARSH ENVIRONMENTS”

This focus area seeks papers on the development and application of fiber optic sensor technology and the components that are being used to support them in harsh or extreme environments including oil and gas, military and defense, infrastructure, and environmental applications. Papers covering sensor packaging, system architectures including multiplexing and distributed measurements, and specialty fiber and fiber devices are encouraged along with papers described field applications.

SPECIAL SESSION ON “ACTIVE OPTICAL FIBERS”

Active optical fibers go beyond traditional silicon-based optical fibers. In the past, Erbium doped fibers have been used to enable Erbium-doped fiber lasers and other light sources. Today, researchers are expanding the materials to create multi-material, multifunctional fibers and fiber assemblies. Papers are solicited that cover this exciting new field for fiber optic sensing.

Papers are solicited on, but not limited to, the following topics:
- Theory and Simulations
- Sensing Architectures and Techniques
  - optical, electrical, magnetic, chemical, biomimetic
  - point and stand-off, arrays, networks, and systems
- novel fiber technologies
- Applications of Sensors and Sensor Systems
  - bio and chemical sensing
  - sensing within fabric structures
  - genomics and biomedical analysis
  - monitoring of pollutants in environment
  - novel application areas.

The Chairs would also like to entertain suggestions for Invited and Tutorial Talks on emerging fiber sensor technology and historical reviews. The chairs would also like to receive submissions on commercial or industrial applications providing a general overview of the application, discussion of market share and competition from other sensing technologies, and discussion of gaps or barriers to the use of fiber sensing in the marketplace or industry.

Save the date

ABSTRACTS DUE:
9 October 2017

AUTHOR NOTIFICATION:
11 December 2017
The contact author will be notified of acceptance by email.

MANUSCRIPT DUE DATE:
19 March 2018

PLEASE NOTE: Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a (6-page minimum) manuscript for publication in the conference proceedings.

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This conference will encompass all aspects of polarization in the optical regime, from measurement and analysis of polarized light in materials, optical components and optical systems, to polarization in remote sensing in terrestrial and space environments. Special emphasis will be placed on novel applications of polarization devices and instrumentation for defense and security applications. Papers are solicited on systems that exploit polarization phenomena and signatures for detection, acquisition, discrimination, or identification of objects of interest in feature rich and cluttered backgrounds and on systems that enhance understanding of polarization phenomenology and signatures. Polarization has been demonstrated to enhance target contrast, aid in target identification, assist in the penetration of scattering media, probe material surfaces, and characterize atmospheric aerosols and cloud particles. Applications for polarimetry have included air- and ground-based sensors, remote sensing, underwater imagers, medical imagery, and non-imaging sensors for environmental and industrial monitoring applications. These and other applications that exploit polarized light and polarized sensing, and systems developed for specific applications are encouraged.

Papers are solicited on the following topics:

**POLARIZATION IN REMOTE SENSING**
- polarization sensing for defense and security applications
- polarization based algorithms for anomaly and target identification
- atmospheric polarization measurements and modeling
- terrestrial and planetary surface polarization
- agricultural crop and soil polarization and modeling
- cloud and haze property determinations
- astrophysical applications
- polarimetric lidar
- polarimetric lidar.

**POLARIZATION PROPERTIES OF MATERIALS**
- natural background materials
- optical materials
- liquid crystals
- crystalline materials
- ceramics and plastics
- organic and biological materials.

**POLARIZATION SIMULATION AND MODELING**
- signature modeling
- algorithms for modeling scattering
- algorithms for modeling surface features
- approaches for including multiple bounces in interactions
- modeling studies and results
- capabilities of current modeling codes.

**MATHEMATICS OF POLARIZATION AND SCATTERING**
- physical understanding of polarization quantities
- mathematical descriptions of instruments
- development in polarization calculi
- understanding of depolarization phenomenon.

**POLARIZATION-BASED DEVICES**
- electro-optic modulators
- liquid crystal modulators
- novel materials for new devices
- novel device applications.

**POLARIZATION OF OPTICAL ELEMENTS**
- polarizers and retarders
- thin-film coatings- phase conjugators
- lenses, mirrors, gratings, beamsplitters
- optical fibers and waveguides.

**POLARIZATION ANALYSIS OF OPTICAL SYSTEMS**
- optical design with polarized light
- instrumental polarization
- polarization ray tracing
- polarization aberration theory
- thin-film design.

**POLARIZATION-BASED OPTICAL SYSTEM CONCEPTS**
- architectures and design tradeoffs
- optical signal processors and computers
- laser radar (lidar or ladar)
- optical data storage
- fiber optic sensors.

**POLARIZATION METROLOGY AND INSTRUMENTATION**
- polarimetry
- ellipsometry
- polarization scattered light measurements
- spectropolarimetry
- imaging polarimetry
- calibration of polarizing devices and polarization systems
- use of calibration standards
- characterization of polarizing devices, sub-systems, and systems, and data reduction.

**POLARIZATION PROPERTIES OF SOURCES AND DETECTORS**
Image sensing technologies extending across broad bands of the spectrum from ultraviolet (UV) to long-wave infrared (LWIR) regions are advancing from novel sensing devices to camera system level implementations for novel commercial applications in a diverse market mix including automotive, biomedical, security and surveillance, agriculture and industrial machine vision. The goal of the conference is to convene the community of researchers active in image-sensing-related research covering materials, devices (image sensor), optics, hybridized or monolithically integrated packaging techniques with SWaP-C optimization in imaging and lens technologies are also of interest. Cutting edge topics including image processing techniques at algorithm levels that will power these image sensing applications, but also at the component and device level. Researchers are seeking ways to embed more intelligence not only at the system software and algorithm levels that will power these image sensing applications, but also at the component and device level to include advanced and adaptive readout electronics, and image fusion processors. Moreover, the realization of various material systems especially on a wide range of substrate usage (e.g., Si, GaAs, dielectric, etc.), and composite materials along with sensing device performance advancement may revolutionize overall image sensing technologies in all spectrum regions.

Image sensing devices from novel sensing devices to camera system level implementations for novel commercial applications, and their novel applications, and provide a robust platform for the mutual exchange of ideas. The conference will address topics directed towards the understanding and advancement of the state of the art of image sensing technologies ranging from the UV to LWIR spectrum emphasizing emerging commercial and industrial applications of these technologies.

Silicon-based imaging sensors (CMOS/CCD) in large format especially for the visible (VIS) spectrum are today widely used in all types of consumer and commercial camera systems from security and surveillance, to smart phones and digital cameras, and recently making in-roads into more value-added applications such as emerging automotive and medical imaging. With this progression, technology innovation in Si-based camera systems not only requires integration at wafer level to include advanced and adaptive readout electronics, and image fusion processors. Moreover, the realization of various material systems especially on a wide range of substrate usage (e.g., Si, GaAs, dielectric, etc.), and composite materials along with sensing device performance advancement may revolutionize overall image sensing technologies in all spectrum regions.

In addition to Si-CMOS/CCD sensors of low-cost and larger formats expanding capabilities from VIS to NIR, recent developments in various detector materials systems, II-VI, III-V, and developments in room temperature IR detectors have resulted in significant material advances, signaling the possibility of higher-performance image sensing technologies at optimal cost to continue the trend towards broader commercial and defense industry application adoption.

The scope of the conference spans topics in new image sensor device-physics, new materials, components and subsystem level development for novel commercial and industrial applications. This conference intends to bring together scientists and engineers involved in the development and transition into commercial and industrial application spaces of novel image sensing concepts from UV to LWIR, broadband or multispectral imaging including various multiband combinations VIS-LWIR, VIS-LWIR, NIR-MWIR, SWIR-LWIR, and other options. Concepts relating to new broadband antireflection (AR) coating and lens technologies are also of interest. Cutting edge topics including image processing techniques on or off the focal plane array, smart reconfigurable readout electronics that bring more intelligence to the imaging devices, innovative packaging techniques, small scale compact systems, lens and optics integration at wafer scale, innovative camera encapsulation techniques with SWaP-C optimization in emerging applications are all of interest.

The sessions are organized to facilitate the exchange of ideas and promote the discussion of recent progress in image sensing device, materials, optics integration research, and trends toward application and system-level development. It is anticipated that this
conference will foster cross-fertilization amidst many disciplines with participants being exposed to the entire range of scientific and engineering problems associated with the concepts-to-systems development pipeline, as well as the development roadmaps at commercial companies, research institutions, academia, and government agencies. We are looking for papers that demonstrate state-of-the-art in novel image sensing technologies that will serve as tools for researchers in various disciplines. Papers are solicited for, but not limited to, the following topics:

**MATERIAL TECHNOLOGIES FOR IMAGE SENSING**
- composites material systems for image sensor and bolometer
- detector / bolometer materials (i.e., Si, Ge, InSb, HgCdTe, GaAs, ZnS, ZnSe, etc.)
- nanotechnologies (nanowires, nanopillars, plasmonic, metamaterials, etc.)-based image sensor
- colloidal technologies for low-cost image sensor
- smart sensing materials
- broadband operation with sensitive detection and conversion of below-bandgap photons
- nano-patterned structures for advanced light trapping schemes via holographic lithography
- nano-enhanced absorbers in the IR range
- advanced windows based on novel transparent conductors
- bandstructure nano-engineering for high conversion performance
- nano-engineered electron processes for suppression of thermalization and recombination losses
- advanced passivation schemes for reducing surface recombination
- epitaxial growth processes of materials on compliant and non-compliant substrates (e.g., HgCdTe, GaAs, InGaAs, etc.) for detectors, and other optoelectronic applications.

**DEVICE TECHNOLOGIES FOR IMAGE SENSING**
- innovative devices
- innovative process and post process (e.g. 3-D integration)
- recent development of detectors and bolometers for image sensing: X-ray, UV, VIS, SWIR, MWIR, and LWIR
- advances in alternative technologies (organic, a-Si etc.)
- nano/micro bolometers
- single-photon imaging: theoretical basis, sensor design, and production
- large-format FPA, bolometer, and CMOS sensor
- advanced quantum structures for large FPAs
- on-chip (image sensor) image fusion processors
- novel uncooled FPA and bolometer technologies
- Bio-inspired techniques for detectors
- development of Novel III/V II/IV/VI materials and devices
- transition efforts that raise the operating temperature and reduce the cost of “cooled” high performance infrared detectors
- transition efforts that increase performance of “uncooled” infrared detectors.

**READ-OUT TECHNOLOGIES FOR IMAGE SENSING**
- development of advanced readout circuits including neuromorphic and bio-inspired circuit designs
- on-chip image processing for 3-D imaging
- innovative high-performance (e.g., high dynamic range and high frame rate, ultralow power, ultra low noise, large format, high speed, etc.) readout integrated circuits (ROIC)
- noise analysis and noise reduction techniques
- on-chip signal or image processing

**OPTICS AND INTEGRATION TECHNOLOGIES**
- theoretical studies and modeling of materials and photonic crystal applications to lenses and windows
- hybrid and monolithic integration of optics and image sensors
- wafer-level optics and electronics integration
- on-chip and off-chip micro-lens array
- broadband AR coating and lens and their integration to image sensors.

**IMAGE SENSING SYSTEMS AND APPLICATIONS**
- sensor system integration and performance
- multiband image fusion systems
- FPAs for simultaneous active and passive imaging
- adaptive multimode sensing
- multimodal-sensor-in-a-pixel FPA
- time-of-flight and 3D imaging applications
- developments in broadcast image sensor technology
- multi-aperture imaging
- computer simulation and modeling of single and multicolor detectors and systems
- on-chip/off-chip vs component/algorith trade-off strategies for system speed, efficiency, and SWaP-C maximization
- imaging systems and camera image quality benchmarking: pinpointing defects that degrade image quality and their source (optics, sensor, processing).
- computational imaging
- embedded vision for intelligent imaging
- imaging and its applications based on THz technique
- Hyperspectral imaging, system integration, and applications
- Machine Learning or Deep Learning Algorithms for smart vision or imaging and their applications
- Multispectral for Medical imaging
Next-Generation Spectroscopic Technologies XI (SI104)

Conference Chairs: Mark A. Druy, Galvanic Applied Sciences USA Inc. (USA); Richard A. Crocombe, Corombee Spectroscopic Consulting, LLC (USA); Steven M. Barnett, Barnett Technical Services, LLC (USA); Luisa T.M. Profeta, Field Forensics, Inc. (USA); Abul Azad, Los Alamos National Lab. (USA)

Program Committee: Leigh J. Bromley, Daylight Solutions (USA); John M. Dell, The Univ. of Western Australia (Australia); Jason M. Eichenholz, Open Photonics, Inc. (USA); Frederick G. Haibach, Confluent Sciences Consulting, Inc. (USA); Willem Hoving, Anteryon BV (Netherlands); Vassili Karamanos, Univ. of Waterloo (Canada); Martin Kraft, Carinthian Tech Research AG (Austria); Jouko O. Malinen, VTT Technical Research Ctr. of Finland (Finland); Ellen V. Miseo, Hamamatsu Corp. (USA); Jeffry J. Santman, Conning Advanced Optics (USA); David W. Schiering, CziTek, LLC (USA); John Seelenbinder, Agilent Technologies (USA); Ulrike Willer, Technische Univ. Clausthal (Germany)

This will be the eleventh year of this conference: it premiered at Optics East 2007 in Boston, MA, and is now part of the SPIE Commercial + Scientific Sensing and Imaging Symposium. For the past five years, the conference has spanned two days and had sessions focusing on: enabling technologies; spectrometers in the field; laser-based (TDLAS, QCL and IBC) and cavity ringdown spectrometry; LIBS, Raman, and terahertz; Raman, SERS, and security applications; portable and novel spectrometers; MEMS- and MOEMS-based spectrometers; hyperspectral imaging spectrometers and applications; and imaging and chemometrics. Over the past two years, the conference introduced a half-day session on ‘Smartphone Spectroscopy’, and in 2018 we are encouraging submissions to expand the coverage of this rapidly-growing area into the area of wearable devices.

The emphasis is on advanced technologies for spectroscopic instrumentation, particularly the uv-visible, infrared, near-infrared, and Raman molecular techniques, but also including advances enabling miniature and portable spectrometers across the electromagnetic spectrum, including x-ray fluorescence, laser induced fluorescence, laser induced breakdown spectroscopy (LIBS), Terahertz, nuclear magnetic resonance and mass spectrometry. The conference also includes papers describing breakthrough and novel, recently-introduced, commercial instrumentation, demonstrations using mobile and wearable devices for diagnostic purposes and the collection of analytical data for distributed point sensing.

Portable and handheld instruments are being developed that are often more sensitive and selective, smaller, cheaper, and more robust than their laboratory predecessors. The concurrent improvements in analytical theory, data analysis methods, algorithms and the power of portable processors enable instrument designers to ‘put a PhD scientist in the box’, and empower field spectroscopic devices to give specific actionable answers. Spectroscopy-based systems are now making critical judgments in environments and applications that were unreachable twenty years ago, from hazardous materials to the operating theater, and from field geologists to customs and border personnel. With the increasing processing and display power of mobile and wearable devices, coupled with their high resolution cameras, a very recent development is ability to put both spectroscopic and imaging instrumentation into the hands of retail consumers. We will see the rise of the ‘citizen spectroscopist’ in the next few years, with sharing and processing of their data in the ‘cloud’.

Advances in array detectors (CCD, CID, InGaAs, InSb, SLS, MCT, CMOS, etc.) are enabling a new generation of faster imaging spectrometers with both laboratory and field applications. Lower-cost microbolometer infrared arrays have been developed, employing MEMS techniques. New laser-based sources (quantum cascade lasers, interband cascade lasers, supercontinuum, terahertz, etc.), particularly in the mid-infrared, are being used in combination with advances in detector technology to create new spectroscopic platforms. Novel designs also enable very compact spectrometers and imagers, suitable for use on airborne platforms, including drones.

Original papers are being solicited in the following areas from those involved in research, system development, application engineering, data analysis and processing, as well as users applying these systems for specific applications:

**NOVEL ENABLING TECHNOLOGIES FOR:**

- IR, NIR, Raman, terahertz, fluorescence, UV-visible
- ‘Smartphone Spectroscopy’: Cell-phone-based spectrometers and imagers
- MEMS-based, miniature, handheld/portable, and robust spectrometers
- Spectrometers based on tunable (quantum cascade lasers, sum-difference techniques, OPOs, etc.) and supercontinuum sources
- Spectral-based sensors: integration of fixed- and tunable filters with single-point and array detectors
- Sources, point-, and imaging detectors
- Spectroscopic imaging systems, including hyperspectral imaging

**MINIATURE, PORTABLE, AND HANDHELD SPECTROMETERS AND IMAGERS:**

- Molecular (IR, NIR, Raman, terahertz, fluorescence, UV-visible, cavity-ringdown)
- Elemental (LIBS, plasma-based emission, XRF, etc.)
- Other novel miniature and portable spectrometers (NMR, ESR, mass, IMS, GC/MS, etc.)
- Combined/integrated techniques (e.g., Raman/LIBS)
- Consumer spectroscopy, imaging and data processing
- Field applications of portable spectrometers and imagers

CONTINUED NEXT PAGE
DESIGN CONSIDERATIONS AND THEORY FOR SPECIFIC APPLICATIONS IN THE AREAS OF:

- Homeland security and public safety
- Narcotics and illicit drug manufacturing
- Field analyses, including customs, Hazmat, food and IED applications
- Anti-counterfeiting and counterfeit detection
- Consumer goods, food fraud, and food safety
- Biological and medical applications
- Advanced materials characterization, including composites
- Pharmaceutical and industrial processing, including PAT
- Usage in challenging and low-resource environments

SYSTEM ENGINEERING AND INDUSTRIAL DESIGN FOR SOLUTION-FOCUSED APPLICATIONS, INCLUDING:

- Operating systems/user interface/ergonomics for handheld analyzers
- Sampling considerations
- Interfaces to robots
- Model-based design
- Chemometrics and data analysis techniques for handheld analyzers and imaging spectrometers, including multivariate calibration and classification; multivariate curve-resolution, blind source separation; figures of merit, performance evaluation.

Save the date

**ABSTRACTS DUE:**
9 October 2017

**AUTHOR NOTIFICATION:**
11 December 2017
The contact author will be notified of acceptance by email.

**MANUSCRIPT DUE DATE:**
19 March 2018

**PLEASE NOTE:** Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a (6-page minimum) manuscript for publication in the conference proceedings.

Submit your abstract today: [www.spie.org/CS18call](http://www.spie.org/CS18call)
Compressive Sensing (CS) is an emerging field of research with far-reaching impact on a variety of applications. For signals admitting sparse representations, CS permits collection of a significantly reduced number of measurements than required by the Shannon-Nyquist sampling theorem, and provides efficient super-resolution signal reconstruction. In essence, CS provides means for fast data acquisition and efficient hardware implementation. The objective of this conference is to provide a consolidated forum to explore and promote advances in compressive sensing from theoretical, algorithmic, and application perspectives. Furthermore, it seeks to foster cross-fertilization of ideas across the various application areas of compressive sensing.

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

- modeling of signals and images based on sparse representations
- physics-based modeling and simulation of CS systems
- hybrid conventional/CS-augmented imaging
- measurement/sampling procedures
- sparsity assessment and sparse and partially sparse signal recovery large-scale optimization problems for sparsity-based solutions
- robust CS methods for noise, perturbations, nonsparsity, or measurement nonlinearity
- theory and practice of CS signal processing (filtering, detection, estimation, classification)
- applications of CS in magnetic resonance imaging, optical imaging, spectral imaging, radar imaging, x-ray computed tomography, motion imagery and video, distributed and remote sensing, acoustical and ultrasound signal processing, surveillance, communications, etc.
- hardware implementation of CS systems
- CS methods for target/source localization
- CS for MIMO systems
- Applications and theoretical advances for compressive sensing in big data analytics
- CS in machine learning applications
- CS in medicine and biology: medical imaging, physiological monitoring, medical diagnostics, etc.
- CS for ultrawideband systems
- compression and superresolution
- waveform agility in CS
- efficient CS algorithms.

SPECIAL SESSION ON Data/Signal Processing with Faulty Measurements

A special session on data/signal processing with faulty measurements is being planned. This session will focus on most recent advances in the theory and practice of inference (e.g., feature extraction) from faulty, corrupted, or missing measurements acquired by compressive or conventional sensing.

SPECIAL SESSION ON Big Data Analytics and Processing

A special session on big data analytics is being planned. This session will focus on the latest advances in big data analytics and processing for applications in Defense, Homeland Security, Finance, and Healthcare Sectors.
Single photon counting is the ultimate level of sensitivity in optical measurement techniques. There has been continued growing interest in the creation, manipulation, and detection of single photons spurred by emerging applications for which photon counting is an enabling capability. In many cases, these applications involve physical processes in which a very small number of photons—often just one—are available for detection, such as single molecule spectroscopy and ultra-low-light-level imaging. In other instances, it is the quantum properties of a single photon that are exploited, and the broad field of quantum optics, particularly quantum information processing, is critically dependent on the means for controlling and sensing various properties of individual photons.

This conference provides a forum for the presentation of advances in all aspects of the science and technology of single photon counting. The program will emphasize the latest developments in detector technologies capable of sensing single photons, as well as sources capable of generating single photons. A multitude of material systems is used to achieve single photon generation and detection at operating wavelengths that span ultraviolet, visible, infrared, and terahertz regimes, and developments throughout this range of wavelengths are of interest. Associated electronic circuitry and signal processing is often crucial to photon counting instrumentation, and submissions concerning advances in these areas are of great value. Applications and techniques that employ these detectors and sources are the drivers for improved device performance, and the presentation of single photon applications is essential to the program. Submissions covering photon counting theory, metrology, and all other elements of photon counting technology are encouraged.

Original papers are solicited in the following areas:

- photon counting theory
- single photon sources
- detectors for photon counting
- photomultiplier technologies
- single photon avalanche diodes (SPADs)
- superconducting single photon detectors (SSPDs)
- novel structures/devices for single photon detection
- electronic circuitry for photon counting detectors
- signal processing for photon counting
- technical principles of photon counting
- photon correlation techniques
- multidimensional TCSPC
- photon counting imaging techniques
- single photon metrology
- instrumentation for photon counting
- applications of photon counting
- fluorescence techniques (FLIM, FRET, FCS)
- optical tomography
- quantum optics and quantum information processing
- quantum cryptography
- free-space optical communications
- laser radar for ranging and 3D imaging
- low-light-level imaging
- adaptive optics systems
Quantum Information Science, Sensing and Computation 2018 (SI107)

Conference Chairs: Eric Donkor, Univ. of Connecticut (USA); Michael Hayduk, Air Force Research Lab. (USA)

Conference Co-Chairs: Michael R. Frey, Bucknell Univ. (USA); Samuel J. Lomonaco Jr., Univ. of Maryland, Baltimore County (USA); John M. Myers, Harvard Univ. (USA)

Program Committee: Paul M. Alsing, Air Force Research Lab. (USA); Radankrishnan Balu, U.S. Army Research Lab. (USA); Mishkat Bhattacharya, Rochester Institute of Technology (USA); Wes Campbell, UCLA (USA); Jerry Chow, IBM (USA); Michael L. Fanto, Air Force Research Lab. (USA); Louis H. Kauffman, Univ. of Illinois at Chicago (USA); Prem Kumar, Northwestern Univ. (USA); Alexander V. Sergienko, Boston Univ. (USA); Kathy-Anne Soderberg, Air Force Research Lab. (USA); Yaakov S. Weinstein, The MITRE Corp. (USA)

Quantum systems that compute, store, and distribute information based on quantum mechanical entanglement, superposition, and interference phenomena are being developed and realized in many physical systems, with possible commercial/industrial applications in quantum cryptography, quantum sensing, quantum communications, and quantum computation. Quantum cryptography exploits the non-cloning property of quantum states to implement secure cryptosystems, quantum sensors exploit quantum correlations to achieve a sensitivity or resolution surpassing classical systems, quantum communication exploits entanglement of quantum states for teleportation, and quantum computing utilizes the parallelism of quantum interference states for computational complexity and speed that may ultimately exceed the capability of today’s digital technology. Non-locality principles can provide a basis for robust quantum networks that can detect and defend against malicious cyber attacks.

Progress in quantum information science, sensing and computation requires multidisciplinary efforts amongst physicists, computer scientists, mathematicians, and engineers. This conference will provide a forum for discussion including theoreticians and experimentalists from these disciplines and others with interest in quantum technologies. Papers that report on new developments and breakthroughs in quantum information science, quantum sensing, quantum communication, quantum cryptography, quantum computing, and mathematical aspects of quantum computing are invited.

Of particular interest are papers dealing with the following topics:

**QUANTUM INFORMATION SCIENCE**
- quantum information theory
- quantum measurement
- decoherence effects
- quantum complexity theory
- quantum algorithms

**QUANTUM SENSORS, CLOCKS AND SYSTEMS**
- quantum magnetometers
- quantum gravimeters and gravity gradiometers
- atom-based accelerometers
- atom clocks
- quantum imaging systems
- quantum memories

**QUANTUM COMMUNICATION, NETWORKS AND CRYPTOGRAPHY**
- quantum networks
- quantum repeaters and memories
- entangled states and their creation
- information processing with entangled states
- teleportation
- quantum cryptography and cryptosystems
- system architecture and engineering

**QUANTUM COMPUTING**
- solid state computing
- ion-trap quantum computing
- neutral-atom quantum computing
- Josephson junction quantum computing
- Photonic-based quantum computing
- cavity-QED quantum computing
- molecular quantum computing
- NMR quantum computing
- fault-tolerant quantum computing
- integrated photonics for quantum information processing
- single-photon sources and detectors

**MATHEMATICAL QUANTUM COMPUTATION**
- Braid groups and topological quantum computing
- Holonomic quantum computing
- quantum walks and games
- quantum cellular automata
- quantum error correction

**CYBERSECURITY**
- secure communications
- quantum key distribution
- quantum number generation
- information sharing and secrecy
- cyber attack countermeasures
Hyperspectral imaging technology has successfully migrated from the DoD arena into commercial sectors such as remote sensing, commercial space, process machine vision, and medical/biotechnology. Each of these can be further segmented to cover applications as diverse and fascinating as specialty crop inspection, precision agriculture, cancer tissue analysis, and more. As the adoption of hyperspectral imaging broadens, the need for clear and concise standards for sensor calibration and characterization also becomes apparent. This conference session will cover these application areas and the standards that will help govern them.

This conference will be focused on the latest application innovations seen across machine vision, medicine, biotechnology, and remote sensing. Process machine vision applications can include, for example, the inspection of specialty crops, seafood or poultry to improve overall wholesomeness and quality based on spectral signatures that are otherwise impossible to detect. The technology is also successful in plant phenotyping. For biotechnology, hyperspectral sensors can be used to improve the detection of certain types of skin cancer and Alzheimer disease. For remote sensing, applications are typically airborne in nature (satellites, fixed-wing manned aircraft, and (in particular) UAVs) for advanced research in forestry, minerals and mining, crop science, environmental research, and pollution analysis.

A conference around the application of hyperspectral sensors necessarily needs to include a discussion on standards: calibration and characterization. As the technology becomes more mainstream...and it has... users and manufacturers alike need to have clear standards around specifications and performance criteria, and that they are not only uniform but also clearly articulated.

Key areas of interest and papers accepted on the following research:

**COMMERCIAL APPLICATIONS:**
- Hyperspectral sensing and imaging sensors
- In-line machine inspection, machine vision
- Cube-sat satellites for earth observation
- Commercial Space
- UAVs and Unmanned vehicles
- Precision agriculture and crop science research
- Spectral signatures
- Chemical sensing
- Imaging spectroscopy
- Medical imaging/Biotechnology
- Standards and calibration of spectrometers
This conference provides a forum to discuss advancements that close the gap between R&D and adoption of technological innovations in additive manufacturing (AM). Papers are solicited to catalyze collaborations and combine the promise of cutting-edge AM technologies with deep materials and process understanding to revolutionize design, manufacturing, and qualification practices for applications that have high consequence if the fabricated products do not perform as intended.

The ability to develop innovative, high-value, high-consequence, complex parts—impossible to build using traditional technologies—is on the horizon if we capture the potential of AM to shift paradigms in engineering design, manufacturing, and material performance. Today, lack of tightly controlled and automated AM tools has led to largely artisan-based design and manufacturing processes that, when combined with high reliability requirements and long development lead times, result in cost inadequacies, loss of flexibility, and adequate but incomplete quantification of performance margins and reliability. The lack of a framework for science-based qualification to assure the materials and parts meet design requirements and are suitable for intended applications remains a key barrier to AM acceptance. Measured discovery to deployment strategies, including intelligent data collection and analysis, are needed to reduce risks and accelerate cycles of learning. Further, while additive materials may have average properties comparable to conventional materials, it is the worst material property and defect content that influences high consequence applications. This drives the need for a profound understanding of reliability and robust design, processes, and materials. Technical papers to address these needs and accelerate the adoption of additive manufacturing into high consequence applications are solicited. Topics include, but not limited to:

**MARGINS BY DESIGN**
- multi-material multi-physics topological optimization - robust design for uncertainties and performance
- integrated computational material engineering
- “digital twin” to engineer materials reliability
- predicting safety and performance margins and uncertainties, including probabilistic approaches
- material and process variability in AM process models
- thermal-mechanical-chemical process models
- time-aware multiscale performance models
- process-structure-property-performance relationships for property critical applications.

**MATERIALS INNOVATION**
- approaches to accelerate materials discovery, design, development, and deployment
- diagnostic and experimental methods to identify and quantify sources of material variability for property critical applications
- elucidation of scale-dependent material physics for additive manufacturing applications
- experimental-computational-data science integration.

**MATERIALS DATA SCIENCES AND INFORMATICS**
- multivariate analytics to translate diverse and sparse data into materials and AM process science knowledge
- machine learning, deep learning, artificial intelligence
- analytics to reduce measurements and modeling to the minimum needed to capture critical physics.

**SCIENCE-BASED PRODUCT QUALIFICATION**
- multi-scale modeling, measurement sciences and methods to accelerate part qualification
- scientific basis to accept or qualify parts
- as-built quantification and property measurements
- approaches to relate microstructure variability to bulk properties and performance.

**ENGINEERED MATERIALS AND MATERIALS ASSURANCE**
- rapid material screening & feedstock characterization
- functionally graded compositions, microstructure control and optimization, multi-material integration, enhanced functionality, and controllable properties
- high-throughput “alistance” material characterization
- materials and additive manufacturing with inherent resilient Trust attributes.

**PROCESS SCIENCE AND CONTROL**
- process-aware additive manufacturing
- vision-based machine learning for adaptive AM sensors; process monitoring; feedback control
- model-based intelligent feed forward concepts
- impact of process environment variations on quality.

**RELIABILITY AND ENVIRONMENTAL SUITABILITY**
- mechanisms underpinning microstructure instabilities
- impact of anisotropies, feature dependence, residual stress, distortion, porosity, and defect distributions on material response/performance margins/degradation
- defect sciences (e.g., defect detection and signatures; methods to statistically characterize, predict, and control critical defect formation and evolution)
- extreme environment material response and part performance (corrosion, fatigue, creep, durability, etc).

This conference is co-located at SPIE Defense + Commercial Sensing. www.spie.org/DScall

**CALL FOR PAPERS**

This conference of related interest is part of Defense + Security.

**NEW FOR 2018**

**Program Committee:** Magdi N. Azer, Illinois Applied Research Institute (USA); Jack Beuth, Carnegie Mellon Univ. (USA); Craig Blue, Oak Ridge National Lab. (USA); Timothy J. Bunning, Air Force Research Lab. (USA); Surya R. Kalidindi, Georgia Institute of Technology (USA); Jennifer Wolk, Office of Naval Research (USA); James L. Zunino III, U.S. Army Armament Research, Development and Engineering Ctr. (USA)
Advances in on-board navigation, vehicle sensors, artificial intelligence, image processing, wireless communications, and advanced servo controls are rapidly transforming transportation systems. Automobiles, trucks, watercraft and aero cargo delivery are experiencing a technical migration beyond methods of manual control. Enabled by artificial intelligence and machine learning, these platforms are undergoing a transition from augmented assistance, to fully autonomous operations. As the commercial private sectors rapidly develop and implement technologies leading to new forms of autonomy for terrestrial and aero vehicles, military and other government communities are fully able to leverage these advancements through public-private partnerships.

Conversion of low-level sensor data into the forms of generalizable high-level information required for reliable, safe and/or assisted autonomous vehicle operation in complex environments remains a seminal problem. Today, multiple organizations are developing and testing cost-effective systems for global deployment. New sensor imaging modalities are being explored in conjunction with sensor fusion techniques that support processing schema for the megabytes of data generated during each second of operation. In addition to technical performance, other emerging issues that are growing in importance include system cost, human/machine interface, reliability, and public policy. Furthermore, this infrastructure requires GPS, V2V and V2I to augment system-level performance and on-board systems performance support deployment. Critical to both new platforms and its supporting infrastructure is the implementation of cyber security standards and software IV&V.

Topics include, but are not limited to the items listed below:

**OBJECT SENSORS FOR DETECTION AND IDENTIFICATION**
- 3D LIDAR/LADAR sensing
- radar systems
- visible/EO cameras
- ultrasonic sensors
- remote sensors
- apertures, arrays and camera systems.

**CYBER SECURITY STANDARDS AND SOFTWARE IV&V**
- cyber threat attack surfaces
- embedded processors and applications
- cyber security standards in development and sustainment
- software IV&V
- software security and reliability testing
- modeling and simulation of physical systems for software vulnerability testing
- automated vulnerability discovery
- adversarial machine learning
- CAN bus security
- side-channel threats and countermeasures.

**WIRELESS COMMUNICATIONS AND THE INTERNET OF EVERYTHING**
- network effects
- precision navigation
- telemetry and wireless systems
- terrain matching systems
- serial telemetry/vehicle platooning
- distributed intelligence
- robust command and control
- remote access.

**AUTONOMOUS PLATFORM FIELD TESTING**
- open road
- test track
- system IV&V
- simulator
- model-based systems.
ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING FOR AUTONOMOUS NAVIGATION

• sensor fusion
• artificial intelligence algorithms
  - object recognition and characterization
  - planning
  - reasoning
• pose determination
• machine Learning
• deep learning
  - reinforcement learning
  - semantic and/or episodic memory applied to navigation learning
  - episodic
• human/machine interface
  - explanation and dialogue, especially for transition from autonomous to assisted operations
  - dialogue
• beyond human performance
  - pure compute solutions
  - human-machine teaming

• sensing systems algorithms
• vehicle/machine computer visualization
• assisted driving versus autonomous driving
• collision avoidance
• weather condition judgments
• situational awareness
• intent recognition (determining the intent of other objects in the environment)
• behavior certification—off-line learning
• cloud computing
• augmented reality heads up displays.

GOVERNMENT POLICY AND PARTNERSHIPS

• driverless/driver vehicle hybrid operations
• pedestrian safety
• technical failure liability
• mission planning with heterogeneous autonomous components
• liability and dispute resolution.

CALL FOR PAPERS

Submit your abstract today: www.spie.org/CS18call

SAVE THE DATE

ABSTRACTS DUE:
9 October 2017

AUTHOR NOTIFICATION:
11 December 2017
The contact author will be notified of acceptance by email.

MANUSCRIPT DUE DATE:
19 March 2018

PLEASE NOTE: Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a (6-page minimum) manuscript for publication in the conference proceedings.
 Sensing for Industry, Environment, and Health

Thermosense: Thermal Infrared Applications XL (S1109)

Conference Chair: Douglas Burleigh, La Jolla Cove Consulting (USA)
Conference Co-Chair: Jaap de Vries, FM Global (USA)

Program Committee: Andrea Acosta, Colbert Infrared Services (USA); Nicolas Avdelidis, National Technical Univ. of Athens (Greece); Paolo Biondo, Consiglio Nazionale delle Ricerche (Italy); Jeff R. Brown, Embry-Riddle Aeronautical Univ. (USA); Fred P. Colbert, Colbert Infrared Services (USA); Amanda K. Criner, Air Force Research Lab. (USA); Ralph B. Dinwiddie, Oak Ridge National Lab. (USA); Jason C. Fox, National Institute of Standards and Technology (USA); Sheng-Jen (Tony) Hsieh, Texas A&M Univ. (USA); Herbert Kaplan, Honeyhill Technical Co. (USA); Timo T. Kauppinen, VTT Technical Research Ctr. of Finland (Finland); Dennis H. LeMieux, Siemens Power Generation, Inc. (USA); Monica Lopez Saenz, IRCAM GmbH (Germany); Gregory B. McIntosh, Teasdale Consultants Ltd. (Canada); Xavier P. V. Maldague, Univ. Laval (Canada); Junko Morikawa, Tokyo Institute of Technology (Japan); Gary L. Orlove, FLIR Systems, Inc. (USA); Beata Oswald-Tranta, Montan Univ. Leoben (Austria); G. Raymond Peacock, Temperatures.com, Inc. (USA); Ralph A. Rotolante, Vicon Enterprises Inc. (USA); Andres E. Rozloznik, SI Termografia Infrarroja (Argentina); Morteza Safai, The Boeing Co. (USA); Takahide Sakagami, Kobe Univ. (Japan); Steven M. Shepard, Thermal Wave Imaging, Inc. (USA); Sami Siikanen, VTT Technical Research Ctr. of Finland (Finland); Gregory R. Stockton, Stockton Infrared ThermoGraphic Services, Inc. (USA); Gary E. Strahan, Infrared Cameras, Inc. (USA); Vladimir P. Vavilov, National Research Tomsk Polytechnic Univ. (Russian Federation); Joseph N. Zalameda, NASA Langley Research Ctr. (USA)

Thermosense is the oldest and largest international technical conference focused on scientific, industrial and general uses of infrared imaging, infrared temperature measurements, and image analysis. Its regular printed proceedings are found in most scientific and engineering libraries, providing an unequaled exchange of information about research, uses and general applications of infrared (IR) imaging technology. This year, we would like to have special sessions on (1) monitoring of additive manufacturing (AM) processes; and (2) signal processing and nondestructive testing. Thermal/infrared related papers are solicited in the areas listed below, and are also welcome in other areas.

AEROSPACE APPLICATIONS
• aircraft NDT
• process monitoring
• corrosion/FOD/fatigue
• aging aircraft
• spacecraft and satellites

AUTOMOTIVE INDUSTRY
• predictive maintenance - electrical
• predictive maintenance - mechanical
• automotive NDT
• process monitoring - automation
• testing, measurement QA, R&R and validation
• driver vision enhancement

BUILDING APPLICATIONS
• energy conservation and energy efficiency
• construction quality control
• roof moisture surveying
• weatherization

CALIBRATION
• standards
• sources
• instruments traceability

DETECTION OF GAS AND OTHER LEAKS
• pipelines, oil fields, offshore platforms, refineries
• gas pumping stations, gasoline stations
• UXO: unexploded ordinance

ENVIRONMENTAL AND AGRICULTURAL MONITORING
• agriculture and water conservation
• fish and wildlife migration
• geology
• pollution and storm water monitoring
• seawater sensing

FIBER OPTICS FOR INFRARED
• detection of hazardous chemicals
• remote sensing in high temperature and corrosive environments
• medical applications

FIRE ANALYSIS AND DETECTION
• wildfire
• home and building fire
• pool fires
• fire research
• flame emission

FOOD PROCESSING AND HANDLING
• quality control monitoring
• temperatures of animals at slaughter
• foreign object detection and characterization

INFRASTRUCTURE
• transportation – roads, bridges, airports, harbors, reservoirs, and dams
• energy – nuclear, wind, solar, fossil fuels power plants

Research Ctr. (USA)
National Research Tomsk Polytechnic Univ. (Russian Federation); Thermographic Services, Inc. (USA); VTT Technical Research Ctr. of Finland (Finland); Sami Siikanen, VTT Technical Research Ctr. of Finland (Finland); Gregory R. Stockton, Stockton Infrared ThermoGraphic Services, Inc. (USA); Gary E. Strahan, Infrared Cameras, Inc. (USA); Vladimir P. Vavilov, National Research Tomsk Polytechnic Univ. (Russian Federation); Joseph N. Zalameda, NASA Langley Research Ctr. (USA)

The Thermosense conference promotes worldwide exchange of information about research, uses and applications of infrared (IR) imaging technology. This includes infrared thermography and thermal infrared sensing (MWIR/LWIR), as well as NIR, SWIR imaging and measuring instruments. Thermosense encompasses technical papers, workshops and short-courses. Over the past 38 years, these activities have included topics from the fundamentals of infrared imaging and calibration to virtually all infrared research and applications. Special emphasis has been on problem solving and turning new developments into standard practices. This year, we would like to have special sessions on (1) monitoring of additive manufacturing (AM) processes; and (2) signal processing and nondestructive testing. Thermal/infrared related papers are solicited in the areas listed below, and are also welcome in other areas.

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• construction quality control
• roof moisture surveying
• weatherization

CALIBRATION
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• sources
• instruments traceability

DETECTION OF GAS AND OTHER LEAKS
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• gas pumping stations, gasoline stations
• UXO: unexploded ordinance

ENVIRONMENTAL AND AGRICULTURAL MONITORING
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• fish and wildlife migration
• geology
• pollution and storm water monitoring
• seawater sensing

FIBER OPTICS FOR INFRARED
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• remote sensing in high temperature and corrosive environments
• medical applications

FIRE ANALYSIS AND DETECTION
• wildfire
• home and building fire
• pool fires
• fire research
• flame emission

FOOD PROCESSING AND HANDLING
• quality control monitoring
• temperatures of animals at slaughter
• foreign object detection and characterization

INFRASTRUCTURE
• transportation – roads, bridges, airports, harbors, reservoirs, and dams
• energy – nuclear, wind, solar, fossil fuels power plants
IR IMAGE FUSION APPLICATIONS
- biological and medical
- field security
- process monitoring
- hyperspectral
- structural analysis

MANUFACTURING AND PROCESSING INDUSTRIES
- composite fabrication and uses
- additive manufacturing
- glass and ceramics
- metals processing
- petrochemical
- plastics
- pulp and paper
- semiconductors and microelectronics
- quality control and predictive maintenance applications

INFRARED NONDESTRUCTIVE TESTING (IR NDT) AND MATERIALS EVALUATION
- Composite structures (aerospace, marine, wind turbine blades, etc.)
- metallic structures (aerospace, turbine blades, and other)
- subsurface defects
- fatigue analysis
- Sonic IR
- Thermal stress analysis (TSA)
- IR NDT combined with other techniques (ultrasound, x-ray, terahertz, etc.)
- Thermal properties of materials
- Underground anomalies
- Electronic components

MEDICAL
- health screening and diagnostics
- veterinary applications
- Disease screening

POWER GENERATION AND DISTRIBUTION
- nuclear, wind, and solar power plants
- field measurement issues
- power plant heat-rate efficiency
- electrical and mechanical P/PM

RESEARCH AND DEVELOPMENT
- terahertz imaging (THz)
- multi-spectral/high-spectral imaging
- enhanced spatial resolution
- enhanced time resolution
- image interpretation
- microscopy
- thermal modeling, CFD and FEA

REMOTE SENSING AND SECURITY
- Search and rescue (fire, snow, etc.)
- law enforcement
- UAV Drones
- maritime guidance

STANDARDS, CERTIFICATIONS AND GUIDELINES
- NDT
- buildings
- condition monitoring
- related areas (e.g. medical, public safety)

In case of multiple submissions, the Program Committee reserves the right to allow only one oral presentation per author group while transferring the others to the poster session. During the Symposium, authors are expected to attend their respective sessions to enable interaction with the audience.

Selected papers will be recommended for publication in related SPIE Journals such as Optical Engineering and Journal of Electronic Imaging.

Limited funds are available to support student attendance at the conference.

VENDORS PRESENTATIONS AND RECEPTION XIV

What’s New in Infrared Sensing & Imaging, Hardware, and Software?

This session is now in its 14th year and has become very popular. This venue provides an early opportunity for exhibitors to highlight their latest technology and products to the Thermosense and IR community, prior to the opening of the Defense + Commercial Sensing (DCS) 2018 Expo. This also enables the technical conference attendees to better prioritize their activities when visiting the Expo. It is a casual meeting with ample time for questions and answers. Looking for state-of-the-art in future generation of IR imagers radiometric and non-radiometric and IR image processing systems and all other hardware and software involve in infrared applications. Your company must be an exhibitor at Defense + Commercial Sensing Expo 2018 to be part of this event. Any DCS-2018 exhibitor offering products or services related to infrared sensing or imaging, photonics can participate. There are no restrictions to the content or topics of submissions: Technical or Commercial within Infrared Imaging Hardware, Optics, Accessories, and Software.

Vendors Session Rules, Guidelines, Topics, and Application Information can be found on the conference website

Slots are limited and available on a first come, first-served basis. The list of participating vendors and the content of their presentations will appear in the final program of the SPIE DCS-2018 symposium.

Moderators: Andres E. Rozlosnik, SI Termografía Infrarroja (Argentina); Sheng-Jen (Tony) Hsieh, Texas A&M Univ. (USA)

If you are interested in participating, or have more questions, please contact:
Andres Rozlosnik, aer@termografia.com;
Sheng-Jen (Tony) Hsieh hsieh@tamu.edu
Advanced Environmental, Chemical, and Biological Sensing Technologies XV (SI110)

Conference Chairs: Tuan Vo-Dinh, Fitzpatrick Institute for Photonics, Duke Univ. (USA); Robert A. Lieberman, Lumoptix LLC (USA)

Conference Co-Chairs: Laura Maria Lechuga, Institut Català de Nanociència i Nanotecnologia (ICN2) (Spain); Dmitri B. Papkovsky, Univ. College Cork (Ireland); Eiichi Tamiya, Osaka Univ. (Japan)

Program Committee: Francesco Baldini, Istituto di Fisica Applicata Nello Carrara (Italy); Luigi Campanella, Univ. degli Studi di Roma La Sapienza (Italy); Jesus Delgado Alonso, Intelligent Optical Systems, Inc. (USA); Franz Ludwig Dickert, Univ. Wien (Austria); Dennis K. Killinger, Univ. of South Florida (USA); Robert Lascola, Savannah River National Lab. (USA); Edgar A. Mendoza, Redondo Optics, Inc. (USA); Anna Grazia Mignani, Istituto di Fisica Applicata Nello Carrara (Italy); David L. Stokes, EOIR Technologies (USA)

In situ characterization and quantification of environmental, industrial, cultural, and biotechnology samples in complex systems is increasingly required for applications ranging from environmental sensing and industrial control to waste minimization, sequestration, and remediation. Micro- and nanoscale technologies, including plasmonic structures and metamaterials have begun to successfully address these analytical challenges. Standalone micromachined sensors as well as miniaturized chemical analysis systems that automatically perform multiple steps including sampling, sample transport, separation, and detection have the potential to greatly advance the field of analytical sciences. At the other end of the length scale, sophisticated distributed sensing techniques, including intrinsically distributed sensor elements and large-scale sensor networks are revolutionizing the speed and resolution with which “whole-field” characterization can be accomplished. An urgent application is surveillance and early warning of accidental or purposeful release of chemical or biological substances.

The development of advanced chemical and biological sensors and analytical systems requires an integration of micro- and nanosystem technology, analytical chemistry, physics of sensors, microfluidics, and biomolecular recognition methods. The primary aim of this conference is to focus on recent advances in the development of photonic monitoring methods, the design, fabrication technologies, and applications of optical chemical nano/microsensors and nano/micro-analysis systems, and nanoscale devices. The conference will also focus on promoting interdisciplinary interaction between scientists and engineers from industry, academia, and federal laboratories.

The research and development community is encouraged to submit contributions in, but not limited to, the following:

- indoor and outdoor environmental chemical sensors and biosensors
- advanced photonics for spectroscopic trace detection (fluorescence, phosphorescence, Raman, SERS, IR, UV absorption, microwave, RF, LIBS, x-ray, terahertz)
- chemically active sensors (optrodes, coating-based distributed sensors)
- instrumentation for air, liquid, and surface pollution
- detection of toxic industrial compounds (TICs) in air and water
- sensors for down-hole monitoring of waste injection and CO2 sequestration
- chemical and physical characterization of environmental sensors
- instrumentation for air pollution and ozone sensing
- global atmospheric monitoring systems
- ground water, river water, and waste water monitoring
- multi-analyte sensors, sensor array devices, and biochips
- distributed and multiplexed chemical and biological sensor networks
- nano/microchemical analysis systems, lab-on-a-chip for environmental analysis (electrophoresis, flow injection analysis, chromatography, etc.)
- nanotechnology/plasmonic/metamaterial-based sensors and systems
- nano/microfluidics for sensors (sample handling, fluidic mechanics, microvalves, bioreactors, etc.)
- high-throughput detection methods and systems
- sensors and subsystems for industrial waste control and minimization
- environmental remediation technologies
- chemical/biological sensors for art identification and diagnostics
- monitoring techniques for cultural heritage preservation
- sensor signal processing technologies
- sensor system integration and performance
- advanced algorithms and treatment of environmental data.
CALL FOR PAPERS

Smart Biomedical and Physiological Sensor Technology XV (SI111)

Conference Chairs: Brian M. Cullum, Univ. of Maryland, Baltimore County (USA); Douglas Kiehl, Eli Lilly and Co. (USA); Eric S. McLamore, Univ. of Florida (USA)

Program Committee: Karl S. Booksh, Univ. of Delaware (USA); Aiper Bozkurt, North Carolina State Univ. (USA); Liliana Braescu, Univ. de Vest din Timisoara (Romania); Jonathan C. Claussen, Iowa State Univ. (USA); Mikhail E. Farrell, U.S. Army Research Lab. (USA); Claudia Gärtner, microfluidic ChipShop GmbH (Germany); Moinuddin Hassan, U.S. Food and Drug Administration (USA); Ellen L. Holthoff, U.S. Army Research Lab. (USA); Ilko K. Ilev, U.S. Food and Drug Administration (USA); K. D. Mandal, Institute of Technology, Banaras Hindu Univ. (India); Heather McCauley, U.S. Food and Drug Administration (USA); Olga S. Ovchinnikova, Oak Ridge National Lab. (USA); T. Joshua Pfefer, U.S. Food and Drug Administration (USA); Shiv K. Sharma, Univ. of Hawai'i (USA); Narsingh B. Singh, Univ. of Maryland, Baltimore County (USA); Dimitra N. Stratis-Cullum, U.S. Army Research Lab. (USA); Michael Weinrich, National Institutes of Health (USA)

Technological advances in sensor development and sensing applications have major impacts on the fields of biomedical diagnostics and biological research in the past two decades. This conference on Smart Biomedical and Physiological Sensor Technology and their application, provides an interdisciplinary forum for scientists, engineers, clinical researchers, medical doctors and industrial partners, from a variety of disciplines, who are engaged in the application of smart sensor technology to problems in the biological and biomedical sciences, to interact and explore cutting edge research and development. Medical doctors, basic scientists and basic bioscience researchers will present recent results and share examples of challenges they face in terms of detection, diagnosis, treatment and integration of new technologies into the field. Engineers and other researchers, who are developing sensors and novel sensor technologies, will present the latest in smart sensor and sensing technology concepts and research. Industrial representatives will present the latest innovations and available technologies for biomedical and optical sensing applications.

This meeting will include sessions ranging from basic research in sensor development and instrumentation to clinical studies and practical applications of sensing and therapeutic methodologies (e.g., minimally and non-invasive sensors, lab-on-a-chip, etc.), all having the same common theme of biological or medical sensing/imaging. This conference will focus on the development and applications of novel smart sensor materials and technologies capable of providing additional information and/or more robust analyses than conventional techniques. Smart sensors employ many different diagnostic/therapeutic methodologies (i.e., optical spectroscopy, electrochemical analyses, etc.) as well as advanced analytical instrumentation and sophisticated approaches for evaluating complex multidimensional datasets. This conference will be comprised of many sessions, devoted to diverse aspects of biological and biomedical sensor development and their application to civilian and defense related challenges. Contributed papers are solicited concerning, but not limited to the following areas:

- Nano-biotechnology
- Bio-compatible and smart sensing materials
- Implantable sensor technology
- Tissue Optics and Non-invasive sensing and imaging
- Photoacoustic sensing and imaging
- Raman and SERS sensing and imaging
- Infrared/Near-Infrared sensing and imaging
- Microfluidics
- Biological “Lab-on-a-chip” technologies
- Paper based sensing technologies
- Multiplexed and high throughput screening
- Micro- and Nano-bio instrumentation
- Point-of-care medical diagnostics
- Wireless signal transmission
- Wearable sensor technologies
- Assistive wearable technologies
- Mobile medical apps
- Remote biological/biomedical sensing
- Space-based health monitoring
- Multivariate sensor response evaluation
- Pre-symptomatic detection
- Clinical applications of biomedical sensors
- Biomedical forensics
- Drug Delivery/Therapeutics
- Nanovectors/Nanocarriers
- Smart molecular signaling probes
- Forensic Sensing and Diagnostics
The scope of the conference ranges from topics in basic research in energy harvesting and storage techniques to component and subsystem level development for defense, security, space, and commercial applications. This conference intends to bring together scientists and engineers involved in the development and transition of novel Energy Harvesting and Energy Storage concepts. Novel energy harvesting approaches to energy scavenging, light, infrared, and motion sources, and high-capacity energy storages such as batteries, fuel cells, ultra-c capacitors, supercapacitors batteries, and other options cover this conference. Concepts relating to portable, flexible, and integrated energy source/storage relevant to defense applications are of interest. Given the enormous diversity of energy harvesting and storage techniques, we have selected several cutting-edge topics relevant to the technology development and transition process. Novel applications range from small scale system (e.g. small unmanned air vehicle, wireless sensor networks etc.), to large scale system (e.g. electric vehicle) such as wireless sensor networks, electric vehicle etc.), requiring nanoscale, microscale to macroscale energy is also covered in this conference area.

The topics of interest in this conference also includes low to ultra-low power electronics requiring little to no external power or electronics harvesting power from its environment. Current trend in Cyber Physical Systems and Internet of Things require innovative approaches in both, very efficiently delivering power as well as harvesting power. Significant progress in sub-threshold transistors, circuits and various other strategies that can function under power starving constraints present a new paradigm in nanoscale, microscale and embedded systems design.

The sessions are organized to facilitate the exchange of ideas and promote the discussion of recent progress in energy harvesting, storage and integration research and trends toward system-level development. It is anticipated that this conference will foster cross-fertilization among diverse disciplines with participants being exposed to the entire range of scientific and engineering problems associated with the concepts-to-systems development pipeline, as well as the development roadmaps at commercial companies and government agencies.

This conference will consider existing and new harvesting and storage techniques as well as recent advances in novel harvesting and storage materials and devices. It will also consider novel approaches to components and systems consuming very low power. Its objective is to bring together experimentalists, theorists, computational specialists, and development engineers to provide an interdisciplinary forum to discuss physical understanding and the state-of-the-art of active and passive electronic and optoelectronic harvesting and storage materials, devices, and their applications. Areas of research that are particularly active include standard (bio, electrolytes, semiconductor, polymer, etc.) and non-standard materials (including biological materials along with its standard and nanostructures such as nanodots, nanotubes, quantum dots, quantum wires, and bio-inspired materials) for energy scavenging including energy storage devices and systems with traditional and nano-structures for improved storage and energy generation and storage mechanisms in micro-/nanomaterials and device architectures.

**NOVEL MICRO/NANO MATERIALS GROWTH AND DEVICE ARCHITECTURES FOR ENERGY HARVESTING AND STORAGE:**

- advanced patterning: nano-imprinting e-beam lithography etc. for nano energy devices
- new materials; synthesis and fabrication: electrodes, electrolytes, semiconductors, dielectrics, polymers, superconductors, organics, magnetics, pyroelectrics, hybrid composites, nano-particles and nano-composites
- techniques for improvement of the energy generation and storage properties, surface treatment and surface functionalization
- hydrogen production by water splitting and hydrogen storage
- MEMS, NEMS, and NOEMS devices for energy generation and storage
- theoretical investigation of the phenomena for understanding the energy generation and storage mechanism in micro-/nanomaterials and device architectures
- nano-structure/nano-composite materials and devices for biological inspired energy devices
- biologically assisted nano-energy devices
- next-generation nano-bio-opto energy devices for improved storage and energy generation
- development of new hybrid energy generation and storage devices and systems with traditional electrolyte, polymeric, semiconductors and/or biological materials
- multifunctional nano-particles based devices
- novel optical rectenna technology
- modeling and simulations of energy devices in micro-/nanodevices
• novel, energy device structures employing PV, vibration, or piezoelectric, RF effects
• novel micro-nano scaled thermoelectric devices for power harvesting (generation)
• MEMS based, reformed methanol micro fuel cell for portable power
• self-sustaining miniature solid oxide fuel cell
• high-power density storage devices based on nanostructures
• energy harvest from water using graphene or other micro-nano materials
• novel manufacturing technologies for energy harvest and storage devices.

THIN FILMS AND NOVEL MICRO/NANO MATERIALS GROWTH AND DEVICE STRUCTURES FOR ENERGY GENERATION AND STORAGE:
• novel 3D confined structures, nano-wire and nano-tube-based energy devices and energy storage devices for mechanical, chemical, biological, medical, and military applications
• novel nano-wire, nano-dots, and nano-tube growth and synthesis
• interactions between photons (radiation) and nano-wires, nano-tubes, and nano-dots
• functionalization of nanostructures for energy generation
• nano-photonics devices for PV cells
• thin-film materials for solar energy harvesting such as II-VI, III-V, polymer, Si etc.
• organic photovoltaics and dye-sensitized solar cells toward solar energy harvesting
• photoconduction in graphene- energy harvest
• graphene based high density battery technologies
• beyond Li-ion battery for energy storage: Li-air, Li-S, Na-ion battery.

HYBRID GENERATION AND STORAGE DEVICE AND SYSTEMS:
• interfaces of electrode/electrolyte within energy harvesting, storage, and semiconductor devices
• energy generation/storage from bio-mass, bio-fuels, electrolyte (battery)
• electrical characterization of hybrid devices (generation, storage)
• mesoscale microdroplet-based combustion power generation using ultrasonic droplets
• MEMS and nanowires for Li or Na or Ni-based micro batteries and novel fuel cells electrodes.

ULTRA-LOW POWER COMPONENTS AND ELECTRONICS
• Electronic components
• Novel circuits and topology
• Power management
• Energy harvesting circuits
• Technology for Internet of Things
• More..

APPLICATIONS:
• flexible, rigid, semi-rigid, energy harvesting/ storage systems
• power tent, circuit interfaces of energy devices
• power skin, power electronics
• integrated portable/deployable systems incorporating energy generation and energy storage devices
• thin film energy storage (battery) including thin-film Li , Ni, or novel material based battery
• energy scavenging systems for on-chip power harvesting and storage
• energy harvesting and storage for wireless sensor networks and electrical vehicle
• energy device for Internet of Things (IoTs)
• solar powered wireless sensing systems for border security.
Autonomous Air and Ground Sensing Systems for Agricultural Optimization and Phenotyping III (SI113)

Conference Chairs: J. Alex Thomasson, Texas A&M Univ. (USA); Mac McKee, Utah State Univ. (USA); Robert J. Moorhead, Mississippi State Univ. (USA)

Program Committee: Atanu Basu, Ayata (USA); Christoph Bauer, KWS SAAT AG (Germany); Subodh Bhandari, California State Polytechnic Univ., Pomona (USA); Andrew N. French, Agricultural Research Service (USA); Yufeng Ge, Univ. of Nebraska-Lincoln (USA); Cheryl McCarthy, Univ. of Southern Queensland (Australia); Seth C. Murray, Texas A&M Univ. (USA); Haly Neely, Texas A&M Univ. (USA); Boyan Peshlov, Monsanto Co. (USA); Carl Salvaggio, Rochester Institute of Technology (USA); Sindhuja Sankaran, Washington State Univ. (USA); Ajay Sharda, Kansas State Univ. (USA); Yeyin Shi, Univ. of Nebraska-Lincoln (USA)

The use of photonics technologies in agriculture is a rapidly emerging and promising area of study, given the potential impact these technologies offer for rapid crop improvement through breeding and genetics as well as optimization of on-farm crop production. The field is in an exciting period of exploration and expansion, as the use of ground- and air-based sensor platforms now permit revolutionizing measurement of plant traits in great detail and with high throughput. This conference will thus bring together researchers and practitioners in this field to discuss the latest technologies, methods and findings.

Proximal and remote sensing systems including point and array detectors and automated ground-based and aerial vehicles applied to agriculture and high-throughput phenotyping are within the scope of this conference. Both active and passive sensing methods as well as sensors based on material reflectance and transmission and such physical phenomena as fluorescence are pertinent to this conference. Optical sensing extending from the UV through the IR where thermal imaging becomes an important methodology is yet another area of active research of interest.

This conference will place emphasis on the use of unmanned aerial vehicles (UAVs) and ground-based robotic platforms equipped with multiple sensing technologies for the purpose of plant and crop phenotyping studies as applied to improving crop characteristics including yield, drought tolerance, stress detection, etc. Contributions are sought on sensing technologies; sensor platforms; and data collection, analysis and visualization schemes. Contributions are welcome which contain results from field studies on topics such as, but not limited to:

- UAVs for remote sensing in agriculture, including autonomous control issues, imaging workflow issues, and imaging software issues
- Ground-based robots for phenotyping
- Hyperspectral imaging
- Multispectral imaging
- Lidar
- Thermal-infrared cameras
- Fluorescence cameras
- Image analysis, data management and data visualization
- Theoretical and empirical estimation techniques including machine learning

BEST PAPER AWARDS:
The Conference Chair and Program Committee would like to recognize pioneers in the field with a Best Paper Award. Two candidates will be selected: one winner for the Best Paper Award and a Runner-up. This award is open to all authors who present in this conference.

SENSING FOR INDUSTRY, ENVIRONMENT, AND HEALTH

CONFEERENCE COSPONSOR

MONSANTO

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- Fluorescence cameras
- Image analysis, data management and data visualization
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SENSING FOR INDUSTRY, ENVIRONMENT, AND HEALTH

CONFEERENCE COSPONSOR

MONSANTO
Sensing for Agriculture and Food Quality and Safety X (SI114)

Conference Chairs: Moon S. Kim, USDA Agricultural Research Service (USA); Kuanglin Chao, USDA Agricultural Research Service (USA); Bryan A. Chin, Auburn Univ. (USA); Byoung-Kwan Cho, Chungnam National Univ. (Korea, Republic of)

Program Committee: Arun K. Bhunia, Ctr. for Food Safety Engineering, Purdue Univ. (USA); Suming Chen, National Taiwan Univ. (Taiwan); Stephen R. Delwiche, USDA Agricultural Research Service (USA); Ki-Bok Kim, Korea Research Institute of Standards and Science (Korea, Republic of); Naoshi Kondo, Kyoto Univ. Graduate School of Agriculture (Japan); Kurt C. Lawrence, USDA Agricultural Research Service (USA); Kangjin Lee, National Academy of Agricultural Science (Korea, Republic of); Alan M. Lefcourt, USDA Agricultural Research Service (USA); Changying (Charlie) Li, The Univ. of Georgia (USA); Renfu Lu, USDA Agricultural Research Service (USA); Bosoon Park, USDA Agricultural Research Service (USA); Yang Tao, Univ. of Maryland, College Park (USA); Yankun Peng, China Agricultural Univ. (China); Gang Yao, Univ. of Missouri-Columbia (USA); Seung-Chul Yoon, USDA Agricultural Research Service (USA)

Based on physical and chemical characteristics, optical sensing methods for real-time inspection of food, water and agricultural products can produce rapid, accurate, and consistent inspection solutions for product quality and safety. Advances in sensing technology have broadened the field of applications suitable for computerized optical instrumentation. No longer restricted to detailed laboratory analyses or simplified implementation in industrial or commercial settings, optical sensing technologies now can accommodate non-destructive, comprehensive, high-resolution spectral and image analyses for real-world safety and quality inspection on rapid food-processing lines.

This conference will focus on optical, spectroscopic, and spectral imaging sensing techniques, and approaches for the use of chemical imaging and biosensors, for rapid or non-destructive assessment of safety and quality for meats, fruits, vegetables, and water. Novel techniques, instruments for real-time measurement and processing, and industrial applications of optoelectronic sensing systems to detect diseases, defects, and fecal or bacterial contamination on meats, fruits, vegetables and water will be emphasized.

Contributed papers are solicited concerning, but not limited to, the following areas:
- high-throughput spectral imaging inspection system
- Vis/NIR spectroscopic inspection system
- hyperspectral imaging applications
- multispectral imaging applications
- time-resolved spectroscopy
- fluorescence imaging
- surface-enhanced Raman scattering (SERS) spectroscopy
- optical scattering
- nanomaterials and nanosensors
- biosensors
- terahertz sensing
- chemical imaging applications in food adulterants and contaminants detection
- handheld optical devices.

CALL FOR PAPERS

Submit your abstract today: www.spie.org/CS18call

Save the date

ABSTRACTS DUE:
9 October 2017

AUTHOR NOTIFICATION:
11 December 2017
The contact author will be notified of acceptance by email.

MANUSCRIPT DUE DATE:
19 March 2018

PLEASE NOTE: Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a (6-page minimum) manuscript for publication in the conference proceedings.
Three-Dimensional Imaging, Visualization, and Display 2018 (SI115)

Conference Chairs: Bahram Javidi, Univ. of Connecticut (USA); Jung-Young Son, Konyang Univ. (Korea, Republic of); Osamu Matoba, Kobe Univ. (Japan)

Conference Co-Chairs: Manuel Martínez-Corral, Univ. de València (Spain); Adrian Stern, Ben-Gurion Univ. of the Negev (Israel)

Program Committee:
- Arun Anand, Maharaja Sayajirao Univ. of Baroda (India);
- Jun Aral, NHK Japan Broadcasting Corp. (Japan);
- V. Michael Bove Jr., MIT Media Lab. (USA);
- Michael T. Eismann, Air Force Research Lab. (USA);
- Pietro Ferraro, Institute of Applied Science & Intelligent Systems (Italy);
- Toshiaki Fujii, Nagoya Univ. (Japan);
- Hong Hua, College of Optical Sciences, The Univ. of Arizona (USA);
- Yi-Pai Huang, National Chiao Tung Univ. (Taiwan);
- Naomi Inoue, National Institute of Information and Communications Technology (Japan);
- Dae-Sik Kim, SAMSUNG Electronics Co., Ltd. (Korea, Republic of);
- Jinwoong Kim, Electronics and Telecommunications Research Institute (Korea, Republic of);
- Janusz Konrad, Boston Univ. (USA);
- Thomas J. Naughton, National Univ. of Ireland, Maynooth (Ireland);
- Wolfgang Osten, Univ. Stuttgart (Germany);
- Min-Chul Park, Korea Institute of Science and Technology (Korea, Republic of);
- David J. Rabb, Air Force Research Lab. (USA);
- José Manuel Rodríguez Ramos, Univ. de La Laguna (Spain);
- Toralf Scharf, École Polytechnique Fédérale de Lausanne (Switzerland);
- Sumio Yano, Shimane Univ. (Japan);
- Zeev Zalevsky, Bar-Ilan Univ. (Israel)

This conference is intended to provide a forum for interchange on various algorithms, devices, systems, sensors, and architectures for novel applications in the field of 3D imaging, 3D visualization, 3D display, 3D TV, 3D video, and biomedical applications. Original unpublished contributions reporting recent advances and invited overview papers are solicited. Both invited papers and regular contributions from internationally known scientists and engineers on these subjects will be presented. These presentations will demonstrate the possibility of realizing 3D imaging, 3D visualization, 3D display, and 3D TV/video systems. All abstracts will be reviewed by the program committee for originality and merit.

Topics of interest include, but are not limited to, the following:
- algorithms for 3D image processing systems
- devices for 3D imaging/TV/video/visualization systems
- hardware for 3D visualization/TV/video/imaging systems
- applications of optical devices for 3D visualization/TV/video/imaging systems
- holographic applications in 3D visualization/TV/video imaging
- electro-holography methods/displays
- digital holography for 3D imaging
- 3D image sensing systems
- 3D image processing
- psychological sciences of 3D perception
- applications of novel materials for 3D TV/video/imaging
- packaging for 3D visualization/TV/video/imaging
- animating and synthesizing images for 3D visualization
- applications of 3D imaging and display in medical and various industries
- video standards for 3D TV/display
- 3D for biomedical applications, 3D microscopy
- 3D for consumer electronics and entertainment.

THE FUMIO OKANO BEST 3D PAPER PRIZE
The Fumio Okano Best 3D Paper Prize is sponsored by NHK-ES, and is presented annually in memory of Dr. Fumio Okano for his enduring contributions to the field of 3D TV and Display. Three papers will be selected for the Best Paper Awards among the papers accepted for this conference. A panel of experts will evaluate all the papers for technical quality and merit. The criteria for evaluation will include: 1) innovation; 2) clarity and quality of the manuscript submitted for publication; and 3) the significance and impact of the work reported. In order to be considered for a Best Paper Award, authors must make their oral presentation and submit their manuscript as scheduled. Conference chairs will not participate in the evaluation process of the papers. All decisions regarding selection of the best papers will be made by an evaluation committee.

AWARD SPONSORED BY
This conference will focus on methods, analysis, and applications of optical metrology and inspection as applied to various industries, with particular emphasis on practical applications for non-optical parts. The field of optical metrology and inspection has grown to wide acceptance for many applications in industry. The advances in machine vision have provided compact, smart camera systems, new cameras and lighting systems, and better ways of communicating with the outside world. Two- and three-dimensional methods have seen wide use in the electronics industry, but have also made advances in traditional areas such as automotive and aerospace metrology and manufacturing. The growth of additive manufacturing methods is demanding new, fast measurement tools for both monitoring the build process as well as checking the final parts. These methods are being used for defect inspection, precision measurements, and the monitoring of automated processes. Modern computing power has made analysis methods such as phase shifting a viable tool for fast on-line monitoring and metrology applications.

This conference is intended to address the latest advances and future developments in the areas of optical inspection and metrology as they are applied to practical applications. Imaging and calibration techniques used in industrial automation are also welcome to this conference.

• machine/robot vision methods, architectures, and applications
• lighting methods and systems for inspection
• surface inspection methods and applications
• special optical systems for inspection and measurements
• 2D and 3D machine vision methods and applications
• structured light methods and applications
• image-based range measurement methods
• micro- and nano-scale measurement methods
• interferometric techniques applied to non-optical parts
• phase shifting methods applied to industrial inspection of non-optical parts
• optical methods for surface metrology
• mechano-optics and photonics for metrology and inspection
• system calibration and error analysis
• dimensional standards and artifacts
• 3D data manipulation
• on-line and process control measurements
• reverse engineering applications
• on-machine measurements of shape and finish
• methods for monitoring additive manufacturing
• high-resolution and high-speed inspection and monitoring applications.
This conference is designed to attract expert researchers and end users in multimedia field, secure communication, and their counterparts in the mobile and wireless field, with the aim of creating a framework to foster research in various aspects of processing, analysis, transmission, and classification of media objects. Current generations of program-mable mobile devices are endowed with low-cost high-resolution digital cameras and can provide new opportunity for mass deployment in applications that involve the use of imaging in various scientific and engineering endeavors. The range of such applications is widening fast to include commercial, biomedical image analysis for diagnoses, crime and terrorism fighting, military, and industrial use. Video streaming over mobile devices, the use of PDA’s in m-health, transmission of image-based biometrics over mobile networks for crime fighting, and deployment of mobile secure communications in disaster areas are all but a few examples of such applications. The emphasis in many such applications is on securi-ty based efficient tools from cryptography and stego-anography. On the theoretical front, recent advances in compressive sampling provides new efficient tools to process extremely complex biomedical images of very high resolutions as well as deal with objects detection/recognition from low-resolution degraded images in surveillance scenarios. The constrained capabilities of mobile devices, the nature of wireless channels, and the severe degradation in image quality and resolution are a source of tough challenges in image processing and security of multimedia objects. The combination of commercial and security-related topics to be covered in this conference is designed to facilitate multidisciplinary discussions and collabor-ation on the algorithmic and technological issues. In addition, the conference welcomes contributions relating to other real-world applications and theoretical developments in the area of mobile multimedia/ imaging techniques in secure and pervasive comput-ing environments.

Key topics discussed include, but are not limited to:

- multimedia analytics
- multimedia deep learning algorithms and systems
- multimedia processing for mobile devices
- innovative image processing techniques (e.g., enhancement, detection, recognition, restoration, verification, and authentication)
- secure mobile communication
- homeland defense and crime-fighting applications
- biometrics-based authentication for mobile and wireless devices/networks
- security and privacy of image-based identity data
- steganography, steganalysis, and watermarking
- fusion techniques for multimedia analysis
- computing architectures for mobile imaging
- mobile image/video databases
- mobile imaging
- mobile deep learning applications
- content-based video indexing and retrieval
- virtual reality and imaging for navigation
- digital media and mobile forensics
- security, trust, and privacy issues in wireless ad hoc networks
- multimedia authentication, encryption, identification, fingerprinting, and copyright protection
- secure multimedia system design and evaluation benchmarks
- biometric key generation and data hiding in biometrics
- practical systems exhibiting data hiding
- mobile TV technologies
- compressive sensing
- superresolution
CALL FOR PAPERS

Computational Imaging III (SI118)

Conference Chairs: Abhijit Mahalanobis, Lockheed Martin Missiles and Fire Control (USA); Amit Ashok, College of Optical Sciences, The Univ. of Arizona (USA); Lei Tian, Boston Univ. (USA); Jonathan C. Petrucelli, Univ. at Albany (USA)

Program Committee: Oliver Cossairt, Northwestern Univ. (USA); Michael E. Gehm, Duke Univ. (USA); Ulugbek Kamilov, Mitsubishi Electric Research Labs. (USA); Jun Ke, Beijing Institute of Technology (China); Chrystane Preza, The Univ. of Memphis (USA); Adrian Stern, Ben-Gurion Univ. of the Negev (Israel); Andreas Velten, Univ. of Wisconsin-Madison (USA); Laura Waller, Univ. of California, Berkeley (USA); Ge Wang, Rensselaer Polytechnic Institute (USA); Abbie Watnik, U.S. Naval Research Lab. (USA); Zeev Zalevsky, Bar-Ilan Univ. (Israel); Yunhui Zhu, Virginia Polytechnic Institute and State Univ. (USA)

Conventional imaging methods typically strive to obtain an ‘isomorphic’ mapping of the spatial/temporal/polarimetric distribution of an object/scene’s parameters (e.g. irradiance, morphology, temperature distribution, scattering strength, etc.). In order to achieve this objective, a prime goal of optical engineering has been to build ‘perfect’ lenses, mirrors, etc. to get an ideal isomorphic replicate, i.e. an image, of the object/scene of interest. This design philosophy results in many well-known limitations in conventional imaging systems. For example, one has to give up resolution for wide field-of-view in both photography and microscopy; images acquired from the optical instruments tend to be constrained by Nyquist sampling, resulting in huge data size in many applications.

Computational imaging and more generally sensing, is a new optical imaging system design frontier, which emphasizes the tight integration of physical optical design and computational post-measurement processing. This alternate approach to system design originates from the idea that imaging capabilities far beyond conventional imaging can be achieved by jointly designing ‘indirect’ measurement through encoding in the optical domain, and decoding (e.g. ‘reconstruction’) via post-processing. Notable examples include demonstrations of extended depth of field imaging, compressive imagers that recover salient object features with orders of magnitude reduction in data requirement, single-shot hyper-spectral imaging, single-shot 3D imagers, and gigapixel high throughput imagers that achieve high resolution and wide field of view simultaneously.

Computational imaging spans a broad class of applications ranging from fundamental science, biomedical to industrial, defense and security applications. The aim of this conference is to bring together researchers from industry, academia and government that specialize in optical instrumentation, coded imaging designs, inverse problems, and signal processing in a single multidisciplinary forum. With the presentations of the latest developments, this conference is intended to serve as a platform to promote idea exchanges, interdisciplinary collaborations, and technological advancements in this new and exciting field with a focus on its future trends and development, and its implications to industrial, defense and security.

This conference intends to cover, but not limited to, the following topics:

**INSTRUMENTATION DESIGN FOR COMPUTATIONAL IMAGING AND SENSING**
- Compressive and feature specific design
- Coded aperture imaging
- Point spread function and pupil engineering
- Light field and tomographic imaging
- Digital and optical super resolution
- Adaptive optics and phase conjugation
- Phase diversity
- Computational/structured illumination
- Multi-modal and multiplexed imaging
- Multi-dimensional data capture, e.g. 3D, hyperspectral, spatiotemporal
- Multiple aperture systems

**COMPUTATIONAL METHODS IN COMPUTATIONAL IMAGING AND SENSING**
- Sparsity and low rank minimization methods
- Bayesian techniques in image reconstruction
- Machine learning and neural networks
- Phase retrieval
- Pattern matching, feature specific and principle component analysis
- Blind deconvolution
- Super resolution methods
- Multi-dimensional reconstruction, e.g. 3D, hyperspectral, spatiotemporal
- Information exploitation algorithms, such as detection, tracking, etc.

**APPLICATIONS OF COMPUTATIONAL IMAGING AND SENSING**
- Multi-spectral and Hyper-spectral imaging
- High-throughput and high-content disease screening
- Security X-ray, Terahertz, and Millimeter wave imaging
- Surveillance and situation awareness sensing and imaging.
Real-time image and video processing involves algorithmic, hardware, and software aspects of making an image or video processing system to operate in real-time. The focus of the SPIE Real-Time Image and Video Processing conference has been on addressing the real-time aspects of image and video processing. This conference has been providing a field catalyst bringing together scientists and researchers from industry and academia working in real-time image and video processing to present recent research results pertaining to new real-time algorithmic, hardware, and software approaches as well as real-time system designs and applications.

Papers of interest addressing the real-time aspects of image and video processing include, but not limited to, the following:

- real-time image and video processing algorithms
- real-time mobile or embedded image/video processing systems
- real-time image and video processing hardware including ARM, FPGA, DSP, GPU, GPP, ASIC, SoC, and SiP implementations
- real-time software optimizations and related design paradigms
- real-time image and video processing via parallel processing and related computer architectures
- real-time computational photography and 3D applications
- real-time image and video processing for stereo and multi-view camera systems and multi-modal imaging sensor fusion.
- real-time depth acquisition methods for 3D digital imaging and video, e.g. real-time RGB+D (i.e. Kinect-based and time-of-flight imaging) and “all-in-focus” imaging (light field imaging)
- real-time processing in super-resolution microscopy
- real-time issues related to compressed sensing
- real-time image and video compression and coding for storage and broadcasting applications including HDTV, HbbTV; Ultra HDTV; 4K-imaging
- real-time image and video transcoding and streaming technologies for future internet applications and emergent image resolutions and upcoming standards
- real-time image and video processing applications including digital, smartphone, smart cameras
- real-time image and video processing for automatic visual inspection and machine vision
- real-time HDMI image processing
- real-time image and video processing for CCTV applications, intelligent surveillance and security including biometric imaging
- real-time image and video processing for robot vision, autonomous systems, human-machine and machine-machine interaction
- real-time image and video processing for multi-dimensional image analysis, spectral and hyperspectral imaging, and remote sensing
- real-time image and video processing for immersive systems using virtual reality (VR), augmented reality (AR) and mixed reality
- real-time tracking of objects in imaging and video animations for VR, AR and MR systems and applications
- real-time aspects in medical imaging.
Multispectral (MSI) sensors, hyperspectral (HSI), and ultraspectral (USI) imaging spectrometers have become essential tools for a wide range of commercial, civil, homeland security, environmental, atmospheric, and defense applications. Advances in optical fabrication and focal plane sensor technology for the ultraviolet through longwave infrared (0.3 - 14 µm) spectral regions, in combination with high-speed data capture, storage, and retrieval make it feasible and cost effective to conduct remote spectrometry from field, airborne, and spaceborne platforms. Robust algorithms and techniques for mitigating the effects of the atmosphere, characterizing target and background spectral phenomena, extracting useful information from spectral data, and fusion of information from different sensor platforms must keep pace with remote spectral sensor system development.

The objectives of this conference are to demonstrate the utility and advance the capabilities of algorithms and sensors for spectral imagery, to identify meaningful applications, and to provide comprehensive insight into the field of spectral remote sensing. This conference facilitates the exchange of information and new ideas amongst the community of spectral sensor systems developers, automated processing and exploitation systems and algorithm designers, atmospheric phenomenology investigators, spectral data analysts, geospatial researchers, and domain experts in specific commercial, civil, homeland security, environmental, and defense applications.

Papers are solicited on all topics relevant to demonstrating or improving the utility of current as well as planned spectral imaging systems. Thematic session proposals are also welcome.

Subjects of particular interest include, but are not limited to the following areas:

**ALGORITHMS FOR:**
- spectral and spatial feature extraction, categorization, and evaluation
- spectral variability and separability characterization and analysis
- target and anomaly detection, material identification, and quantitative analysis of solids, liquids, and gases
- subpixel spectral analysis and pixel unmixing
- change detection and temporal analysis
- geospatial analysis such as multisensor platform image registration and rectification
- characterization and mitigation of sensor artifacts
- atmospheric compensation and radiometric calibration
- spectro-polarimetry spectroscopy
- compression and transmission of spectral data
- fusion of spectral imagery with other imaging and sensing modalities
- combined analysis (spatial and spectral) of high-spatial resolution, spectral imagery
- analysis of spectral video imagery
- exploitation of spectral imagery using data mining and machine learning techniques.

**DEVELOPMENT OF:**
- spectral sensor and related optical technology for marine, ground, air, and space-based applications
- spectral remote sensing systems in the visible through longwave infrared spectral region
- sensor designs for current and planned airborne and satellite spectral remote sensing systems
- active spectral sensing systems
- spectral phenomenology associated with solid, liquid, gaseous, particulate, composite, and radiological materials
- spectral signature libraries, metadata characterization approaches, field, and laboratory collection quality control and measurement techniques, and description standards for spectral library data
- techniques for physics-based target and background characterization, modeling, and simulation
- data sets, techniques, and approaches for evaluating the performance of spectral data analysis algorithms

CONTINUED NEXT PAGE
• computing systems and real-time systems for spectral data analysis
• multi-modal sensing systems that integrate spectral remote sensing with other sensing modalities (e.g. LiDAR)
• models and mathematical methodologies for the analysis of spectral imagery
• spectral instruments and systems for unmanned airborne platforms.

APPLICATIONS DEMONSTRATING:
• utility of current passive and active spectral sensor systems (e.g. ground, air, and space-based) in areas of homeland security, civilian emergency and disaster response, defense, environmental and climate monitoring, precision agriculture, and municipal development
• utility of current and planned commercial satellite remote sensing systems
• quantitative atmospheric profile measurement and retrieval techniques
• atmospheric characterization and correction techniques
• calibration techniques for remote sensing
• utility of spectral reflectance and BRDF libraries
• sensor fusion
• electronic and optical data processing related to spectral technology
• cartographic use of registered/geo-rectified fused multisensor platform data including DEMs with spectral data
• GIS/vectorization and utilization of information extracted from spectral or fused sensor data
• non-traditional and novel uses of spectral imaging (e.g. biomedical, forensics, art, document, and antique conservation).
This conference is an annual forum for new research on optical/digital pattern recognition and tracking (PRT). It includes algorithm, architecture, and system approaches. Theoretical, simulation, and optical/digital hardware realizations are strongly encouraged. Special emphasis will be given to new advances in distortion-invariant filters for pattern recognition and tracking. Papers on optical/digital filters and systems that perform with real-world non-ideal optical/digital devices are encouraged. Other pattern recognition architectures and approaches besides correlators are also encouraged, which may include optical feature extractors for product inspection, and object identification and tracking. Papers on devices, components, systems, and products developed under the Small Business Innovative Research (SBIR) program are encouraged. We further encourage papers on new techniques to process newer sensor data, such as laser radar and synthetic aperture radar (SAR) inputs.

The tentative sessions and hence the list of topics for which papers are requested include:

- optical/digital pattern recognition and tracking (PRT) systems
- distortion-invariant (and controlled invariance) correlation filters
- correlation filters for clutter and structural noise rejection, and for segmentation/detection
- new techniques to process IR, SAR, laser radar, MMW, etc., sensor data
- optical feature extractors for product inspection and target identification
- optical/digital neural networks
- optical/digital hardware and use of non-ideal real-world devices
- photorefractive elements in OPR systems
- SBIR optical devices, components, systems, and products
- optical/digital as related to homeland security, sensing, and defense
- new recognition and tracking algorithms
- optical/digital biometric recognition
- wide-area surveillance.
Long-Range Imaging III (DS132)

Conference Chair: Eric J. Kelmelis, EM Photonics, Inc. (USA)

Program Committee: Jeremy P. Bos, Michigan Technological Univ. (USA); Chris J. Cormier, Raytheon Co. (USA); Vincent Hamel, L-3 Wescam (Canada); Jony Jiang Liu, U.S. Army Research Lab. (USA); Craig Olson, L-3 Sonoma EO (USA); Kevin Rice, UTC Aerospace Systems (USA); Michael A. Rucci, Air Force Research Lab. (USA)

This conference of related interest is part of Defense + Security co-located at SPIE Defense + Commercial Sensing.

www.spie.org/DScall

Long-Range Imaging is critical to many applications such as surveillance and security, border patrol, search and rescue missions, safety monitoring, test support, and many others. In this conference, we address the technologies required to effectively image over long distances from a diverse set of platforms, including airborne, land, and maritime. Specifically, we will discuss the sensors, systems, image processing techniques, and testing tools being developed to support long-range imaging and their application to real-world situations.

Topics to be addressed include but are not limited to:

**IMAGING HARDWARE**
- EO/IR sensors that support long-range imaging
- camera systems capable of imaging over long distances
- large optics and telescopes
- alternative sensing modalities
- long-range imaging component technologies (stabilization systems, detector arrays/ROICs, flight computers, etc.)
- active imaging systems for long-range applications
- manufacturing technologies that support fabrication of optical elements to support long range imaging systems
- adaptive optics (AO).

**PROCESSING**
- image processing techniques for improving sensor range
- exploitation algorithms for identifying content in imagery
- state-of-the-art imaging sensor stabilization methods
- multisensor exploitation and fusion
- modeling of imaging systems and atmospheric effects
- camera-independent processing.

**APPLICATIONS**
- applications and long-range imaging scenarios
- field tests
- developments in testing and support
- long-range UAS imaging, identification, and tracking.
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Include your paper in one or more of these topical tracks to gain additional exposure and help attendees find applicable presentations. When submitting an abstract, you can choose to be included in one or more of the following areas.

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Unmanned Autonomous Systems Applications

Agricultural and Food Safety/Quality Applications

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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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REVIEW, NOTIFICATION, AND PROGRAM PLACEMENT INFORMATION
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• 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 no later than 11 December 2017.
• Final placement in an oral or poster session is subject to the Chairs’ discretion.

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SC154 Electro-Optical Imaging System Performance
INSTRUCTOR: Gerald Holst

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SC995 Target Detection Algorithms for Hyperspectral Imagery
INSTRUCTOR: Nasser Nasrabadi

“Instructor was extremely knowledgeable regarding the subject matter. Lessons learned from his experience were very useful and relevant. Excellent practical treatise of a complex topic.”

SC1052 Optical Systems Engineering
INSTRUCTOR: Keith Kasunic

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Laura Sharik, SPIE Lead Course Coordinator, lauras@spie.org

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The top eight Aerospace and Defense companies on the Fortune 500 list all have operations—including major manufacturing operations—in or near Orlando. Florida's strengths in homeland security's diverse components—including infotech, photonics, simulation and training, and biotech—makes it a supportive location for companies working with the latest technologies to secure our ports, detect threats, and enhance cybersecurity. The warm, sunny weather makes this another popular destination for attendees to bring their families. (Enterprise Florida)

AREA HIGHLIGHTS INCLUDE:

• Orlando is home to BRIDG the world's first industry-led smart sensor consortium. BRIDG has partnered with Harris Corporation to accelerate breakthroughs necessary to achieve the “International Technology Roadmap for Semiconductors” (ITRS) targets with 3D over the next four years- targets critical for advanced commercial and defense systems.

• Imec, the world leading nanoelectronics research center is establishing imec Florida in Osceola County. This new entity will focus on highly innovative III-V-on-silicon solutions for a broad range of applications including sensors, high-speed electronics and photonics.

• Innovative sensor companies such as Photon-X, Talawah Technologies, Open Photonics, NanoZyme, and more

• Notable defense companies in the region: Northrop Grumman, Lockheed Martin, Boeing, Harris, L3 Technologies, Rockwell Collins, General Dynamics, DRS Technologies

• World-renowned, college-level optics and lasers program (CREOL at UCF)
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**SPIE Commercial + Scientific Sensing and Imaging**
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You can also be included in the following topical track listings. Papers are identified in the program for attendees interested in these topics.

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<tr>
<th>Cyber Physical Systems/IoT</th>
<th>Unmanned Autonomous Systems</th>
<th>Agriculture</th>
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