DEFENSE+ SECURITY
SENSORS, IMAGING, AND OPTICS FOR A SAFER WORLD

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Conferences & Courses
20–24 April 2015

DSS EXPO
21–23 April 2015

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PRESENT YOUR LATEST RESEARCH IN THESE TECHNOLOGY AREAS:
- Imaging and Sensing Technologies
- Infrared Sensors and Systems
- Lasers and Systems
- Radar Sensors
- Display Technologies
- Imagery and Pattern Analysis
- Information System and Networks
- Next-Generation Sensors and Systems
- Sensor Data and Information Exploitation
- Command, Control, Communications & Intelligence (C3I)

PRESENT YOUR RESEARCH ON THE LATEST SENSORS, IMAGING, LASERS, AND OPTICS RESEARCH FOR THESE CRITICAL APPLICATION AREAS:
- Avionics/Aerospace
- Port/Border Protection
- Communications/Networking
- Cyber Sensing/Security
- Mine/Chemical Detection (CBRNE)
- System/Network Integrator/VAR
- UAVs
- Biometrics
- Cyber Sensing/Security
- Instrumentation and Control
- Intelligence, Surveillance, and Reconnaissance

“The quality of research presented at this technology conference was very high and interfaced well with the need to apply technology to research discovery.”

~AUTHOR, comment from DSS14 attendee survey
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We invite you to participate in SPIE Defense + Security 2015, the leading meeting for scientists, researchers and engineers from industry, military, government agencies, and academia throughout the world. For more than 20 years Defense + Security has been one of the largest defense technology meetings worldwide, and it is the key event featuring optics, imaging, and sensing.

One of the strengths of Defense + Security is its central location in the Baltimore Inner Harbor, close to the center of many U.S. Federal Government offices/agencies and many of the largest defense/security contractors and aerospace companies in America. Defense + Security is a prime event for government acquisition, policy, and program executive representatives.

Thank you again for your past participation, and we look forward to an even closer and stronger partnership with you during Defense + Security 2015. We urge you to participate by submitting your abstract, and encourage your colleagues to do the same.

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# Contents

## IR SENSORS AND SYSTEMS

<table>
<thead>
<tr>
<th>DS100</th>
<th>Infrared Technology and Applications XLI</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Andresen/Fulop/Hanson/Norton)</td>
<td>. . . . 6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DS101</th>
<th>Infrared Imaging Systems: Design, Analysis, Modeling, and Testing XXVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Holst/Krapels)</td>
<td>. . . . 8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DS102</th>
<th>Technologies for Synthetic Environments: Hardware-in-the Loop XIX</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Buford/Murrer/Ballard)</td>
<td>. . . . 9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DS103</th>
<th>Window and Dome Technologies and Materials XIV</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Zelinski)</td>
<td>. . . . 10</td>
</tr>
</tbody>
</table>

## DEFENSE, HOMELAND SECURITY, AND LAW ENFORCEMENT

<table>
<thead>
<tr>
<th>DS104</th>
<th>Detection and Sensing of Mines, Explosive Objects, and Obscured Targets XX</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Bishop/Issacs)</td>
<td>. . . . 11</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DS105</th>
<th>Chemical, Biological, Radiological, Nuclear, and Explosives (CBRNE) Sensing XVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Fountain)</td>
<td>. . . . 12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DS106</th>
<th>Sensors, and Command, Control, Communications, and Intelligence (C3I) Technologies for Homeland Security, Defense, and Law Enforcement Applications XIV</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Carapezza)</td>
<td>. . . . 13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DS107</th>
<th>Biometric and Surveillance Technology for Human and Activity Identification XII</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Kakadiaris/Kumar/Scheirer)</td>
<td>. . . . 15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DS108</th>
<th>Cyber Sensing 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Ternovskiy/Chin)</td>
<td>. . . . 16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DS109</th>
<th>Sensing and Sensor Modeling (SSM) in Virtual Reality Environments (VRE) Technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Shirkhodaie)</td>
<td>. . . . 17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DS110</th>
<th>Ocean Sensing and Monitoring VII</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Hou/Arnone)</td>
<td>. . . . 18</td>
</tr>
</tbody>
</table>

## INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE

<table>
<thead>
<tr>
<th>DS111</th>
<th>Airborne Intelligence, Surveillance, Reconnaissance (ISR) Systems and Applications XII</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Henry)</td>
<td>. . . . 20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DS112</th>
<th>Radar Sensor Technology XIX</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Ranney/Doerry)</td>
<td>. . . . 21</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DS113</th>
<th>Passive and Active Millimeter-Wave Imaging XVIII</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Wikner/Luukanen)</td>
<td>. . . . 23</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DS114</th>
<th>Motion Imagery: Standards, Quality, and Interoperability III</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Self)</td>
<td>. . . . 24</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DS115</th>
<th>Ground/Air Multisensor Interoperability, Integration, and Networking for Persistent ISR VI</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Priddy/Pham/Kolodny)</td>
<td>. . . . 25</td>
</tr>
</tbody>
</table>

## LASER SENSORS AND SYSTEMS

<table>
<thead>
<tr>
<th>DS116</th>
<th>Laser Radar Technology and Applications XX</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Turner/Kamerman)</td>
<td>. . . . 26</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DS117</th>
<th>Atmospheric Propagation XII</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Wasiczko/Spillar)</td>
<td>. . . . 27</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DS118</th>
<th>Laser Technology for Defense and Security XI</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Dubinski/Post)</td>
<td>. . . . 28</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DS119</th>
<th>Active and Passive Signatures VI</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Gilbreath/Hawley)</td>
<td>. . . . 29</td>
</tr>
</tbody>
</table>

## NEXT-GENERATION SENSORS AND SYSTEMS

<table>
<thead>
<tr>
<th>DS120</th>
<th>Micro- and Nanotechnology Sensors, Systems, and Applications VII</th>
</tr>
</thead>
<tbody>
<tr>
<td>(George/Dutta/Islam)</td>
<td>. . . . 30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DS121</th>
<th>Unmanned Systems Technology XVII</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Karlsen/Gage/Shoemaker/Gerhart)</td>
<td>. . . . 31</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DS122</th>
<th>Sensors and Systems for Space Applications VIII</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Pham/Chen)</td>
<td>. . . . 32</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DS123</th>
<th>Flexible Electronics II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Quevedo-Lopez/Hagen)</td>
<td>. . . . 33</td>
</tr>
</tbody>
</table>

## DISPLAYS

<table>
<thead>
<tr>
<th>DS124</th>
<th>Head- and Helmet-Mounted Displays XX: Design and Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Marasco/Havig/Browne/Melzer)</td>
<td>. . . . 34</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DS125</th>
<th>Display Technologies and Applications for Defense, Security, and Avionics IX</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Desjardins/Sarma)</td>
<td>. . . . 36</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DS126</th>
<th>Degraded Visual Environments (DVE): Enhanced, Synthetic, and External Vision Solutions (ESXVS) 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Güell/Sanders-Reed)</td>
<td>. . . . 37</td>
</tr>
</tbody>
</table>

## SENSOR DATA AND INFORMATION AND EXPLOITATION

<table>
<thead>
<tr>
<th>DS127</th>
<th>Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspetacl Imagery XXI</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Velez-Reyes/Kruse)</td>
<td>. . . . 39</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DS128</th>
<th>Geospatial Informatics, Fusion, and Motion Video Analytics V</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Pellechia/Palaniapannou/Doucette/Dockstader/Seetharaman)</td>
<td>. . . . 40</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DS129</th>
<th>Signal Processing, Sensor/Information Fusion, and Target Recognition XXIV</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Kadar)</td>
<td>. . . . 42</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DS130</th>
<th>Algorithms for Synthetic Aperture Radar Imagery XXII</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Zelnio/Barber)</td>
<td>. . . . 43</td>
</tr>
</tbody>
</table>

## IMAGERY AND PATTERN ANALYSIS

<table>
<thead>
<tr>
<th>DS131</th>
<th>Automatic Target Recognition XXV</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Sadjadi/Mahalanobis)</td>
<td>. . . . 44</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DS132</th>
<th>Optical Pattern Recognition XXVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Casassent/Alam)</td>
<td>. . . . 46</td>
</tr>
</tbody>
</table>

---

**GREEN PHOTONICS**

Cutting-edge developments in photonics-driven green technologies and applications, such as energy, sustainability, conservation, and environmental monitoring. Watch for this icon next to conferences discussing innovative ways to help our planet.
### INFORMATION SYSTEMS AND NETWORKS: PROCESSING, FUSION, AND KNOWLEDGE GENERATION

<table>
<thead>
<tr>
<th>Conference ID</th>
<th>Title</th>
<th>Authors/Editors</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS131</td>
<td>Modeling and Simulation for Defense Systems and Applications X</td>
<td>(Kelmelis)</td>
</tr>
<tr>
<td>DS132</td>
<td>Open Architecture/Open Business Model Net-Centric Systems and Defense Transformation 2015</td>
<td>(Suresh)</td>
</tr>
<tr>
<td>ST121</td>
<td>Independent Component Analyses, Compressive Sampling, Large Data Analyses (LDA), Neural Net, Biosystems, and Nanoengineering XIII</td>
<td>(Szu)</td>
</tr>
<tr>
<td>ST122</td>
<td>Machine Intelligence and Bio-inspired Computation: Theory and Applications IX</td>
<td>(Blowers)</td>
</tr>
<tr>
<td>ST124</td>
<td>Multisensor, Multisource Information Fusion: Architectures, Algorithms, and Applications 2015</td>
<td>(Braun)</td>
</tr>
<tr>
<td>ST125</td>
<td>Next-Generation Analyst III</td>
<td>(Broome/Hanratty/Hall/LLinas)</td>
</tr>
<tr>
<td>ST126</td>
<td>Quantum Information and Computation XIII</td>
<td>(Donkor/Pirich/Hayduk)</td>
</tr>
<tr>
<td>ST101</td>
<td>Fiber Optic Sensors and Applications XII</td>
<td>(Pickrell/Udd/Du)</td>
</tr>
<tr>
<td>ST103</td>
<td>Next-Generation Spectroscopic Technologies VIII</td>
<td>(Druy/Crocombe)</td>
</tr>
<tr>
<td>ST104</td>
<td>Terahertz Physics, Devices, and Systems IX: Advanced Applications in Industry and Defense</td>
<td>(Anwar/Crowe/Manzur)</td>
</tr>
<tr>
<td>ST106</td>
<td>Spectral Imaging Sensor Technologies: Innovation Driving Advanced Application Capabilities II</td>
<td>(Bannon)</td>
</tr>
<tr>
<td>ST107</td>
<td>Compressive Sensing IV</td>
<td>(Ahmad)</td>
</tr>
<tr>
<td>ST114</td>
<td>Advances in Global Health through Sensing Technologies 2015</td>
<td>(Southern)</td>
</tr>
<tr>
<td>ST115</td>
<td>Sensors for Extreme Harsh Environments II</td>
<td>(Senesky/Dekate)</td>
</tr>
<tr>
<td>ST116</td>
<td>Advanced Photon Counting Techniques IX</td>
<td>(Itzler)</td>
</tr>
<tr>
<td>ST117</td>
<td>Energy Harvesting and Storage: Materials, Devices, and Applications VI</td>
<td>(Dhar/Dutta)</td>
</tr>
</tbody>
</table>

### IMAGING AND SENSING TECHNOLOGIES

<table>
<thead>
<tr>
<th>Conference ID</th>
<th>Title</th>
<th>Authors/Editors</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST102</td>
<td>Fiber Optic Sensors and Applications XII</td>
<td>(Pickrell/Udd/Du)</td>
</tr>
</tbody>
</table>

### Abstracts Due: 6 OCTOBER 2014

Awards Information                                      49
General Information                                     70
Submission of Abstracts                                 71
About SPIE DSS                                           72
DSS Courses/Workshops                                   74
DSS EXPO                                                75
About Baltimore                                         76

---

SPIE DEFENSE + SECURITY IS CO-LOCATED WITH SPIE SENSING TECHNOLOGY + APPLICATIONS.

The Conference Chairs have identified some conferences that may also be of overlapping interest; those conferences are included here for your perusal. The full call for papers for SPIE Sensing Technology + Applications may be found online at [www.spie.org/stacall](http://www.spie.org/stacall).

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Abstracts Due: 6 OCTOBER 2014
Author Notification: 15 DECEMBER 2014
Manuscript Due Date: 23 MARCH 2015

PLEASE NOTE: Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a full-length manuscript for publication in the conference proceedings.
Infrared Technology and Applications XLI (DS100)

Conference Chairs: Bjørn F. Andresen, Consultant, IR Tech. and Appl. (Israel); Gabor F. Fulop, Maxtech International, Inc. (USA); Charles M. Hanson, Texas Instruments Inc. (USA); Paul R. Norton, U.S. Army Night Vision & Electronic Sensors Directorate (USA)

Program Committee: Tayfun Akin, Mikro-Tasarim Ltd. (Turkey); Middle East Technical Univ. (Turkey); Christopher C. Alexay, StingRay Optics, LLC (USA); Jagmohan Bajaj, Teledyne Imaging Sensors (USA); Stefan T. Baur, Raytheon Vision Systems (USA); Philippe F. Bois, Thales Research & Technology (France); Wolfgang A. Cabanski, AIM INFRAROT-MODULE GmbH (Germany); John T. Caulfield, Cyan Systems (USA); Eric M. Costard, SOFRADIR (France); Ronald G. Driggers, St. Johns Optical Systems (USA); Michael T. Eismann, Air Force Research Lab. (USA); Christy Fernandez. Cull, MIT Lincoln Lab. (USA); Mark E. Greiner, L-3 Communications Cincinnati Electronics (USA); Sarath D. Gunapala, Jet Propulsion Lab. (USA); Masafumi Kimata, Ritsumeikan Univ. (Japan); Hee Chul Lee, KAIST (Korea, Republic of); Paul D. LeVan, Air Force Research Lab. (USA); Chuan C. Li, DRS Technologies, Inc. (USA); Kevin C. Liddiard, Electro-optic Sensor Design (Australia); Wei Lu, Shanghai Institute of Technical Physics (China); Tara J. Martin, UTC Aerospace Systems (USA); Paul L. McCarley, Air Force Research Lab. (USA); R. Kennedy McEwen, SELEX ES (United Kingdom); John L. Miller, FLIR Systems, Inc. (USA); A. Fenner Milton, U.S. Army RDECOM CERDEC NVESD (USA); Mario O. Münzberg, Cassidian Optronics GmbH (Germany); Peter W. Norton, BAE Systems (USA); Robert A. Owen, L-3 Communications EOTech. (USA); Joseph G. Pellegrino, U.S. Army Night Vision & Electronic Sensors Directorate (USA); Manijeh Razeghi, Northwestern Univ. (USA); Donald A. Reago Jr., U.S. Army RDECOM CERDEC NVESD (USA); Colin E. Reese, U.S. Army Night Vision & Electronic Sensors Directorate (USA); Sergey V. Riaznev, RICOR-Cryogenic & Vacuum Systems (Israel); Patrick Robert, ULIS (France); Antoni Rogalski, Military Univ. of Technology (Poland); Ingo Rühlich, AIM INFRAROT-MODULE GmbH (Germany); Jas S. Sanghera, U.S. Naval Research Lab. (USA); Piet B. W. Schmering, TNO Defence, Security and Safety (Netherlands); Itay Shtrichman, SDL Semiconductor Devices (Israel); Rengarajan Sudharsanan, Spectrolab, Inc., A Boeing Co. (USA); Stefan P. Svensson, U.S. Army Research Lab. (USA); Venkataraman Swaminathan, U.S. Army Armament Research, Development and Engineering Ctr. (USA); J. Ralph Teague, Georgia Tech Research Institute (USA); Simon Thibault, Univ. Laval (Canada); Meimei Tidrow, U.S. Army Night Vision & Electronic Sensors Directorate (USA); Alexander Veprik, SDL Semiconductor Devices (Israel); Jay N. Vizgaitis, U.S. Army Night Vision & Electronic Sensors Directorate (USA); Michel Vuillermet, SOFRADIR (France); James R. Waterman, U.S. Naval Research Lab. (USA); Lucy Zheng, Institute for Defense Analyses (USA)

Rapid advances are taking place today in infrared technologies. These are enabling the development of more capable sensor systems that are expected to have improved performance with greater reliability, reduced weight, volume, power consumption, and lower cost.

The emphasis in this conference is on the components used in infrared sensor systems. In addition, general-purpose sub-systems and systems are covered. Finally, selected applications will be covered, especially in military and security systems, so as to provide continuity between developers of components and systems.

This conference will bring together researchers and students, as well as developers and users of infrared technologies, to discuss improvements in military and paramilitary sensors brought about by the incorporation of advanced technologies and/or new techniques.

THE KEYNOTE PRESENTATION WILL BE GIVEN BY: Dr. Donald Reago, Director, U.S. Army RDECOM CERDEC Night Vision and Electronic Sensors Directorate

Papers solicited for this conference may address infrared technologies like:

- cooled and uncooled Focal Plane Arrays (FPAs)
- cooled and uncooled single element and linear array detectors
- detector coolers
- monolithic and hybrid detectors
- two- and three-color detectors
- multiband and hyperspectral FPAs
- very large arrays for astronomy and situational awareness
- FPAs for 3D imaging and ranging
- integrated and fused sensors
- FPAs for simultaneous active and passive imaging
- scanning and staring imagers
- single- and multiband IR imaging optics
- optical filters, protective and anti-stray light coatings
- in- and behind-the focal plane signal processing electronics
- ROICs.

and their use in sensors/systems such as:

- thermal imagers and infrared search and track (IRST)
- microsensors
- multispectral and hyperspectral imagers
- image fusion such as combined thermal imaging/low-light-level imaging systems
- sensors for micro air vehicles and UAVs
- threat warning systems
- airborne navigation, piloting, and precision targeting systems
- thermal weapons sights (TWS)
- driver’s vision enhancers (DVE)
- smart munitions
- space-based sensors
- missile seekers
- trackers with and without radiation hardening.

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CALL FOR PAPERS

Sessions being planned for the four day conference:
• cooled FPAs and applications
  - HgCdTe detectors and FPAs
  - InSb and epi-InSb FPAs
  - superlattice, barrier detectors and FPAs
  - high-operating temperature (HOT) detectors
  - QWIP and QDIP FPAs and applications.
• reduced pixel pitch FPAs
• emerging cryocoolers for IR detectors
  - laser cryocoolers
  - thermoelectric cryocoolers
• in-use cryocoolers for IR detectors
• uncooled IRFPAs and applications
• emerging uncooled detector technologies
• IR optics: designs and materials
• optical coatings: AR, protection, filters, stray light control
• on/near FPA smart image and signal processing
• advanced sensors, technologies, and techniques
• Army, Navy, Air Force and Paramilitary infrared R&D
• combined uncooled IR and low-light level integrated sensors
• integrated and fused sensors
• thermal imagers
• development of 3rd generation thermal imagers
• NIR and SWIR imagers and applications
• range-gated imaging and 3D imaging
• IR air- and seaborne, ground- and space-based sensor systems
• IR technologies in security.

THE CHAIRS ARE PLEASED TO ANNOUNCE AN INVITED-PAPER SESSION DEDICATED TO NAVY INFRARED R&D

NOTE 1: Only one paper on a given topic will be accepted from each company/institution.
NOTE 2: Papers should emphasize the technical nature of the topic. Product names and any type of product promotion should be avoided.
NOTE 3: Please address questions and comments concerning the conference to any one or all of the four Chairs:
andresen@netvision.net.il; gfulop@maxtech-intl.com; c-hanson@ti.com; phort@cox.net

IMPORTANT DATES
Abstracts Due:
6 OCTOBER 2014
Author Notification:
15 DECEMBER 2014
Manuscript Due Date:
23 MARCH 2015

PLEASE NOTE: Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a full-length manuscript for publication in the conference proceedings.
Infrared Imaging Systems: Design, Analysis, Modeling, and Testing XXVI (DS101)

Conference Chairs: Gerald C. Holst, JCD Publishing (USA); Keith A. Kruepels, U.S. Army Night Vision & Electronic Sensors Directorate (USA)

Program Committee: Gary H. Ballard, U.S. Army Research, Development and Engineering Command (USA); Gisele Bennett, Georgia Institute of Technology (USA); Piet Bijl, TNO Defence, Security and Safety (Netherlands); James A. Buford Jr., U.S. Army Research, Development and Engineering Command (USA); James A. Dawson, Dynetics, Inc. (USA); Ronald G. Driggers, St. Johns Optical Systems (USA); Richard L. Espinola, U.S. Army Night Vision & Electronic Sensors Directorate (USA); David P. Forrai, L-3 Communications Cincinnati Electronics (USA); Jonathan G. Hixson, U.S. Army Night Vision & Electronic Sensors Directorate (USA); Alan Irwin, Santa Barbara Infrared, Inc. (USA); Eddie L. Jacobs, Univ. of Memphis (USA); Terrence S. Lomheim, The Aerospace Corp. (USA); R. Lee Murrer Jr., Millennium Engineering and Integration Co. (USA); Teresa L. Pace, SenTech, LLC- A DSCI Co. (USA); Hector M. Reyes, Raytheon Co. (USA); Endre Repasi, Fraunhofer-Institut für Optonik, Systemtechnik und Bildauswertung (Germany); Joseph P. Reynolds, U.S. Army Night Vision & Electronic Sensors Directorate (USA); Bernard M. Rosier, ONERA (France); Michael A. Soel, FLIR Systems, Inc. (USA); Curtis M. Webb, Northrop Grumman Electronic Systems (USA)

Sensor technologies are undergoing revolutionary advances. Increases in spatial, spectral, and temporal resolution, and in breadth of spectral coverage, render feasible sensors that function with unprecedented performance. Advances in computational power allow unparalled exploitation of information collected by multicolor sensors, hyperspectral imaging, and multisensors. Existing applications are significantly enhanced and completely new application areas are arising. This has generated a renewed demand for measuring, modeling, and simulating target and background signatures and synthesizing multisensor contrast attributes to a depth of detail not seen before.

Sensor suites (multisensor platforms) are becoming prevalent. The methods used for design, modeling, analysis, and testing are generic to all imaging systems and apply to all sensors within a suite. Papers (listed in the following areas) are solicited for both non-thermal (UV, visible, low light level TV, NIR, SWIR, and mm) as well as thermal imaging systems (MWIR and LWIR).

The potential for smart sensing, robotic platforms, and communication networks has inspired both commercial and military users to look at families of affordable, interactive sensors to enhance situational awareness including surveillance, targeting, seekers, damage assessment, traffic assessment, and environmental monitoring. Platforms for consideration are unmanned ground and air vehicles, munitions, and unattended ground sensors. Topics include:

- smart sensor design
- sensor suites (including sensor interactions)
- sensor suite analysis metrics
- testing metrics.

Varieties of models (e.g., NVThermIP) exist for analyzing advanced infrared imaging systems. New models or upgrades to existing models are necessary as new concepts are developed or existing systems are improved. Emerging technologies include uncooled detectors, quantum well detectors, novel scanning focal plane arrays, as well as image processing algorithms. The advantages of image processing on target detection has not been fully quantified. Topics include:

- modeling of scanning, staring, TDI systems
- imaging trackers and seekers
- image quality metrics of sampled data systems
- image processing models (applicable to target detection and recognition)
- human factors
- display characteristics
- effects of sampling and phasing
- system improvements gained by microscan, superresolution.

Model validation can only be ascertained through accurate and comprehensive testing. Topics include:

- calibration
- measurement techniques
- uncertainty analysis
- test requirements for second generation and uncooled systems
- laboratory-field test correlation.

The sensor suite may contain laser range finders and laser designators. Future applications on unmanned ground and air vehicles will place more importance on integration, alignment, testing and field support of multi-sensor platforms. Topics include:

- multisensor boresight
- laser range finder and designator testing
- low light level TV testing
- development of test metrics for integrated systems
- sensor fusion metrics.

Imaging system optimization requires knowledge of the target signatures, and atmospheric propagation effects. Topics include:

- target and background measurements and characterization
- characterization of backgrounds in other than moderate climates, including the urban environment
- improvements in and validation of target and background models including clutter
- advances in scene simulation/representation models and related technologies
- camouflage, concealment and deception (CC and D)
- target acquisition in benign and cluttered scenes
- broadband atmospheric phenomena (absorption, scattering, and path radiance)
- atmospheric turbulence effects on target acquisition
- comparison of measure and predicted atmospheric transmission.
CALL FOR PAPERS

Technologies for Synthetic Environments: Hardware-in-the-Loop XIX (DS102)

Conference Chairs: James A. Buford Jr., U.S. Army Aviation & Missile Research, Development and Engineering Ctr. (USA); R. Lee Murrer Jr., Millennium Engineering and Integration Co. (USA); Gary H. Ballard, U.S. Army Research, Development, and Engineering Command (USA)

Program Committee: James A. Annos, Naval Air Warfare Ctr. Weapons Div. (USA); Dennis H. Bunfield, The AEgis Technologies Group, Inc. (USA); Raul Fainchtein, Johns Hopkins Univ. Applied Physics Lab. (USA); Kevin Fisher, ACUTRONIC Switzerland Ltd. (Switzerland); Jeffrey P. Gareri, Simulation Technologies, Inc. (USA); Hajin J. Kim, U.S. Army Research, Development and Engineering Command (USA); John M. Lannon Jr., RTI International (USA); Heard S. Lowry, Aerospace Testing Alliance (USA); William M. Lowry, U.S. Army Redstone Technical Test Ctr. (USA); Robert W. Mitchell, Ideal Aerosmith, Inc. (USA); Joseph W. Morris, U.S. Army Aviation and Missile Research, Development and Engineering Ctr. (USA); Ronald J. Rapp, Air Force Research Lab. (USA); Joseph P. Rice, National Institute of Standards and Technology (USA); Donald R. Snyder, Air Force Research Lab. (USA); Florence C. Solomon, U.S. Air Force (USA); Leszek Swierkowski, Defence Science and Technology Organisation (Australia); Mark Umansky, U.S. Army Aviation and Missile Research, Development and Engineering Ctr. (USA); Brian K. Woode, Naval Air Warfare Ctr. Aircraft Div. (USA)

Hardware-in-the-loop (HWIL) facilities continue to play an important role in weapon development programs as a means of reducing risk leading up to flight tests while also reducing the number of flight tests. Smart missiles having imaging sensors (both passive and active), complex signal processing, and a dynamic threat environment, present unique challenges for HWIL ground test facilities. The emergence of multi-mode systems requiring simultaneous stimulation in two or more spectral bands places even greater requirements on these facilities. Many organizations are upgrading their capabilities with dynamic infrared projection systems that are driven with high-fidelity phenomenology modeling codes hosted on real-time rendering computers. Developing, characterizing, and integrating these technologies into a HWIL environment for smart weapons remains an area of intense focus. This conference will address the broad spectrum of HWIL testing of smart weapons with emphasis on the integration of new test technologies and the associated methodologies pertinent to HWIL simulation.

Suggested topics for presentation include:

FACILITIES, TESTBED EXAMPLES/TECHNIQUES

• a special poster session will be conducted that focuses on the future trends and planning of HWIL facilities and testbed examples and techniques. Papers should layout technology needs, ongoing research efforts, and verification/validation of new technologies/techniques. Papers are encouraged to have more of a technical emphasis rather than a top level description.

INFRARED PROJECTORS

• research and characterization efforts of enabling technologies with emphasis on recent advances in plasma display and 2D LED (MWIR & LWIR) devices, high-temperature materials, device architecture, fabrication processes
• characterization of ongoing technologies
• ultimate temperature resolution capability: achieving the 10mK holy grail
• test requirements: spatial sampling, radiometric and temporal fidelity, dual color, cold background, noise resolution, hyperspectral, semi-active laser
• nonuniformity data collection, real-time implementation
• papers discussing projector performance are encouraged to include measurement techniques, analysis examples, and validation techniques.

LADAR SCENE GENERATION AND PROJECTION

• with the growing interest in LADAR sensors we will continue with a dedicated session addressing LADAR simulation requirements, implementation solutions, and research/characterization efforts into the enabling technologies
• papers are solicited to those currently addressing LADAR simulation/stimulation requirements
• ongoing research into phenomenology modeling, digital rendering, and photon generation technologies
• validation with field measurements.

SYSTEM INTEGRATION

• solutions to integrating projector devices with drive electronics, scene rendering computers, calibration systems, and the user
• innovations to addressing emerging requirements (large format arrays, high speed operation, high resolution, etc.)
• managing noise.

FLIGHT MOTION SIMULATION SYSTEMS

• design and implementation of unique flight table configurations
• advancements in gimbal materials, hydraulic actuators, electric motor materials
• current state-of-the-art in flight table design
• advancements in controller design
• meeting higher bandwidth requirements
• challenges of complex target gimbal implementations
• specifying performance for the application.

SCENE GENERATION TECHNOLOGIES

• development/feasibility of low-cost PC scene generators
• user needs, development activities, challenges
• real-time modeling and rendering of synthetic targets/backgrounds: image projection, signal injection
• LADAR hyperspectral, semi-active laser, image generation and presentation for real-time HWIL.

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Window and Dome Technologies and Materials XIV (DS103)

Conference Chair: Brian J. Zelinski, Raytheon Missile Systems (USA)

Program Committee: Joel Askinazi, Goodrich Corp. (USA); Rick Gentilman, Raytheon Integrated Defense Systems (USA); Daniel C. Harris, Naval Air Warfare Ctr. Weapons Div. (USA); Brian K. Jones, U.S. Army Research, Development and Engineering Command (USA); John S. McCloy, Washington State Univ. (USA); Richard Porter, Air Force Research Lab. (USA); Michael E. Thomas, Johns Hopkins Univ. Applied Physics Lab. (USA); Randal W. Tustison, Consultant (USA)

This conference is intended as an international forum for the presentation of advances in design, processing, characterization, and use of optical windows, domes, and related materials technology. It is particularly focused on optical materials intended for operation from the ultraviolet to the infrared. These materials technologies will impact electro-optic (EO) systems and the platforms on which they operate including ground, air, or sea-based systems.

This conference will report on the state-of-the-art of the various optical materials technologies. Papers on the following and related topics are solicited:

- theoretical studies and modeling of materials and optophotonic crystal applications to windows and domes
- modeling of transmittance, surface and bulk scattering, and absorption in window and dome materials
- physically induced phenomenon in optical materials (e.g., dn/dT, fracture, impact resistance, rain and sand erosion, thermal shock, emission, ballistic impact)
- mechanical toughening and strengthening of optical materials
- optical materials for supersonic and/or hypersonic application
- optical materials for window applications including multimode operation
- abrasion and rain erosion protective and related hard coatings
- conductive coatings and structures
- optical filters, frequency selective coatings, and microstructures
- composite, bonded, tiled, or faceted windows and domes
- actively cooled windows and domes
- conformal optics: design, manufacturing, and testing
- deterministic optical finishing methods
- rapid, low-cost optical finishing methods
- fabrication of optical materials for windows and domes
- low-cost optics including polymeric materials
- optical ceramics and glasses of oxides, nitrides, sulfides, and phosphides
- semiconductor optical materials (i.e.; Ge, Si, GaAs, GaP, ZnS, ZnSe)
- diamond and diamond-like material and coatings
- sapphire and polycrystalline alumina
- UV-VS-NIR transmitting materials
- 3-5 µm transmitting materials
- 8-12 µm transmitting materials
- materials characterization and testing
- nanophase and nanocomposite optical materials and processing
- photonic bandgap materials and processing
- optical metamaterials for window and dome applications
- optical materials for high-energy laser applications
- optical materials for solid state laser gain medium
- multifunctional optical materials and structures
- inorganic scintillators
- alkali halide optical elements.
Detection and Sensing of Mines, Explosive Objects, and Obscured Targets XX (DS104)

**Conference Chairs:** Steven S. Bishop, U.S. Army Night Vision & Electronic Sensors Directorate (USA); Jason C. Issacs, Naval Surface Warfare Ctr. Panama City Div. (USA)

**Program Committee:** Benjamin E. Barrowes, U.S. Army Engineer Research and Development Ctr. (USA); Ryan R. Close, U.S. Army Night Vision & Electronics Sensors Directorate (USA); Leslie M. Collins, Duke Univ. (USA); Gerald J. Dobek, Naval Surface Warfare Ctr. Panama City Div. (USA); Anthony A. Faust, Defence Research and Development Canada, Suffield (Canada); Tesfaye G-Michael, Naval Surface Warfare Ctr. Panama City Div. (USA); Gregory Garcia, Naval Surface Warfare Ctr. Panama City Div. (USA); James M. Keller, Univ. of Missouri-Columbia (USA); Aaron LaPointe, U.S. Army Night Vision & Electronic Sensors Directorate (USA); Henric Östmark, Swedish Defence Research Agency (Sweden); Motoyuki Sato, Tohoku Univ. (Japan); Waymond R. Scott Jr., Georgia Institute of Technology (USA); Richard C. Weaver, U.S. Army Night Vision & Electronic Sensors Directorate (USA)

In the terrestrial realm, both hastily scattered and buried minefields and isolated improvised explosive devices can be a major impediment to military operations. For this reason the remote detection of buried explosive objects, surface-laid mines, and minefields is a key to the implementation of new Army warfighting doctrine based on rapid movement. Detection of mines and explosive objects to address the threat of a minefield is that remains active and in place for a very long time, generally outlasting any deep water is also a continuing technical challenge. Additionally, the use of mines as effective defensive weapons and improvised explosive objects and homemade explosives as inexpensive terrorist alternatives have proliferated worldwide during the last decade. As a consequence, the detection of mines, explosive objects, and obscured targets remains an ever important topic, not just because of its military related applications, but also for its humanitarian and environmental impacts. It is relatively easy to lay a minefield or use an explosive device but very dangerous, costly, and time consuming to detect, localize and to clear it. In the humanitarian context, the threat of a minefield is that it remains active and in place for a very long time, generally not lasting any minefield documentation. Improvised devices can cause massive personal trauma and these devices present unique detection challenges.

Unexploded ordnance presents a hazard for military operations and during and after conflicts, as well as a tremendous environmental liability on lands where it is present as the legacy of decades of testing and training. It is very important, therefore, to directly address these issues in a broad forum. The detection of mines/minefields, other explosive objects, ordnance, hazardous waste materials in plastic or metallic containers, and obscured targets like improvised explosive devices, and unexploded ordnance is a challenging problem because of the variability in target shape and size, material, color, and backgrounds and because they can undergo changes once deployed. In general, mine detection is hampered by problems of low detector signal under common environmental conditions. Detection frequency occurs in the presence of significant amounts of both natural and anthropogenic clutter. In order to increase the effectiveness of mine detection it is essential to develop technically superior sensor modalities, better understand environmental effects on sensors, implement innovative uses of sensors, and enhance sensor fusion and data fusion capabilities.

Suggested topics for submissions:

- mine sensor technologies of all kinds (including acoustic, electro-optics, magnetics, active and passive UV to LWIR, GPR, passive mm-wavelength imaging, terahertz technology, nuclear methods (including imaging), multispectral and hyperspectral imaging, polarization imaging, x-ray tomography, seismic imaging, vibrometric lasers and radars) as well as research systems applied to detection of mines, UXO, IED or hazardous objects buried underground or obscured by foliage, atmosphere, ocean water, or buildings
- multispectral and hyperspectral imaging technologies applied to the detection of landmines, UXO and IED, both surface and buried/obscured
- novel biological and chemical approaches to explosives sensing in the context of landmine, UXO and IED detection
- autonomous and unmanned robotic technologies for mine detection, localization, and neutralization
- new and emerging technologies for the detection and identification of minefields, landmines, and IED from airborne platforms
- the effects of dynamic soil processes and environmental conditions on clutter and false alarms as well as on the geophysical signatures of landmines, UXO, and IED
- evaluation tests of geophysical sensors for humanitarian demining
- system applications of technology addressing the detection of buried or underwater minelike targets, ordnance, hazardous waste materials in plastic or metallic containers, and obscured structures of all kinds
- measurement instruments and systems for the acquisition of data for the detection of buried and obscured targets, including ground-based, airborne, shipborne, and underwater systems, and related research investigations
- sensor and target models, and their predictive capabilities and limitations
- multisensor signal processing and fusion techniques
- image and signal processing algorithms and related performance evaluation measures, such as probability of detection and false alarm rate
- results of measurements addressing the detectability of targets that are buried, obscured, or in shallow water or coastal environments using both multispectral and hyperspectral systems, active laser systems, synthetic aperture radar, and other systems such as biological, chemical, and nuclear. robotics
- the effective analysis of the operator as a signal processing component in a detection system, cognitive engineering
- other enhancements to improve detection of surface mines and minefields, especially in areas to improve night operations, increase area coverage rates, and increase standoff distances or operational altitudes
- passive and active detection of primitive tunnels, underground passageways and bunkers, and tunneling activity.

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A greater proliferation through the internet to military and security forces or the localities’ responders from industrialized chemical gases on the battlefield in World War I. Since the introduction of chlorine gas on 21 April 1915 at Ypres, the world has added biological, radiological, nuclear, and most recently explosive (CBRNE) hazards to the list of threats expected by forces, the current and future strategic environment of asymmetric threats.

This conference provides an unprecedented forum for authors from Government, industry, and academia to address a wide variety of CBRNE sensing issues and technologies. Suggested topics for presentation include, but are not limited to:

- novel photonics-based CBRNE detection modalities and materials
- machine learning for detection and identification
- signal processing and data analytics for detection and identification
- sensor array and multichannel signal processing
- modeling and sensing phenomenology
- unmanned and/or autonomous ground or aerial CBRNE detection
- optics-based CBRNE environmental monitoring
- biological surveillance and monitoring, methods and analysis
- point of need diagnostics
- atmospheric transport phenomena for CBRNE releases
- environmental fate and transport of CBRNE materials
- novel decontamination and remediation technologies
- consequence management
- integrated base defense
- micromechanical components/nano-composite materials for CBRNE sensing
- biologically inspired or biomimetic CBRNE sensors
- active/passive detection and identification
- results/status of laboratory testing (live or attenuated agents, simulants)
- results/status of field testing (live or attenuated agents, simulants)
- gamma and neutron detection techniques
- standoff detection of ionizing radiation
- shipping container monitoring techniques.

DEFENSE, HOMELAND SECURITY, AND LAW ENFORCEMENT

Chemical, Biological, Radiological, Nuclear, and Explosives (CBRNE) Sensing XVI (DS105)
CALL FOR PAPERS

Sensors, and Command, Control, Communications, and Intelligence (C3I) Technologies for Homeland Security, Defense, and Law Enforcement Applications XIV (DS106)

Conference Chair: Edward M. Carapezza, EMC Consulting, LLC (USA)
Program Committee: George Cybenko, Thayer School of Engineering at Dartmouth (USA); Panos G. Datskos, Oak Ridge National Lab. (USA); Gregory L. Duckworth, BBN Technologies, A Raytheon Co. (USA); Susan F. Hallowell, Transportation Security Lab. (USA); Dept. of Homeland Security (USA); Todd M. Hintz, Space and Naval Warfare Systems Command (USA); Myron E. Hohil, U.S. Army Armament Research, Development and Engineering Ctr. (USA); Ivan Kadar, Interlink Systems Sciences, Inc. (USA); Pradeep K. Khosla, Univ. of California, San Diego (USA); Daniel Lehrfeld, Blue Marble Group LLC (USA); Tariq Manzur, Naval Undersea Warfare Ctr. (USA); Jordan Wexler, Raytheon Applied Signal Technology, Inc. (USA)

This program will address nine technology focus areas related to advanced unattended and attended sensors and command, control, communication, intelligence, and information technologies. In the aggregate, these technology areas provide the fundamental technologies, tools and systems required for the timely and effective support of homeland security, homeland defense, and law enforcement operations. The papers and presentations should provide a description of the technology and should identify existing and potential linkages between the technology and the system developers, industry and government laboratories, and the community of homeland security, defense, and law enforcement end users. The time critical aspects of the various technologies should be described in these papers with special attention to the availability of the specific technology and, in the case of evidence, to the admissibility of information collected and processed (using this technology) in support of legal proceedings. The long-term potential benefits of these technologies to homeland security, defense, and law enforcement agencies and their respective operational personnel should also be described in the papers and presentations. We therefore seek technical papers from researchers, application system developers, and homeland security, defense and law enforcement users for each of the following technology focus areas.

Please designate on your abstract one of the following TOPICAL AREAS as primary:

INFRASTRUCTURE PROTECTION AND COUNTER TERRORISM SYSTEMS AND TECHNOLOGIES:
unattended and attended sensors and command, control, communication, and intelligence technologies and systems designed for infrastructure protection and counter terrorism applications.

CYBER CRIMES AND CYBERRTERRORISM TECHNOLOGIES AND SYSTEMS:
technologies and systems to detect, acquire, analyze, and model cybercrime related events, hardware and software, including investigative and computer system related forensic techniques, trends and methods.

CONCEALED WEAPONS AND THROUGH-THE-WALL SENSOR TECHNOLOGIES AND SYSTEMS:
detection, classification and tracking of concealed weapons (metallic and non-metallic handguns, knives, etc.), and personnel and objects through walls of different thickness and character including the use of technologies such as passive and active infrared imagers, passive and active millimeter wave, acoustic and x-ray imagers related technologies and systems, including algorithms to process individual and multiple sensor data.

INTELLIGENCE EXPLOITATION SYSTEMS AND TECHNOLOGIES:
speech and image processing, signal intelligence exploitation, correlation and fusion, indications of warning.

INFORMATION SYSTEMS AND TECHNOLOGIES:
interoperability mechanisms for both data and programs to functionally integrate a wide variety of computational resources, which are geographically dispersed but interconnected, information storage and access across and within information systems, multilevel information security to provide access control, authentication, integrity and assured service, user interfaces that provide visualization and natural means of interacting with vast quantities of information.

COMMUNICATION SYSTEMS AND TECHNOLOGIES:
advanced communications associated with field operations, advanced high-speed secure wireless communication for imagery transmission from the field to evidence gathering, high-speed digital transmission links to the field for local, regional and national crime databases and information networks, image-based and multi-media based file systems, affordable encryption systems, software based re-programmable communication systems for multi-agency interoperability, and advanced low profile antennas.

COMMAND AND CONTROL SYSTEMS AND TECHNOLOGIES:
response technologies and systems for natural disasters, major localized events, terrorism related events and civil unrest, techniques for planning, monitoring, and real-time re-planning of operations using artificial intelligence-based planning and scheduling techniques. GIS based systems, applications of planning systems to law enforcement environments, simulation environments for planning and post event analysis, option and decision generation tools, collaborative planning tools, and resource management tools.

(DS106) (continued next page)
COUNTER SNIPER, SMALL PROJECTILE, AND GUNFIRE LOCALIZATION SYSTEMS AND TECHNOLOGIES: fixed and mobile gunfire detection and shooter localization systems, acoustic detection and localization systems, acoustically cued camera detection and localization systems, infrared, radar and laser localization and bullet tracking systems, exploitable signatures from small ballistic projectiles (40 mm and smaller) and gunfire events, forensic analysis of small ballistic projectiles (40 mm and smaller) and gunfire events using detection and localization systems.

NON-LETHAL TECHNOLOGIES AND SYSTEMS: counterpersonnel to deny entry to or occupation of an area or facility; to control or direct crowds or large groups, and to incapacitate individuals or small groups until they can be secured by military or law enforcement personnel; counter-materiel to deny entry or operation of vehicles, vessels, or aircraft while minimizing potential harm to the operators/passengers; counter-capability to disable or neutralize facilities remotely and counter WME to deny the use of weapons of mass destruction.
CALL FOR PAPERS

Biometric and Surveillance Technology for Human and Activity Identification XII (DS107)

Conference Chairs: Ioannis A. Kakadiaris, Univ. of Houston (USA); Ajay Kumar, The Hong Kong Polytechnic Univ. (Hong Kong, China); Walter J. Scheirer, Harvard Univ. (USA).

Program Committee: J. Ross Beveridge, Colorado State Univ. (USA); Terrance E. Boult, Univ. of Colorado at Colorado Springs (USA); Rama Chellappa, Univ. of Maryland, College Park (USA); Bernadette Dorizzi, TELECOM & Management SudParis (France); Julian Fierrez, Univ. Autónoma de Madrid (Spain); Patrick J. Flynn, Univ. of Notre Dame (USA); Brian C. Heffin, Univ. of Colorado at Colorado Springs (USA); Daniel R. Lopresti, Lehigh Univ. (USA); Norman Poh, Univ. of Surrey (United Kingdom); Nalini K. Ratha, IBM Thomas J. Watson Research Ctr. (USA); Anderson Rocha, Univ. Estadual de Campinas (Brazil); Arun A. Ross, Michigan State Univ. (USA); Natalia A. Schmid, West Virginia Univ. (USA); Stephanie Schuckers, Clarkson Univ. (USA); William R. Schwartz, UFMG (Brazil); Shishir Shah, Univ. of Houston (USA); Kar-Ann Toh, Yonsei Univ. (Korea, Republic of); Raymond N. J. Veldhuis, Univ. Twente (Netherlands); Ruigang Yang, Univ. of Kentucky (USA).

FOR CONFERENCE DS107 ONLY

In addition to the abstract that is due by 6 October 2014, prospective authors are REQUIRED to submit, at the same time, a Supplemental File that includes a full paper (minimum of 6 pages including text, figures, and bibliography) to facilitate the review process. Abstract submissions without the required Supplemental File will neither be reviewed nor considered for acceptance. Formatting instructions for the supplemental file may be accessed from www.spie.org/x14101.xml

Biometrics is the science of automated recognition of individuals based on their biological and behavioral characteristics (e.g., fingerprints, iris, face, voice, hand geometry, gait). Automated and reliable identification of humans is one of the most challenging tasks in a number of law enforcement (e.g., criminal investigation), government (e.g., border control), and commercial (e.g., smart home security) applications. With an increased emphasis on next-generation security technologies in all sectors, there is a growing and urgent need to automatically identify humans both locally and remotely on a routine basis. Moreover, the rapidly expanding commercial market for biometrics has opened up new application areas related to photo tagging, mobile payments, gaming and user interface design. Biometrics is a constantly evolving field that engages the research of multiple disciplines including sensor design, pattern recognition, computer vision, image analysis, signal processing, statistics, and computer security. The purpose of this conference is to provide a scientific forum for researchers, engineers, system architects, and designers to report recent advances in this important area of human identification using biometrics. Suggested topics for presentation include, but are not limited to:

- biometric theory
- biometric acquisition and transmission
- biometric modalities
- biometrics and forensics
- biometric system design and evaluation
- biometric security and privacy
- biometric applications
- surveillance
- activity recognition
- voice biometrics.

WHY SHOULD YOU ATTEND THIS CONFERENCE?

- SPIE Exhibition: Interact with the leading-edge technologies vendors
- Keynote Presentations: What are the major research advances in the field? What are the challenges of using current technologies in the field?
- Emerging Frontiers: What is the vision of federal agencies for moving forward in the field?
Cyberspace is a global domain within the information environment consisting of the interdependent networks of information technology infrastructures, including the Internet, telecommunications networks, sensors, computer systems, and embedded processors and controllers. Simply put, if an electronic device produces, emits, or transmits digital information, it is in the cyberspace domain.

It is an operational domain equally important as land, sea, air, and space. Cyberspace interconnects and controls communication networks, transportation infrastructure, international financial transactions, and even public utilities (i.e., a nation’s critical infrastructure). These domains must be defended against malicious attack. With the growing dependence on information systems by the modern world, cyber is thought of as a domain of operations where the entire electromagnetic spectrum is the medium.

Nevertheless, the medium itself is not what is truly important; it is how the operation of information systems is affected which defines what is, and is not, a part of the cyber domain. A basic example is that a “traditional” RF sensor can be considered a cyber sensor if it is being used in such a way as to detect the presence of a wireless network.

As with any domain, the cyber domain requires the environment to be sensed in order to be able to have situational awareness. Cyber sensing seeks to exploit any part of the electromagnetic spectrum in order to provide the information necessary for that situational awareness so the integrity of information assets and the networks that bind them can be better maintained and defended. To achieve this, this conference seeks to discuss the development of novel cyber sensing technologies and cyber sensing methodologies. Technical and scientific papers related to innovative cyber sensing technologies that push beyond the scope of the state of the art in industry are solicited.

Some topic areas include, but are not limited to:

**NOVEL CYBER SENSORS AND CYBER SENSING PARADIGMS**
- cyber-oriented sensing techniques
- collaborative sensor networks
- autonomous sensors and exploitation/data-driven sensing
- cyber attacks-aware sensors/networks
- virtual (software-based) sensors embedded within information systems/networks
- cellular phone detection and/or geolocation
- innovative cyber sensing applications.

**INFORMATION PROCESSING AND ANALYSIS TECHNIQUES**
- cyber domain state estimation
- cyber sensor, including fusion of traditional sensor data for cyber effects
- artificial immune systems
- trusted systems operating in open environment
- Internet of Things: processing and analysis
- Big Data processing detection and sensing.

**CYBER PROTECTION, CLOUD SECURITY**
- access control policy monitoring/enforcement
- dynamic malware/rootkit detection and network defense technologies
- network-based and host-based monitors/intrusion detection systems
- resilient cyber defense agents
- cyber countermeasures, methods to detect and react to compromised cyber resources
- techniques to maintain functionality during degraded performance
- novel measures to ensure trust between cyber resources; identity management
- computation on encrypted data
- fully homomorphic encryption schemes.

**THEORY OF CYBER SENSING AND SECURITY, MATHEMATICAL UNDERSTANDING OF SECURITY**
- emerging method and techniques (graph theory, network topology, complexity theory, experimental game theory, etc.) to model and analyze cyber domain
- model-based detection of behavior anomalies in cyber space
- algorithm-independent performance bounds prediction
- topological data analysis to combine local security information to achieve a coherent global picture
- Game-Semantics: a new paradigm to model correctness of a part, if not whole, of a piece of software
- Lambda calculus
- Turing computational models.

**SOCIAL CYBER SENSING; CYBER SENSING THROUGH SOCIAL MEDIA**
- crowd-sourced sensing and sense-making from human populations (SETI, FoldIt, etc.)
- Web 2.0 exploration and analysis
- social networks and science, education, economy, and politics; controllability of networks, influence and intervention mechanisms
- efficient methods to find social structures in large-scale graphs; finding rumors, botnets, etc.
CALL FOR PAPERS

Sensing and Sensor Modeling (SSM) in Virtual Reality Environments (VRE) Technologies (DS109)

Conference Chair: Amir Shirkhodaie, Tennessee State Univ. (USA)

Virtual reality environment techniques is fastly growing by defense industries for training and utilization of command control. All echelons of department of defense are using VRE techniques for simulation, demonstration, rehearsal, and training of their personnel before and after any mission operation. Furthermore, VRE offers a unique opportunity for visualization and visual analytics related to the human and physical environment landscape. VRE can serve well as a test bed for embedding virtual sensors of different modalities, and extracting sensor data from virtual sensors seamlessly. If VRE modeled properly, a large gap between physical environment sensing and virtual environment sensing is achieved at low-cost and efficiently. The proposed conference brings about a forum of researchers from defense/industry/academia for exchange technical discussions on present and future possibilities of such advance techniques. With achievement of high-speed computing power, this is only a step towards achievement of future holodeck concepts.

The SSM-VRE will pursue the following paper topics including but not-limited to:

MULTI-MODALITY SENSOR MODELING TECHNIQUES IN VRE
• optical/EO/IR/acoustic/seismic/radar virtual sensors modeling
• sensors deployments techniques in VRE
• sensor communication modeling in VRE
• sensor operational techniques
• evolutionary sensing techniques.

SENSORS SIMULATION AND PERSONNEL TRAINING TECHNIQUES
• virtual objects, humans, and avatars modeling techniques
• virtual sensors and terrain modeling techniques
• humans/avatars behavior/impression modeling in VRE
• perceptual and mental models principles for VRE applications
• human factors modeling in VRE
• photorealistic augmented reality modeling techniques
• stereoscopic rendering of VRE
• sensors calibration, interfacing, and deployment schemes
• content-based virtual training techniques
• emerging events technologies.

MAN-MACHINE INTERFACING TECHNIQUES IN VRE
• multimedia-based devices/interfaces in VRE.

VIRTUAL REALITY ENVIRONMENT MODELING TECHNIQUES
• constructive virtual environments techniques
• augmented virtual environments building techniques
• collaborative distributed virtual environments.

VIRTUAL REALITY SENSOR DATA VISUALIZATION AND ANALYTICS TECHNIQUES
VIRTUAL ROBOTICS UGV/UAV/UAS SYSTEMS DEVELOPMENT FOR VRE APPLICATIONS
VIRTUAL ENVIRONMENT COMPUTATIONAL INTELLIGENCE TECHNIQUES
MULTIMODAL AND IMMERSIVE TECHNOLOGIES
VRE SOFTWARE USABILITY AND PERFORMANCE EVALUATION
SSM-VRE APPLICATIONS (defense, manufacturing, entertainment, medical, firefighter, border protection, crime fighting, and future schools/universities)
Ocean Sensing and Monitoring VII (DS133)

Conference Chairs: Wellin W. Hou, U.S. Naval Research Lab. (USA); Robert A. Arnone, Univ. of Southern Mississippi (USA)

Program Committee: Sam Ahmed, The City College of New York (USA); James H. Churnside, National Oceanic and Atmospheric Administration (USA); Richard L. Cruitt, U.S. Naval Research Lab. (USA); Alexander Ignatov, National Oceanic and Atmospheric Administration (USA); Linda J. Mullen, Naval Air Systems Command (USA); Mitchell A. Roffer, Roffer’s Ocean Fishing Forecasting Service, Inc. (USA); Michael Twardowski, WET Labs., Inc. (USA)

Open and coastal oceans are key areas to comprehensive understanding of our planet, from large-scale events such as El Nino, hurricane formation and tracking, to long-term events such as global climate change, to short term weather predictions of both the atmosphere and the ocean. They are also very important in defense and security applications. This conference, attended by researchers from both in situ and remote sensing communities, is in the ocean and lake sensing community to provide better solutions to the overall science, industry, as well as defense and security market by addressing current technology and environmental limitations, system decision, and implementation issues, as well as new technology that may be applied to ocean sensing problems. Specifically, these include topics associated with in situ and remote monitoring of the ocean surface, water column, deep sea, bathymetric and benthic features, impacts on sensor performance and calibration, data assimilation, and forecasting.

Traditional ocean research techniques are widely augmented today with in situ sampling packages on moorings, buoys, floats, flow-through systems, mobile platforms (gliders, AUVs and ROVs), integrated sensor networks, and observatories. These are vibrant research and development areas and generate the most accurate data available, 3D, often in real-time, and are less affected by adverse conditions. However, spot sampling lacks the rapid, broad coverage that is critical in high-level real-time tactical decision making. In situ observations at times are not available for unsafe or denied-access environments. Remote sensing techniques (both active and passive) have been proven to offer synoptic surface coverage with adequate accuracy, when sensors are calibrated and validated correctly. It is essential to establish and maintain precise protocols for deciding the appropriate mix and application of different sensor systems in order to maintain data coherence and comparability. It is important to understand how the ocean environment affects sensor performance, and what techniques are being developed to enhance sensor performance in challenging ocean environments. Further, modern defense and security needs demand that accurate information be provided when and where it is needed. Ocean sensing must provide not only timely and accurate data, but also offer insights regarding overall 3D and future environmental conditions, i.e., forecasting. The combined use of in situ observations, remotely sensed data and physical models is a rapidly evolving field, although improved assimilation of available data into models still poses a challenge. The ability to sense, integrate, and predict is vital in establishing a true real-time 4D cube of verified and validated information for ocean nowcast and forecast. This conference is aimed at bringing together research and technical personnel from industry, governments, and especially academia, to foster cooperation to increase the utility of operational oceanographic assets to address both oceanographic, as well as defense and homeland security concerns.

This conference will benefit from fruitful technical and scientific discussions on these and related topics (esp. focus areas):

IN SITU SENSING AND MONITORING
• advancements in instrumentation
• emerging sensing and monitoring techniques, especially chemical and biological
• sensors and platforms: ship-based, buoys, observatories, moorings, UUV/gliders
• real-time observation systems
• data management
• hydrographic surveys and ocean mapping
• harmful algal blooms (HAB), water quality
• adaptive sampling strategies.

IMAGING SENSORS, SYSTEMS, AND SIGNAL PROCESSING TECHNIQUES
• underwater EO sensors and systems: gated, modulated, scanned, polarized, 3D, stereo, video
• sonar: synthetic aperture, scanning, multibeam, sidescan
• image processing techniques
• imaging through air-sea interface
• effects of particles, turbulence, bubbles, surface and internal waves, salinity and thermal structures.

CHARACTERIZATION AND FORECASTING OF OCEANIC AND COASTAL ENVIRONMENTS
• high-resolution coastal ocean remote sensing (microwave/SAR, optical, IR, passive, active)
• marine optical properties: particles/chlorophyll/CDOM
• marine physics: surface and internal waves, currents, tides, small-scale eddies, and turbulence
• passive and active remote sensing (lidar): systems and algorithms
• benthic and bathymetric properties
• surf zones and shallow water optics
• sediment transport and suspension
• riverine and lake environment characterization
• model and data assimilation
• 3D/4D environmental forecasting, uncertainty assessment
• data integration and visualization.

OCEAN REMOTE SENSING
• active and passive remote sensing of the ocean and atmosphere (visible, IR, SAR)
• inversion techniques for active and passive measurements
• calibration and characterization of satellite sensors
• cloud screening and effect of ambient/residual cloud on retrievals
• Cal/Val, quality control and consistency checks of satellite products, inter-sensor comparisons
• uncertainty evaluation
• radiative transfer in the ocean and atmosphere.
CALL FOR PAPERS

CALIBRATION AND VALIDATION OF PRESENT AND FUTURE REMOTE SENSING SYSTEMS
• site characterization and classification
• protocols
• vicarious methods
• inter-sensor comparison
• uncertainty evaluation
• quality control, data access, management
• cooperative (inter-agency) efforts.

DEEP SEA SENSING AND OPERATIONS
• long range communication
• long range, extended duration sensing
• acoustical, EO and hybrid surveillance
• distributed nodes.

OCEAN DATA MANAGEMENT
• automated systems: buoys, mooring, observatories
• intelligent and adaptive sampling
• automated data collection and processing: plans, algorithms, improvements, results
• system and data calibration, quality control.

OIL DETECTION AND MONITORING/EXTREME EVENTS SENSING AND MONITORING
• detection methods of oil spills from space and in situ
• time series analysis, detection and monitoring from various sensors, instrumentation and platforms
• assessment of extreme and major events: hurricanes, earthquakes, tsunami, flooding, spillway discharge, etc.

EMERGING TECHNOLOGIES AND TOPICS
• renewable energy
• Arctic exploration and sensing
• sub-sea communications
• global warming and homeland security
• climate impacts (hurricanes, long term trends)
• simulation of environments
• policies and education programs.

IMPORTANT DATES
Abstracts Due:
6 OCTOBER 2014
Author Notification:
15 DECEMBER 2014
Manuscript Due Date:
23 MARCH 2015

PLEASE NOTE: Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a full-length manuscript for publication in the conference proceedings.
INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE

Airborne Intelligence, Surveillance, Reconnaissance (ISR) Systems and Applications XII (DS110)

Conference Chair: Daniel J. Henry, Rockwell Collins, Inc. (USA)
Conference Co-Chairs: Davis A. Lange, UTC Aerospace Systems (USA); Dale Linne von Berg, U.S. Naval Research Lab. (USA); S. Danny Rajan, Exelis Inc. (USA); Thomas J. Walls, U.S. Naval Research Lab. (USA); Darrell L. Young, Raytheon Intelligence & Information Systems (USA)

This conference’s goal is to highlight advances in Intelligence, Surveillance, and Reconnaissance (ISR) systems and subsystems technology. Manned and unmanned information collection and exploitation systems for military, civil (homeland security, disaster support/FEMA, renewable natural resources management, law enforcement, etc.), and commercial applications will be addressed. Papers are solicited on the following topics:

• airborne and ground-based intelligence/surveillance/reconnaissance (ISR) systems (tactical, strategic and commercial systems)
• sensor systems: electrooptical, infrared (cooled and uncooled), multispectral imagers (MSI), hyperspectral imagers (HSI), synthetic aperture radar (ISAR/SAR), light detection and ranging (LIDAR/LADAR), LIDAR SAR, polarimetric, wide-area persistent surveillance (WAPS), signals intelligence (SIGINT), etc.
• airborne and ground tasking, collection, processing, exploitation and dissemination systems (TCPED, PED) techniques and developments
• automatic/aided target recognition (ATR) and sensor cueing (e.g. multisensor systems, MSI, HSI, polarimetric, SAR, LIDAR, WAPS etc.)
• systems for surveillance, tracking, feature location, border protection, activity pattern discernment, and suspect apprehension
• image processing (multisensor fusion, image/information compression, tracking, mosaicing, 3D profile extraction, still frame and motion video, etc.)
• UAV platforms (micro to full size; very low to high altitude, MALE and HALE) for ISR applications
• basic and applied research and development applicable to sensors and total sensor system components and developments
• new technologies including optics, sensor pointing systems, thermal management, image stabilization, image processing, wireless communications, GPU and FPGA processing (system miniaturization)
• data manipulation, mining, and multisource report generation
• data links (air-to-air, air-to-ground, SATCOM), networking, bandwidth compression
• autonomous navigational systems/GPS/INS
• FEMA/homeland security applications/requirements
• renewable natural resources management
• forest fire detection/suppression support
• wildlife monitoring, detection, and tracking
• airborne system performance predictions and modeling
• still frame and motion video evaluation/quantification
• image and video archival/retrieval solutions.
Radar Sensor Technology XIX (DS111)

CALL FOR PAPERS

Conference Chairs: Kenneth I. Ranney, U.S. Army Research Lab. (USA); Armin Doerry, Sandia National Labs. (USA)

Program Committee: Fauzia Ahmad, Villanova Univ. (USA); Moeness G. Amin, Villanova Univ. (USA); Joseph C. Deroba, U.S. Army CERDEC Intelligence and Information Warfare Directorate (USA); Mark Govoni, U.S. Army CERDEC Intelligence and Information Warfare Directorate (USA); Majeed Hayat, The Univ. of New Mexico (USA); Chandra Kambhamettu, Univ. of Delaware (USA); Seong-Hwoon Kim, Raytheon Space & Airborne Systems (USA); James L. Kurtz, Univ. of Florida (USA); Changzhi Li, Texas Tech Univ. (USA); Jenshan Lin, Univ. of Florida (USA); Hao Ling, The Univ. of Texas at Austin (USA); David G. Long, Brigham Young Univ. (USA); Jia-Jih Lu, General Atomics Aeronautical Systems, Inc. (USA); Neenal Magotra, Western New England Univ. (USA); Anthony F. Martone, U.S. Army Research Lab. (USA); Gregory J. Mazzaro, The Citadel (USA); George J. Moussally, Mirage Systems (USA); Ram M. Narayanan, The Pennsylvania State Univ. (USA); Lam H. Nguyen, U.S. Army Research Lab. (USA); Hector A. Ochoa, The Univ. of Texas at Tyler (USA); Zhijun G. Qiao, The Univ. of Texas-Pan American (USA); Ann M. Raynal, Sandia National Labs. (USA); Jerry Silvious, U.S. Army Research Lab. (USA); Brian Smith, U.S. Army Armament Research, Development and Engineering Ctr. (USA); Helmut Suess, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); David Tahmoush, U.S. Army Research Lab. (USA); Russell Vela, Air Force Research Lab. (USA); Berenice Verdin, The Univ. of Texas at El Paso (USA); Frank Yakos, SELEX Galileo, Inc. (USA); Yan Zhang, The Univ. of Oklahoma (USA)

The continued advance of basic technologies in areas including components, processing, and enabling tools is facilitating remarkable leaps forward in radar system performance. This includes enabling new modes, more sophisticated processing algorithms, and new applications in defense, homeland security, and commercial arenas. This conference seeks to foster dialog between researchers and developers in the various aspects of radar technology development, including commercial, academic, military, and government sectors. It furthermore seeks to provide a forum to present new developments, including experimental and theoretical results that might be of interest to the larger community.

Papers are solicited in topical areas including the following:

PROGRAMS AND SYSTEMS
- airborne, vehicle-borne, maritime, and space-based radar systems
- operational, experimental, developmental, and demonstration systems
- science missions, radar astronomy
- multi-mission systems, collaborative sensors, EW topics.

APPLICATIONS AND EXPLOITATION TECHNIQUES
- intelligence, surveillance, and reconnaissance (ISR)
- IED detection and defeat, including UXO and mine detection

- foliage penetration (FOPEN) radar, ground penetration (GPEN) radar
- homeland security, law enforcement, border monitoring, tunnel detection, disaster monitoring
- maritime, littoral and coastal applications, arctic applications
- collision avoidance, sense-and-avoid, due-regard, air traffic control, guidance and control
- moving target detection, traffic monitoring, vibrometry, dismount detection, change detection
- meteorological, environmental, and climate monitoring
- high-fidelity mapping, precision navigation, tags and transponders
- polarimetric techniques.

ALGORITHMS AND PROCESSING TECHNIQUES
- imaging radar including real-beam, SAR, and ISAR
- interferometric processing, 3D and tomographic techniques, passive radar
- radar target detection and tracking, space-time adaptive processing (STAP)
- automatic target recognition (ATR), interference mitigation, spectrum engineering
- multisensor integration and aiding, sensor fusion, GPS-denied operation.

COMPONENTS AND TECHNOLOGIES
- navigation systems, instruments, and components for radar
- microwave components, including microwave power amplifiers, DRFM technology
- antennas, including AESA antennas, multi-aperture antennas
- waveform design and generation, radar processors
- metamaterials, double-negative and single-negative materials
- tools and techniques for radar system and circuit design, modeling, fabrication, and performance validation.

PHENOMENOLOGY
- radar scattering from terrain, rain/snow, ice, atmospheric particulates, and sea clutter
- propagation through walls, foliage, ground, other media, including atmospheric effects
- target scattering modeling and measurements from cultural targets and vehicles.

SPECIAL SESSION ON NOISE AND LOW-PROBABILITY OF INTERCEPT (LPI) RADAR
- noise, noise-like, and chaotic waveform generation
- noise radar system architecture and implementation
- LPI, passive, and covert radar sensing technology
- processing techniques for noise radar systems
- applications of noise radar (e.g. MTI, SAR, ATR).

(DS111) (continued next page)
INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE

Radar Sensor Technology XIX (DS111) (continued)

SPECIAL SESSION ON MIMO
- programs, applications, algorithms, techniques, and phenomenology
- collocated and distributed MIMO arrays, adaptive beamforming
- statistical modeling for sensor arrays, MIMO diversity gain
- bistatic, multistatic, and polystatic radar, including use of transmitters of opportunity, netted radar systems
- coherent and non-coherent MIMO systems, MIMO systems and space-time coding
- MIMO radar waveform design, radar ambiguity function, waveform diverse sensors and systems
- MIMO detection and estimation, including direction-of-arrival estimation, and space-time adaptive processing
- multichannel imaging, synthetic aperture techniques.

SPECIAL SESSION ON MEDICAL APPLICATIONS OF RADAR
- biomedical and physiological sensing with radar
- dielectric properties of human and animal tissue
- non-invasive heartbeat and respiration estimation, biometric signature characterization
- tomographic imaging of the human body
- radar as a medical diagnostic tool, dosimetry
- antennas for medical radar applications.

SPECIAL SESSION ON INDOOR/URBAN TARGET DETECTION, LOCALIZATION, AND TRACKING
- interior building sensing using ground-based SAR, Airborne SAR
- indoor stationary and/or moving target detection and classification, sense through the wall radar
- multipath suppression and exploitation.

SPECIAL SESSION ON RADAR MICRO-DOPPLER (JOINT SESSION WITH ACTIVE AND PASSIVE SIGNATURES CONFERENCE)
- techniques, targets, phenomenology, models, and simulations
- bistatic, multistatic, urban, and polystatic micro-Doppler
- micro-Doppler radar and waveform design
- micro-range with micro-Doppler, non-coherent micro-Doppler
- classification, fusion with micro-Doppler
- applications, including military, automotive, medical
- windmills and wind farms.

SPECIAL SESSION ON COMPRESSIVE SENSING FOR RADAR (JOINT SESSION WITH COMPRESSIVE SENSING CONFERENCE)
- theory and practice of CS signal processing (filtering, detection, estimation) for radar systems
- sparse signal recovery algorithms with comparable space- and time- complexity to matched filter-based radar signal processing.
- waveform agility in CS based radar systems
- CS for MIMO radar systems, CS for ultra-wideband radar systems.

SPECIAL SESSION ON NON-LINEAR AND COGNITIVE RADAR
- theory and practice of non-linear and cognitive radar sensing and signal processing (operational bands, hardware implementation issues, high resolution processing, etc.)
- spectrum sensing strategies
- waveform design and adaptation
- detection, tracking, and image formation in non-linear and cognitive systems
- hardware architecture design in non-linear and cognitive systems.
CALL FOR PAPERS

Passive and Active Millimeter-Wave Imaging XVIII (DS112)

Conference Chairs: David A. Wikner, U.S. Army Research Lab. (USA); Arttu R. Luukanen, Asqella Corp. (Finland)

Program Committee: Roger Appleby, Queen’s Univ. Belfast (United Kingdom); Erich N. Grossman, National Institute of Standards and Technology (USA); Christopher A. Martin, Trex Enterprises Corp. (USA); Duncan A. Robertson, Univ. of St. Andrews (United Kingdom); Bruce Wallace, Defense Advanced Research Projects Agency (USA)

The purpose of this conference is to provide a technical forum for the community working to develop technology and applications in the area of millimeter-wave and sub-millimeter-wave imaging, seeking to bring together customers, end users, industry, and academia.

The two driving attributes of this region of the electromagnetic spectrum are that the atmosphere has good transmission under conditions of poor visibility such as cloud, fog, and dust, and that many materials are semi-transparent. These properties open up two core applications: one in poor weather imaging and the other in the security screening of people.

Recent developments in technology and applications that are seen as central to this conference include:

• new sub-millimeter-wave band technology which facilitates the transition to more compact systems, which can be used for security scanning
• innovative device technology and electronic beam forming for affordable millimeter-wave imaging systems
• poor weather imaging for piloting aircraft in fog, cloud, or dust conditions
• millimeter-wave imaging based on novel passive or active illumination architectures.

The conference will include various topics including:

• systems (new applications and phenomenology)
• security scanning systems (active and passive)
• enabling technology (receivers, optical materials, and packaging)
• electronic beam-forming (fundamentals, calibration, technology, and systems)
• image processing and simulation (compressive sensing and modeling).

This conference provides an opportunity for users and technologists to update their knowledge in this growing field. Papers are solicited which address imaging applications and technology in the millimeter and sub-millimeter bands.
Motion Imagery: Standards, Quality, and Interoperability III (DS113)

Conference Chair: Donnie Self, National Geospatial-Intelligence Agency (USA)
Program Committee: Jeffrey Malapit, AMPS Strategies (USA); Gary Nadler, Consultant, Commercial Broadcast Industry (USA); Norman S. Stein, InTec, LLC (USA); Bernie H. Street, WISC Enterprises (USA)

Motion Imagery has experienced exponential growth within DoD, the federal government, and increasingly, within the civil sector. Motion Imagery is delivering critical capabilities today and promises a whole new range of opportunities and challenges for defense, intelligence, law enforcement, and commercial users. Motion imagery standards enable the discovery, access, exchange, exploitation/use, and integration of motion imagery across multiple collectors and user communities. Standards provide the foundation for motion imagery interoperability, quality, and reliability. However, while standards are foundational, implementation and operational processes, procedures, and tools are critical for building, maintaining, and operating a successful motion imagery architecture.

Among other topics, we will examine the evolving standards in defense and civil sectors; trends in metadata and processes/tools for metadata tagging; compression algorithms; geopositioning techniques; motion imagery quality metrics; transport protocols; file wrappers; encoding and decoding; compliance testing and certification; and end-to-end enterprise interoperability.

Suggested topics for presentation include, but are not limited to:
- challenges and opportunities in motion imagery interoperability
- motion imagery standards: state-of-the-art, projected changes, and best practices
- motion imagery standards: issues and opportunities
- motion imagery quality: how to measure it and metrics
- motion imagery quality: how to implement systems to monitor and maintain quality
- cloud based motion imagery dissemination: challenges of quality control and metrics through the “cloud”
- motion Imagery a “commercial” view: commercial image quality and metrics tests: a look at commercially available test equipment and its applications in the defense motion imagery environment
- metadata tagging for motion imagery and other sources
- metadata tagging for multi-source correlation and integration
- motion imagery metadata tagging tools and techniques
- geopositioning methods, techniques, and tools for motion imagery
- motion imagery compression algorithms and best practices
- motion imagery transport protocols, differences, and best practices
- motion imagery time stamping
- standards, processes, and best practices for large volume streaming data (LVSD)
- motion imagery encoding and decoding tools and best practices
- formats for storing and archiving motion imagery: state of the art, the future, and best practices
- motion imagery systems compliance testing: how to get certified, experiences, best practices
- motion imagery interoperability demonstrations: opportunities, benefits, and experiences
- reliability for the motion imagery enterprise: experiences, tools, techniques, and best practices
- next-gen video distribution, IP based: new standards, new considerations, new interoperability, new issues
- network video training: where bits can be lost and where you might find them; an educated operator is part of the challenge.

STUDENT PAPERS ARE WELCOME!
CALL FOR PAPERS

Ground/Air Multisensor Interoperability, Integration, and Networking for Persistent ISR VI (DS114)

Conference Chair: **Kevin L. Priddy**, Air Force Research Lab. (USA)

Conference Co-Chairs: **Tien Pham**, U.S. Army Research Lab. (USA); **Michael A. Kolodny**, U.S. Army Research Lab. (USA)

Program Committee: **Flavio Bergamaschi**, IBM United Kingdom Ltd. (United Kingdom); **Robert Heathcock**, U.S. Defense Intelligence Agency (USA); **Olga Mendoza-Schrock**, Air Force Research Lab. (USA); **Raja Suresh**, General Dynamics Advanced Information Systems (USA); **Robert Williams**, Air Force Research Lab. (USA)

The conference focuses on research and technology for persistent surveillance applications with an emphasis on interoperability of ISR assets. More specifically, the conference will focus on how to integrate and network disparate ISR elements (i) to enable disparate sensor and information sources to be combined, fused and/or discovered autonomously or semi-autonomously; (ii) to provide the users (e.g., analysts) with reliable and actionable information products to conduct persistent surveillance missions; and (iii) to autonomously and/or remotely (re)configure and (re)task ISR assets to adapt to changing conditions and missions.

Topical areas and applications include, but are not limited to the following:

- interoperability for joint operations and coalition warfare
- persistent ISR for current operations
- data-to-decisions
- data and information tasking, collection, processing, exploitation and dissemination (TCPED)
- collaborative information processing and sharing, and decision making among human-based and sensor-based systems
- distributed/decentralized sensor networks and data fusion
- novel ISR sensing for detection, tracking, and classification
- unmanned ISR sensors and systems
- persistent surveillance exercises, demonstrations, and lessons learned.

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PANEL SESSION ON “TECHNOLOGY FOR INTEROPERABILITY OF ISR ASSETS”

including topics on architecture development, wired/wireless interface development, and data and control payload formats.

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SPECIAL AND JOINT SESSIONS

- A special Government session on Interoperability of ISR Assets
- Possible joint sessions with other SPIE DSS conferences such as Multisensor, Multisource Information Fusion: Architectures, Algorithms, and Applications 2015, and Next Generation Analyst
Laser Radar Technology and Applications XX (DS115)

Conference Chairs: Monte D. Turner, Air Force Research Lab. (USA); Gary W. Kamerman, FastMetrix, Inc. (USA)

Program Committee: Philip Gatt, Lockheed Martin Coherent Technologies (USA); Dominique Hamoir, ONERA (France); Richard M. Heinrichs, Defense Advanced Research Projects Agency (USA); Vasyl Molebny, National Taras Shevchenko Univ. of Kyiv (Ukraine); Russell Philbrick, North Carolina State Univ. (USA); Upendra N. Singh, NASA Langley Research Ctr. (USA); Ove K. Steinvall, Swedish Defence Research Agency (Sweden); Douglas G. Youmans, SPARTA Inc./Parsons Corp. (USA)

Laser radar and laser remote sensing methods continue to evolve with the development of the enabling component technologies, advanced systems concepts, integration with new platforms, and innovative employment strategies. Combined with advances in signal processing, data fusion, and visual display, the diversity and sophistication of these capabilities continue to grow in support of a wide range of defense, scientific, and commercial applications. The opportunity for participants in these communities to interact, collaborate, and foster innovation in the development of these ladar systems is central to the success of this field of research and development and is the focus of this conference.

While the development of technology is an important and interesting topic in and of itself, the development of technology is much more effective when considered within the context of the applications of that technology. Furthermore, emerging and difficult defense, security, counter terrorism, and natural disaster and emergency response requirements demand innovative solutions for which laser radar techniques appear to be well suited. These new applications may create additional demands upon the supporting technologies. As a result, this conference will focus not only on laser radar technology, but also on the practical applications of that technology and, in particular, new applications of laser radar technology. Separate sessions in this conference will be devoted to specific application areas. Papers on military, industrial, and commercial applications are solicited.

Papers are solicited in the following areas:

- laser radars for defense applications, target detection, identification, and accurate geolocation
- laser systems remote detection of mines, explosives, and weapons of mass destruction
- design, development, or testing (laboratory or field) of laser radars including laser radar calibration standards, testing standards, and quality assurance procedures
- scanning, scannerless and flash imaging laser radar systems
- autonomous vehicle navigation and control, robotics, and machine vision
- spacecraft docking systems, inspection systems, and sensors for space exploration
- collision avoidance sensors for aircraft and marine vessels
- topographic mapping and bathymetry systems, their testing, calibration, and applications

- foliage and camouflage poke-through 3D laser radar systems and methods
- obscured imaging methods using laser radar to penetrate dust, fog, rain and clouds
- modeling, simulation, verification and validation of laser radar systems performance
- automated target recognition based on laser radar methods
- processing, interpretation, image segmentation, and object recognition or exploitation of 3D data
- atmospheric lidar sensing systems including meteorological applications and atmospheric monitoring (e.g., airport hazard warning, wind-shear detection, tornado detection, wind field mapping, etc.)
- integrated active ladar and passive imaging systems, and passive and active 3D data fusion
- non-contact metrology, multispectral lidar, and laser polarimetry
- vibration and acoustic detection, dynamics and microdynamics measurements via laser vibrometry
- new laser radar materials, novel laser sources enabling new applications and component technology
- advanced laser radar detectors, novel pointing, beam-steering and control technologies
- ladar for autonomous navigation and hazard avoidance for air and ground vehicles (Smart Cities)
- hostile environment applications (e.g., underwater, high radiation, high or low temperatures, etc.)
- medical applications of imaging/sensing methods employing laser systems
- advanced cost-reduction techniques and more effective system architectures
- laser radar techniques used in any new or unconventional applications.
Atmospheric Propagation XII (DS116)

Conference Chairs: Linda M. Wasiczko Thomas, U.S. Naval Research Lab. (USA); Earl J. Spillar, Air Force Research Lab. (USA)

Program Committee: Ammar Al-Habash, Raytheon Space & Airborne Systems (USA); Gary Baker, Lockheed Martin Space Systems Co. (USA); Harris R. Burch Jr., U.S. Naval Research Lab. (USA); Gary G. Gimmestad, Georgia Tech Research Institute (USA); Ken J. Grant, Defence Science and Technology Organisation (Australia); Juan C. Juarez, Johns Hopkins Univ. Applied Physics Lab. (USA); Christopher I. Moore, U.S. Naval Research Lab. (USA); William S. Rabinovich, U.S. Naval Research Lab. (USA); Jonathan H. Saint Clair, The Boeing Co. (USA); David H. Tofsted, U.S. Army Research Lab. (USA); Morio Toyoshima, National Institute of Information and Communications Technology (Japan); Cynthia Y. Young, Univ. of Central Florida (USA)

Atmospheric effects on laser systems are common to many applications. The atmosphere causes both attenuation and random physical effects such as beam spreading, scintillation, and beam wander. These phenomena result in engineering consequences such as power loss, fading, errors in target recognition, and tracking. Boundary layer and complex flows around structures can have a significant effect on line-of-sight free space optical links, lidar and imaging systems.

The objective of this conference is to bring together the laser systems and atmospheric propagation communities to exchange ideas on challenges posed by the atmosphere. Specific DOD and industry applications are of particular interest.

Papers that are theoretical or experimental are solicited in the following areas:

**ABSORPTION AND SCATTERING (DETERMINISTIC EFFECTS)**
- aerosol effects on laser propagation
- optical obscurants (smoke, fog, etc.)
- the statistics and effects of natural clouds on propagation.

**OPTICAL TURBULENCE (RANDOM EFFECTS)**
- models governing optical wave propagation through the atmosphere
- propagation experiments and model validation
- fade statistics
- variation of turbulence with altitude
- turbulence statistics across time and space
- deep turbulence.

**PROPAGATION IN THE MARINE ENVIRONMENT**
- ship to ship and littoral environments
- boundary layer effects
- marine propagation models and validation
- impact of mirages and other maritime phenomena.

**MITIGATING THE ATMOSPHERE**
- diversity techniques: temporal, spatial, wavelength, etc.
- aperture averaging
- adaptive optics
- partial coherence
- photon counting.

**AIRBORNE AND AERO-OPTICAL LAYERS**
- fluid-optic interaction
- experimental measurements of optical aberration of fundamental and complex flows
- scaling laws for aircraft turrets, pods, and domes.
Laser Technology for Defense and Security XI (DS117)

Conference Chairs: Mark Dubinskii, U.S. Army Research Lab. (USA); Stephen G. Post, Missile Defense Agency (USA)

Program Committee: Steven R. Bowman, U.S. Naval Research Lab. (USA); Iyad Dajani, Air Force Research Lab. (USA); Fabio Di Teodoro, The Aerospace Corp. (USA); Anthony M. Johnson, Univ. of Maryland, Baltimore County (USA); Don D. Seeley, High Energy Laser Joint Technology Office (USA)

The development of moderate to high average power solid-state (bulk and fiber) lasers or ultra-high pulse power lasers is a demanding engineering feat, involving critical component technologies based on the latest scientific advances. These laser systems have important emerging DOD applications as well as uses in commercial markets. This conference will focus on moderate to high-power solid-state (bulk and fiber) laser component and device technology to address laser source technology applicable to LIDAR, LADAR, remote chemical detection, IRCM, high-power illuminators, trackers, and laser weapons. These laser systems have many similar challenges yet can be quite different depending on the type of laser, the laser architecture, and the requirements and constraints of the application. Development of the laser engine itself, e.g., solid state laser, or a solid-state/gas hybrid, and the components that go into making a high energy laser are critical for any high energy laser system. All high energy lasers must have an efficient thermal management and very good beam quality, which assumes the use of thermally advanced gain media as well as proper designs. In addition, depending on the particular application, there are many other engineering issues such as efficiency, size and weight, power management, beam propagation, pulse width, repetition rate, wavelength, and spectral brightness to consider. This conference will address the current issues facing moderate to high average power and ultra-high pulse power solid state lasers and introduce future projections for component and system technologies. Also addressed will be advances in the area of laser eye and sensor protection.

The topic areas include, but are not limited to:

- laser performance: modeling and simulation
- beam propagation and phase aberrations involving issues such as resonator design, adaptive optics for wavefront correction, and mode locking
- thermal management: novel means to control heat and minimize its impact on the laser power and beam quality while maximizing overall laser efficiency, including cryogenic cooling of gain medium
- laser scaling to higher energy and power levels and how the laser can be designed to effectively mitigate or take advantage of nonlinear effects, probability of damage to optical elements, and complexity
- power scaling through incoherent beam combining (e.g. spectral multiplexing) as well as passive or active coherent phasing of multiple laser sources
- solid state laser designs such as rod, slab, disk, and fiber lasers as well as gain media advances such as ceramics, gradient-doped ceramics, composite gain elements based on bonding of dissimilar materials, new laser materials with advanced thermal and/or spectroscopic properties
- fiber laser advances in single aperture power or pulsed energy scaling, including fiber lasers operating at eye-safer wavelengths and fiber-based nonlinear generation of UV, visible, and mid-IR wavelengths
- diode laser advances in output power and efficiency, brightness, spectral brightness, and spectral stability; advances in underdeveloped spectral ranges; efficient diode laser fiber coupling
- advanced laser designs and devices such as waveguide-based lasers, ultra-short pulse lasers, hybrid gas/diode lasers (DPALs), scalable optically pumped semiconductor lasers, novel laser materials, including new materials for direct mid-IR generation, and critical optical components for advanced laser development.
CALL FOR PAPERS

Active and Passive Signatures VI (DS118)

Conference Chairs: G. Charmaine Gilbreath, U.S. Naval Research Lab. (USA); Chadwick Todd Hawley, Senior Expert for Signatures (USA)

Program Committee: David W. Allen, National Institute of Standards and Technology (USA); Kelly W. Bennett, U.S. Army Research Lab. (USA); Carlos Omar Font, U.S. Naval Research Lab. (USA); Marco O. Lanzagorta, U.S. Naval Research Lab. (USA); Ram M. Narayanan, The Pennsylvania State Univ. (USA); Frank Pipitone, U.S. Naval Research Lab. (USA); Robert Richardson, U.S. Dept. of Defense Intelligence Information Systems (USA); Carl Salvaggio, Rochester Institute of Technology (USA); Fred Schnarre, National Geospatial-Intelligence Agency (USA); David N. Strafford, Soter Technology (USA)

Signatures are key to detection and identification of events that can be characterized either phenomenological or as a predictable marker or pattern. Essentially, most events have a signature. We are soliciting papers to explore active and passive signatures as they pertain to:

• 3D lidar imaging sensors and signatures
• optical to RF (e.g. Raman, UV to LWIR, terahertz) signatures man-made objects and background materials
• multiple phenomenology signatures of explosives and related materials
• signatures and biometrics
• composite signatures from multiple sensors: methods and algorithms
• signature support to address dispersion of aerosols
• novel and unique applications of signatures
• signatures of life: terrestrial planet signatures, etc.
• signatures of climate change.

We are specifically seeking papers which address signatures from the infrared through the ultraviolet regime, the related sensors, and implications.

AFTER SUBMITTING AN ABSTRACT TO SPIE, please submit a copy to Dr. G. C. Gilbreath at Charmaine.gilbreath@nrl.navy.mil. Papers and presentations at this Conference are Unclassified.

IMPORTANT DATES

Abstracts Due: 6 OCTOBER 2014
Author Notification: 15 DECEMBER 2014
Manuscript Due Date: 23 MARCH 2015

PLEASE NOTE: Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a full-length manuscript for publication in the conference proceedings.
Micro- and Nanotechnology Sensors, Systems, and Applications VII (DS119)

Conference Chairs: Thomas George, Zyomed Corp. (USA); Achyut K. Dutta, Banpil Photonics, Inc. (USA); M. Saif Islam, Univ. of California, Davis (USA)

Program Committee: Roger Appleby, Queen’s Univ. Belfast (United Kingdom); Debyoti Banerjee, Texas A&M Univ. (USA); Richard Conroy, National Institutes of Health (USA); Ertugul Cubukcu, Univ. of Pennsylvania (USA); Akyutlu Dana, Bilkent Univ. (Turkey); Nibir K. Dhar, U.S. Army Night Vision & Electronic Sensors Directorate (USA); Muhammad M. Hussain, King Abdullah Univ. of Science and Technology (Saudi Arabia); Matthew E. L. Jungwirth, Honeywell Defense and Space Electronic Systems (USA); Anupama B. Kaul, National Science Foundation (USA); Christopher M. Kroninger, U.S. Army Research Lab. (USA); Ryan Lu, Space and Naval Warfare Command (USA); Susan M. Maley, U.S. Dept. of Energy (USA); Michael C. McAlpine, Princeton Univ. (USA); Parvaneh Mokarian-Tabari, Univ. College Coeik (Ireland); William D. Nothwang, U.S. Army Research Lab. (USA); Stergios J. Papadakis, Johns Hopkins Univ. Applied Physics Lab., LLC (USA); Michael K. Rafailov, The Reger Group (USA); Bilge Saruhan-Brings, Deutsches Zentrum für Luft- und Raumfahrt (Germany); Antonio Sastre, National Institutes of Health (USA); Noriko Satake, UC Davis Medical Ctr. (USA); Sivalingam Sivananthan, Univ. of Illinois at Chicago (USA); Andre U. Sokolnikov, Visual Solutions and Applications (USA); Kyung-Ah Son, HRL Labs., LLC (USA); Thomas G. Thundat, Univ. of Alberta (Canada); Christopher C. Wilcox, U.S. Naval Research Lab. (USA); Joyce Wong, Schummerger Ltd. (USA), California Institute of Technology (USA); Eui-Hyeok Yang, Stevens Institute of Technology (USA)

This conference has successfully pioneered a unique, “follow the investments” approach of having sessions that are based on MNT research and development programs currently being pursued by various DoD agencies, DOE, NSF, NIH, NASA and commercial companies. An example of such a comprehensive, interdisciplinary program is the Army Research Laboratory’s Micro Autonomous Systems and Technology (MAST) program that is showcased in a joint session with the Unmanned Systems Technology Conference. A tentative list of conference session topics is as follows:

- Two-dimensional nano-layered systems: graphene and beyond
- Flexible, stretchable, transient electronics: what’s next?
- Micro-autonomous systems and technology
- Droplet microfluidics
- Micro and nano-sensors for oil and gas applications
- Micro/nano-sensor systems for power and chemical production applications
- Micro/nano technologies for adaptive optics and beam control
- Peripheral nerve modulation using acoustic/em fields
- Opto-­‐ceuticals: using light to stimulate/modify function and the efficacy of therapies/drugs
- Mm-­‐wave and THz imaging systems for security and standoff weapon-explosive detection
- Laser-­‐based standoff chemical detection
- Tunable and broad-band lasers: quantum-­‐cascade and ultra-­‐fast lasers shaped for defense and security applications.

Papers are solicited on the following and related topics:

- innovative micro-­‐ (MEMS) and nanofabrication, materials, devices and systems
- micro/nanotechnologies for healthcare applications
- MEMS and nanotechnologies for CBRNE detection and mitigation
- nanophotonics
- standoff detection and characterization of chemicals with quantum cascade and ultrafast lasers
- novel micro/nanosensors for harsh environment applications
- nanoscale adaptive response sensors and nanomaterial substrates
- next-­‐generation nanoscale transparent conductors for electronic and optoelectronic devices
- nano-­‐ and microscale materials for photovoltaic and photoelectrochemical energy harvesting.

The scope of the conference ranges from showcasing particular topics in basic research in Micro-­‐ and Nanotechnologies (MNT), to component, subsystem and system level development for defense, security, energy, biomedical, space and commercial applications. This conference intends to bring together scientists and engineers involved in the development and transition of novel MEMS/NEMS and Nanotechnology concepts for various system-­‐level applications. Given the enormous diversity of MNT, we have selected several cutting-­‐edge, application-­‐driven topics relevant to the technology development and system-­‐level transition process. It is anticipated that this conference will foster cross-­‐fertilization across many disciplines with participants being exposed not only to a broad range of scientific and engineering problems associated with the concepts-­‐to-­‐systems technology development pipeline, but also the accompanying programmatic considerations such as development roadmaps at commercial companies and government agencies. Ultimately, at the system-­‐level, we hope to bring attention to the problem of reliability and robust performance of MEMS and Nanotechnology systems.
Unmanned Systems Technology XVII (DS120)


Program Committee: Jonathan A. Bornstein, U.S. Army Research Lab. (USA); Jared Giesbrecht, Defence Research and Development Canada, Suffield (Canada); Frank L. Lewis, The Univ. of Texas at Arlington (USA); Larry H. Matthies, Jet Propulsion Lab. (USA); Camille S. Monnier, Charles River Analytics, Inc. (USA); Paul L. Muench, U.S. Army Tank Automotive Research, Development and Engineering Ctr. (USA); Hoa G. Nguyen, Space and Naval Warfare Systems Ctr. Pacific (USA); James L. Overholt, Air Force Research Lab. (USA); Mike Perschbacher, RovnoTech (USA); Anthony Stentz, Carnegie Mellon Univ. (USA); Gary Witus, Turing Associates, Inc. (USA); Brian M. Yamauchi, iRobot Corp. (USA)

This conference explores research and development for teleoperated, semi-autonomous, and autonomous unmanned vehicle systems (UVS). It examines the technology requirements and operational capabilities of unmanned vehicle programs for air, ground, surface, under water, and planetary exploration applications. Also of interest are issues involved in fielding UVS, including standards and manufacturing. This conference brings together the technologist, developer, and user communities to discuss requirements, challenges, and technical approaches for commercial and military UVS technology. It seeks to provide a balanced perspective on (a) programs and applications, and (b) theory, algorithms, designs, and implementation. It provides a unique opportunity for UVS program managers to present their unique requirements and perspectives on the important technical issues.

This conference also provides the opportunity for hands-on demonstration of robot systems and component technologies. Researchers who would like to demonstrate their robotic vehicles and unique capabilities are strongly encouraged to contact one of the program chairs.

Papers are solicited, but not limited to, the following topic areas:
• autonomy and autonomous vehicles
• biological inspiration
• commercial and civilian applications
• communication and networks
• driver assist, active safety, and other automotive technology
• government programs: technical and performance challenges
• human machine interface
• intelligent behaviors
• manipulation for mobile platforms
• metrics and regulations
• mission execution

• mobility designs and running gear configurations
• path planning and navigation
• payloads and auxiliary functions
• perception and semantic understanding
• power and energy
• sensor fusion and integration
• shared man-machine control
• standards and open architectures
• system performance modeling and simulation
• system performance testing and evaluation
• vehicle mobility and motion control
• world and vehicle modeling.

SPECIAL JOINT SESSIONS WITH OTHER DEFENSE + SECURITY CONFERENCES:
A special session on OA/OBM Systems and DoD Strategies is jointly planned with the Open Architecture/Open Business Model Net-Centric Systems and Defense Transformation conference.
A special session on the Micro-Autonomous Systems and Technology (MAST) Collaborative Technology Alliance (CTA) is jointly planned with the Micro- and Nanotechnology Sensors, Systems, and Applications conference.
The popular appreciation for the effects of space weather, orbital debris, the proliferation of space launch capability within the third world, and the halt of American manned space flight have all increased the demand for contextual understanding for both challenges and possibilities for the future of space. Developments in microsat and picosat systems, coupled with more affordable launch services such as the pioneering Space X enterprise, may vastly transform space architectures for navigation, surveillance, communications, and other missions. The success of the recent launches of missile defense tracking and surveillance systems along with the launch of advanced missile warning sensors are closely shadowed by anti-satellite missile tests, the shoot down of an errant satellite, a catastrophic collision between two space vehicles. In addition, radio interference is a growing concern for all space communication users, including private, commercial, and Government. Greater understanding of sources of radio interference, impacts of radio interference on civil and military communication systems, and assessment of mitigation strategies are therefore in need. Last but not least, as for cyberization of space systems, cyber-attacks become a critical threat to space systems. All these events raise concern over: i) space situational awareness and defense space control capabilities to characterize and mitigate orbital debris and co-orbital anti-satellite threats, ii) electromagnetic wave interference to characterize, predict, and mitigate its effects on both civil and military satellite communication systems, and iii) methodologies for spacecraft cyber defense-in-depth to enable spacecraft mission assurance in contested cyber environments

This conference captures the unique military interests in space and provides a forum for cross-fertilization between international civil space, military space, and the intelligence community.

Papers are solicited on the following and related topics:

- radiation hardening and space weather effects mitigation
- sensor contamination detection, abatement, and effects
- modeling and simulation of space-based systems
- dual-use civil-military sensors and systems
- advanced missile warning under all-weather conditions
- position, navigation and timing in GPS-denied environments
- dynamic data cluttering and multi-object estimation for unknown backgrounds and dim-lighted space resident objects
- resilient space architectures/decision support tools against counterspace aggression
- vulnerability and protection of commercial and military communications satellites toward RF interferences and personal mobile telecommunications
- radio interference detection and prediction for satellite communications and operations, and
- cyber-secure architectures, decision support systems, and information processing for future spacecraft mission assurance.
Flexible Electronics II (DS134)

Conference Chairs: Manuel A. Quevedo-Lopez, The Univ. of Texas at Dallas (USA); Joshua A. Hagen, Air Force Research Lab. (USA)

Flexible electronics holds significant promise for civil, defense and security applications. The field includes electronic, electro-optic and sensor devices integrated with traditional transistor and thin-film transistor devices fabricated on flexible substrates. Promising near-term applications include large-area sensing arrays, smart medical bandages, displays, wearable devices and electronic textiles, particularly when combined with external COTS components for systems requiring high-speed computation. The objective of this conference is to bring together experts in flexible electronics technology working in commercial and defense applications. The resulting discussion should illuminate the principal technical challenges and approaches for dual-use in commercial and defense applications. Papers are solicited in but not limited to the following areas:

DEFENSE AND SECURITY NEEDS FOR FLEXIBLE ELECTRONICS
- sensing arrays
- smart medical bandages
- electronic textiles
- wearable devices and sensors
- prognostics
- power sheets and batteries
- displays
- antennas.

LARGE AREA, FLEXIBLE SENSING ARRAYS
- visible, x-ray, and IR imaging arrays
- neutron, gamma ray, and charged particle radiation detection
- acoustic and ultrasound detection/transmission arrays
- pressure mats
- fingerprint detection
- electromagnetic detection blankets.

FLEXIBLE ELECTRONICS TECHNOLOGIES
- organic and inorganic photovoltaics
- organic light emitting materials and diodes
- mixed oxide thin film transistors (TFT)
- amorphous silicon TFTs
- organic TFTs
- poly-silicon TFTs
- thin film CMOS processes
- ultra-thin chip packages
- thin film diodes and MEMs
- energy conversion layers
- stretchable circuits and substrates
- implantable and biocompatible devices
- graphene and carbon nanotube (CNT) devices.

CALL FOR PAPERS

SUBMIT YOUR WORK BY 6 OCTOBER

Present and publish your latest research for a worldwide audience of scientists, engineers, product developers, and decision makers.
This will be the twentieth year of the Head- and Helmet-Mounted Displays conference. Interest in head- and helmet-mounted display (HMD) technology continues to grow as new uses evolve rapidly. HMD applications are expanding into commercial, industrial, and academic environments, as well as medical, educational, and entertainment applications as a core technology for vision enhancement and visual augmentation systems such as augmented reality. The future of HMDs lies in these application areas and is limited only by our imagination and creativity.

In parallel, military programs continue to pursue the development of HMDs as well as investigating visual and human factors issues associated with displayed information. Advanced military HMDs for airborne (fixed and rotary wing) and ground-based applications (soldier, combat vehicle, and simulator applications) are also being developed internationally as HMDs have become essential equipment to future combat information systems.

Due to the nature of HMDs, space, weight, and power consumption are critical system characteristics that must be balanced against imaging performance and may limit system utility and acceptance. The development of smaller, light-weight, high-performance components (displays, optics, and electronics) in response to requirements continues and is dramatically lowering system head-supported weight, system power, and packaging size. Not to be forgotten are the human interface issues for this unique technology. As we expand the applications, we must keep in mind visual, ergonomic and anthropometric issues.

This conference will focus on advancements in the general field of HMD design and use, including technological advancement in core components as well as the design, testing, and specifications. We are keenly interested in research papers that push the current boundaries of HMD technology and welcome papers ranging from basic research and component technology to fully implemented, fielded systems.

The conference will examine new, dual-use application in fields such as maintenance, training, medical imaging, and entertainment. Greater emphasis will be placed on virtual and augmented reality applications (both civilian and military) in this year’s conference. We seek papers that address all aspects of virtual and augmented reality with respect to HMD development, especially novel research ideas and applications in the consumer market, and research covering human factors issues relating to these new applications.

Papers are sought for a joint session with conference Defense and Security, Display Technologies and Applications for Defense, Security, and Aviation. Component technologies such as micro-displays, light modulation strategies, and micro projector technology are desired. However, other concepts relevant to both vehicle-mounted and body-mounted display strategies will be considered.

Papers are also sought for a joint session with conference Defense and Security, Degraded Visual Environments (DVE): Enhanced, Synthetic, and External Vision Solutions.

Related technologies such as body-mounted sensing for vision augmentation, image fusion, head and eye trackers, and head-mounted sensors will be represented. The global nature of HMD technology development means that wide participation is an essential element of this conference. Papers are sought from international researchers to enhance the broad base of HMD experiences presented.

We are considering ways to better allow demonstration of equipment, including a special session separate from the DSS exhibition. Authors are encouraged to inform the committee of their desire to participate and contribute to such a demonstration when the abstract is submitted.

Papers are solicited in the following and related areas:

**HMD DEVELOPMENT AND OPERATIONAL USES**

- operational applications for HMDs: military, homeland security, law enforcement, maintenance, medicine, virtual and augmented reality, entertainment, training, education, and other fields
- applications and requirements from the commercial market
- lessons learned for operational HMD systems
- advances in head-mounted camera systems and body-mounted sensing technology
- advances in image fusion or other visual sensory enhancement techniques
- HMD flight/field and laboratory performance testing
- system integration
- helmet system anthropometry, ergonomics, and manufacturing
- simulation and mission rehearsal
- HMD technology for virtual and augmented reality
- critiques of current specifications for HMD technology
- future applications of head-mountable sensors
- display symbology and imagery considerations to enhance ease of use
- HMD technologies relevant to vision enhancement in degraded environments are sought for a joint session with Degraded Visual Environments (DVE): Enhanced, Synthetic, and External Vision Solutions.

**HMD HUMAN FACTORS RESEARCH**

- advances in the understanding of human visual perception and performance
- HMD performance in a dynamic environment, including examinations of awareness, physical limitations, and operational performance
- database development for HMD symbols and information
CALL FOR PAPERS

- research on the application of color to HMD symbology
- symbology design criteria for ongoing or anticipated vehicle development programs
- proposed standards for HMD technology
- effect of degraded environment on displayed information
- advances in the presentation of information on HMDs including novel symbology
- human informational requirements and display formatting.

SYSTEM COMPONENTS
- image source technologies: LCD, OLED, LCOS, DMD, and other light modulation approaches
- optical systems for HMDs, including waveguide and diffractive technologies
- advances in optical design: binary, holographic, aspheric lens surfaces, free-form prisms, and others
- advances in eye- and head-tracker technologies
- image/information fusion electronics
- wearable component technology.

Special emphasis will be placed on university research in general, and student conceived and executed research in particular. As an incentive, a non-monetary award for the best student paper will be given.

HISTORICAL PERSPECTIVES
Contributions chronicling system and component development as well as lessons learned over the last 20 years in HMD technology. The conference committee is interested in receiving papers that provide a retrospect of 20 years of research and development at government labs, academia or private industry.
Display Technologies and Applications for Defense, Security, and Avionics IX (DS123)

Conference Chairs: Daniel D. DesJardins, Consultant (USA); Kalluri R. Sarma, Honeywell Technology (USA)

Program Committee: Masoud Ali, Barco, Inc. (USA); Hari M. Atkuri, BEAM Engineering for Advance Measurements Co. (USA); Philip J. Bos, Kent State Univ. (USA); Alexander A. Cameron, BAE Systems (United Kingdom); Reginald Daniels, Air Force Research Lab. (USA); Gary W. Jones, NanoQuantum Sciences, Inc. (USA); Charles J. Lloyd, Visual Performance, LLC (USA); John P. McIntire, Air Force Research Lab. (USA); Joe Tchon, Rockwell Collins, Inc. (USA); Paul L. Wisely, Holoeye Systems (USA)

This conference addresses displays of all kinds, to include visual, auditory, and haptic devices used to implement human-to-system and sensor interfaces. Display applications encompass all land, sea, air, and space civil and military platforms, including simulators, plus body-worn and man-portable systems where the human serves as platform. User groups include warfighters, special operations personnel, command/control/surveillance, and unmanned vehicle controllers. The emphasis is on display systems delivered to the field, future systems, and emerging science and technology associated with displays. In addition to the technologic aspects, this conference is also concerned with the human factors issues associated with efficient display use.

Our conference objective is to bring together engineers, researchers, managers, warfighters, and technologists in all display related disciplines serving security and defense applications, thereby providing a forum for sharing display technology and application needs, ideas, concepts, and knowledge. We are vitally interested in current or future displays and enabling technology addressing demanding requirements such as low-power, low-cost, high-luminance, high-resolution, high-reliability, and survivability to shock, vibration and temperature. We are also interested in affordable information interfaces for displays, including digital video interfaces and image processing to enhance display human interface qualities. Applications for these information interfaces may include pilot/co-pilot flight-instrumentation displays, mission crew workstations, vehicle, and man-portable displays.

The DSS 2014 attendee survey revealed a particular interest in topics such as wearable displays, visual detection of buried explosive hazards, tunable lasers in visible wavelengths, 3D manufacturing, cameras having ranging capability that are also reversible to project 3D images, optic fibers and associated technologies, optical and active imaging. We encourage and welcome papers in these particular areas.

Papers are solicited, but not limited to, the following topics:
- national defense display systems and technologies
- homeland security display systems and technologies
- vehicle and crew-station display applications and supporting technologies
- integrated systems that merge displays

with other functions including computing, communication and/or sensing
- human factors issues associated with display/ operator interfaces
- avionics displays for military, commercial, general aviation, derigibles and space vehicles
- vetrionics displays for tanks, trucks, automobiles, and other ground vehicles
- shipboard displays for surface, underwater and amphibious vessels
- wearable information systems, including flexible displays, wireless data and battery technologies
- body-mounted, hand-held or weapon-mounted displays
- integration of advanced displays into existing military platforms
- non-visual human interfaces (haptic, auditory, olfactory)
- 3D, novel, and smart display devices
- display symbology and associated graphics generation processors
- display sub-systems, components and supporting technologies
- display electronics, optics, and organic/inorganic chemical research
- projection displays for training simulation and other applications
- affordability and commonality issues at both acquisition and design levels
- future display technologies, e.g., flexible glass substrates, barrier coatings, smart chips, transparent conductors, improved row/column drivers, electro-optic imaging elements, etc.

For the 2015 conference, we are anticipating a joint session with the Head- and Helmet-Mounted Displays Conference. We therefore seek papers in micro-display and micro-projector technology which can be included in this joint session to the benefit of both display communities.

BEST PAPER AWARD

Each year, a “Best Paper” award is given based on originality, depth of research, significance of findings and/or historical interest. The award is based primarily on the oral presentation and is a joint decision stemming from input by conference committee members and chairs. The winner is determined shortly after the meeting, and notified by the chairs.

The 2014 Best Paper Winner
Presented to Joseph L. Tchon, Tracy J. Barnidge, Bruce D. Hofnagle, Birenda Bahadur, Rockwell Collins Inc. (USA)

For their presentation at SPIE Defense + Security Symposium 2014
Current state of OLED technology relative to military avionics requirements [9086-15]
Enhanced, Synthetic, and External Vision Solutions (ESXVS) 2015 (DS124)

Papers are sought on all aspects of degraded visual environments, enhanced vision, synthetic vision, external vision, and combinations thereof, from physical sensing capabilities, algorithmic techniques, and system descriptions, to human factors studies and flight test results. Of particular interest are papers on the fundamental components and subsystems: weather and obscurant-penetrating imagers, image enhancement, multispectral image fusion, precision navigation solutions, terrain database and rendering techniques, 3D graphics processing techniques, GPU acceleration, 3D pathway guidance, novel display formats, lidar/ladar visualization, and 360° viewing. Also welcome are applications to manned or unmanned autonomous vehicles, aircraft approach, landing and ground operations (ownship awareness, maneuvers, and proximity to obstacles), required navigation performance (RNP), minimum operating performance standards (MOPS), search and rescue, firefighting, military, and homeland defense. Papers describing methodology, analysis, studies, and results leading to specific operational requirements (e.g. obscurant densities, required field of regard, and required object detection as a function of range) for various scenarios and applications are welcome. Discussions of architectural issues, including how to integrate multiple sensors, databases, and other onboard or off-board data, and processing systems for degraded visual environment situational awareness, issues related to integration into new and/or existing systems, and dual or multi-use sensors are also of interest. Background information and related topics are provided below.

Operations in degraded visual environments (DVE) have long been a serious safety issue for all forms of vehicles from fixed and rotary wing aircraft to ground vehicles and maritime vessels. Although typically referred to as brownout or whiteout, DVE includes all forms of poor to zero visibility where pilots/operators may lose their sense of location or orientation. These conditions include nighttime, adverse meteorological conditions of fog, mist, rain, snow, storm clouds, and obscurant clouds like dust, silt, sand, sea spray, smoke, fire, chemicals, etc. Even reduced field of view, or in the extreme, windowless cockpits can be considered a form of DVE. As the visual environment degrades, the comfort of natural visual cues is quickly replaced with cumbersome situational awareness (SA) interpretation from instrumentation and display formats, increasing pilot workload and decreasing safety margins. In some cases, DVE may be avoided through judicious operational modifications such as delayed departure or preferred trajectory selection. However there are many cases in which DVE simply cannot be avoided, as in search and rescue operations, first-in capabilities, and sustainment of humanitarian or combat operations. Enhanced, synthetic, and external vision (ESXV) systems provide the pilot with natural visual cues lost due to DVE, and in many cases provide salient SA information beyond what is seen by the naked eye. ESXV systems leverage DVE-penetrating imaging sensors, terrain elevation data, vehicle navigation states, off board data links, and many other sources to present some form of derived imagery on head-down, head-up, or head-worn displays. Platform-specific performance and mission parameters tend to dictate specific sensing, database, and display requirements, whereas the underlying algorithms and systems that derive the resulting imagery are very similar, providing an excellent opportunity for research and collaboration. The various combinations of ESXV sensing, databases, algorithms, and display systems are typically expressed as three fundamental components: enhanced vision, synthetic vision, and external vision. “Enhanced vision (EV)” refers to SA derived primarily from imaging sensors such as low-light CCD, infrared, and millimeter-wave (MMW), where the resulting imagery enhances the natural view. “Synthetic vision (SV)” typically consists of 2D orthographic or 3D perspective views that synthesize imagery of terrain elevation (either from databases or updated in real-time using sensors such as MMW radar or 3D lidar) and obstacle data, time-critical pathway guidance (4D), local traffic indicators, vehicle state overlays, etc. “External vision (XV)” applies when the navigator is afforded no natural view windows, where SA must be derived solely from a combination of imaging sensors and SV sources, regardless of environmental conditions.

Additional topics of interest:

**DVE OPERATIONS**
- operational surveys, studies, and trials
- flight qualification and certification issues
- operations through DVE weather, smoke, obscurant
- windowless cockpits
- runway and taxiway following
- runway incursions, collision avoidance
- automated landing systems
- development of DVE system requirements

**DVE-PENETRATING SENSORS AND SYSTEMS**
- enhanced, low-light CCD
- long-wave, mid-wave, and short-wave infrared
- active millimeter-wave radar
- passive millimeter-wave imaging
- Terahertz imaging for obscurant penetration
- obscurant penetrating 3D lidar
- night vision, color night vision
- weather radar exploitation
- sensor operation and control
- dual or multi-use sensors

(CS124) (continued next page)
Degraded Visual Environments (DVE): Enhanced, Synthetic, and External Vision Solutions (ESXVS) 2015 (DS124) (continued)

- sensor, weather, and environmental effect simulation
- airport surface characterization at low-grazing angles (MMW effects).

**EV, SV, XV ALGORITHMS AND CAPABILITIES**
- image enhancement, registration, exploitation
- multispectral image fusion, feature extraction, obstacle and wire detection
- dangerous weather identification (microburst, wind shear, etc.)
- airport, runway, and taxiway feature matching
- world-conformal display alignment methods
- system latencies, refresh rates
- terrain and obstacle database management, including sensor driven real-time updating
- database acquisition, generation, verification, certification, formats
- efficient rendering techniques for terrain and high volume ladar/lidar data
- embedded graphics systems, multicore GPU algorithm acceleration.

**ESXV DISPLAY SYSTEMS AND PRESENTATION FORMATS**
- head-up, head-down, head-worn display formats
- 360° viewing, picture-in-picture windows
- photo-realistic display, 3D stereo display formats
- dynamic perspective flight guidance, 4D pathway, highway in the sky
- flight-management and planning systems integration
- electronic Flight Bag integration
- information management, integration, and presentation.
Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery XXI (DS125)

Conference Chairs: Miguel Velez-Reyes, The Univ. of Texas at El Paso (USA); Fred A. Kruse, Naval Postgraduate School (USA)

Program Committee: Eustace L. Dereniak, College of Optical Sciences, The Univ. of Arizona (USA); Michael T. Eissmann, Air Force Research Lab. (USA); Glenn E. Healey, Univ. of California, Irvine (USA); Jacqueline J. Le Moigne, NASA Goddard Space Flight Ctr. (USA); David W. Messinger, Rochester Institute of Technology (USA); Dalton S. Rosario, U.S. Army Research Lab. (USA); Alan P. Schaum, U.S. Naval Research Lab. (USA); James Theliger, Los Alamos National Lab. (USA); Grady Tuell, Georgia Tech Research Institute (USA)

Multispectral (MSI) sensors, hyperpectral (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, practical, 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, sensors, and applications for multispectral, hyper-spectral, and ultraspectral imagery 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 developers, atmospheric phenomenology researchers, spectral data analysts, geospatial researchers, and developers of specific commercial, civil, homeland security, environmental, and defense MSI, HSI and USI 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
- 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 removal of sensor artifacts
- atmospheric compensation and radiometric calibration
- spectro-polarimetry and gamma-ray spectroscopy
- compression and dissemination of spectral data
- fusion of spectral imagery with other imaging and sensing modalities
- combined analysis of high spatial resolution, MSI, HSI, and USI imagery
- analysis of MSI, HSI and USI video imagery.

DEVELOPMENT OF:
- MSI, HSI, and USI sensor and optical related technology for marine, ground, air, and space-based applications
- MSI, HSI, and USI thermal remote sensing systems
- sensor designs for current and planned airborne and satellite spectral remote sensing systems
- spectral phenomenology understanding 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 and approaches for automated processing and exploitation of spectral 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
- computing systems for spectral data analysis
- multimodal sensing systems that integrate spectral remote sensing with other sensing modalities (e.g. lidar).

APPLICATIONS DEMONSTRATING:
- utility of current MSI, HSI, and USI sensor systems (e.g. ground, air, and space-based) in areas of homeland security, civil and disaster response, defense, environmental and climate monitoring, 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 and materials 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.
Geospatial Informatics, Fusion, and Motion Video Analytics V (DS126)

Conference Chairs: Matthew F. Pellechla, Exelis, Inc. (USA); Kannappan Palaniappan, Univ. of Missouri-Columbia (USA); Peter J. Doucette, Integrity Applications, Inc. (USA); Sheila C. Dockstader, Exelis, Inc. (USA); Gunasekaran Seetharaman, Air Force Research Lab. (USA)

Program Committee: John A. Berger, Toyon Research Corp. (USA); Erik P. Blasch, Air Force Research Lab. (Canada); Bernard V. Brower, Exelis, Inc. (USA); Subhasis Chaudhuri, Indian Institute of Technology Bombay (India); Brian J. Daniel, Exelis Inc. (USA); Larry S. Davis, Univ. of Maryland, College Park (USA); Mark A. Duchaineau, Google (USA); Dan L. Edwards, National Geospatial-Intelligence Agency (USA); Adel Hafiane, Ecole Nationale Superieure d' Ingenieurs (France); Simon J. Juller, Univ. College London (United Kingdom); Haibin Ling, Temple Univ. (USA);

Dennis Motenko, National Geospatial-Intelligence Agency (USA); Peter Paul, Xerox Corp. (USA); Robert B. Pless, Washington Univ. in St. Louis (USA); V. B. Surya Prasath, Univ. of Missouri-Columbia (USA); Kari A. Pulli, NVIDIA Corp. (USA); Ambassamudram Rajagopalan, Indian Institute of Technology Madras (India); Raghveer M. Rao, U.S. Army Research Lab. (USA); John A. Richards, Sandia National Labs. (USA); Sartaj Sahni, Univ. of Florida (USA); Carl Salvaggio, Rochester Institute of Technology (USA); Stefano Soatto, Univ. of California, Los Angeles (USA); Suresh Subramanian, Lockheed Martin Missiles and Fire Control (USA); Bruce Swett, EOIR Technologies (USA); George R. Thoma, National Library of Medicine (USA); Darrell L. Young, Raytheon Intelligence & Information Systems (USA); Karmon M. Vongsy, Air Force Research Lab. (USA)

Geoinformatics is the science and the technology that develops and uses information science to address applications in the geospatial and geosciences. Recent trends in “Big Data” and cloud computing technologies and the exponentially increasing volumes of geo-aware distributed video and multi-INT sensor network data streams are driving the development of novel methodologies and tools for fusing and exploiting multi-source geospatial information. A geospatial information system (GIS) describes any information system that collects, integrates, stores, edits, analyzes, shares, and displays geographic information. Geoinformatics and GIS systems are fundamental to today’s information networks and inherently encompass techniques that transform “raw bits and bytes” into “actionable, fused information”, also termed InfoFusion.

GIS applications incorporate tools that allow users to create interactive queries (user-created searches), analyze time-varying spatial information, edit data, maps, and present the results of all these operations. GIS is used in cartography, remote sensing, land surveying, utility management, geographical strategic natural resource planning, photogrammetric science, geography, urban planning, emergency management, navigation, mobile communications, surveillance, reconnaissance and localized search engines. Today, defense and security applications, such as space-based imaging, airborne/unmanned airborne systems (UAS), navigation for autonomous vehicles, terrestrial and maritime-based security systems, are aggressively transforming from a legacy collect-and-view paradigm that simply “take pictures” to a fully-capable GIS that incorporate multi-sensor collections, perform advanced processing and analytics in real-time, initiate sensor cross-cueing, and allow multiple users to rapid retrieve and disseminate information and with higher accuracies. Exploitation of full motion video and wide area motion imagery for change detection, target tracking and activity-based intelligence are becoming essential components of the evolving geoinformatics field. Geoinformatics and GIS are critical to defense and security providers in order to enable satisfying emerging demands and rapid access to information for situational awareness and forensic back-tracking missions.

This conference provides a central collaboration point for industry, government, and academic leaders of geoinformatics, GIS and video analytics technologies to share their advancements, learning, and new solutions. The emphasis of this conference is on expanding the awareness of advanced architectures and enabling technologies that address emerging and adaptive tools that analysts can use to more effectively exploit multiple sources of geospatial information. Technical and scientific papers related to advancements in architectures for GIS collection sensors, data processing algorithms and techniques, video analytics, the uncertainty in data from collection through exploitation, information dissemination, serving, search, and query methodologies, and information visualization solutions that push beyond the scope of the state-of-the-art are solicited.

Topic areas include:

- geoinformatics/geomatics application needs, challenges, and roadmaps
- GIS-relevant program updates, challenges, results, and next steps
- field survey results and newly identified technology gaps
- anticipated technology trends, including, but not limited to:
  - activity based/anticipatory intelligence/predictive analytics
  - advanced multi-dimensional reconstruction techniques and analysis
  - autonomous mobile mapping systems
  - image, video and target track intelligence
  - geospatial sourcing, human geography and behavior
  - 3D urban reconstruction and point cloud processing
  - laboratory technology/R&D roadmaps

ENABLING ARCHITECTURES FOR MULTI-DIMENSIONAL/MULTISENSING GIS

Sought papers will be limited to those discussing geoinformatic architectures, with an emphasis on papers that discuss the methods and approaches where multiple sensors are used together to characterize a scene or event with higher fidelity than with the individual sensor. Issues in managing big data and cloud computing resources for computation and collaboration are especially encouraged.
CALL FOR PAPERS

- “Big Data” database technologies, archives and spatial data infrastructures
- fusion of multidimensional 3D/4D generalized point-clouds participatory sensing
- EO/IR motion imagery and full motion video (FMV)
- EO/IR wide-area motion imagery (WAMI) and persistence surveillance
- layered sensing and exploitation
- Laser-based Imaging: LIDAR, LADAR
- polarimetric SAR
- acoustic/sonar/RF-based collection/multistatic radar
- imaging spectrometers
- on-board processing for hazardous environments
- sensor modeling and characterization
- field survey results and newly identified technology gaps
- software productivity tools for analysts
- cloud-based collaboration, exploitation and assessment tools
- perceptual user interfaces and human effectiveness
- crowd sourcing, mobile and social network GIS applications.

GEO-REGISTRATION AND UNCERTAINTY HANDLING IN GEOSPATIAL DATA

Papers are sought that address some of the fundamental challenges of uncertainty handling in geospatial data such as: 1) promoting the use and efficient visualization of uncertainty metrics; 2) exploiting uncertainty information in fusion applications; 3) extending the use of standard error metrics when integrating heterogeneous data types; 4) developing new standards for uncertainty that can address a broader set of needs for commonly used geospatial processes; 5) promoting standards for data provenance that can better enable uncertainty handling. Applications to developing autonomous vehicles and navigation systems supporting autonomy are of particular interest. Example application areas include:  
- geopositioning
- mensuration
- registration and conflation
- fusion and error propagation
- analytical human geography
- provenance
- photogrammetry
- metrics and measures for uncertainty modeling
- navigation for autonomous vehicles.

GEOINFORMATICS PROCESSING EXPLOITATION AND VISUALIZATION
- vector processing
- spatial processing
- temporal processing
- 3D/4D reconstruction, analysis and quantitative metrics, social and cognitive-based methodologies
- data compression and novel data reduction techniques
- cross-sensor cueing and advancements in data fusion techniques
- sparse representation for geospatial analysis of multi-sensory datasets
- assisted, automated multi-target tracking using features, plus other GIS data
- advancements in open-standards, semantics and ontologies
- search and retrieval controls and methods
- dissemination techniques (chipping, serving, client-server interaction)
- point clouds from lidar, video, models
- shape representation, modeling and rendering
- 3D object segmentation and recognition from point clouds.

MOTION VIDEO ANALYTICS
- automated search and cueing: detection, classification, recognition, and identification
- new techniques and metrics for conveying algorithm/process performance
- data reduction methodologies
- hyperspectral and thermal video exploitation
- video summarization
- image and video processing, enhancement, segmentation and object tracking
- multi-target tracking, filtering and trajectory-based event analysis
- multimedia applications and multimodal interfaces
- video-based activity detection, recognition and exploitation
- anomaly detection and classification
- workflow and visualization efficiencies
- moving target indicators (MTI)
- analytics-enabled GIS data-base management system (DBMS) for video
- algorithm performance evaluation and testing
- mobile and embedded video processing.
Signal Processing, Sensor/Information Fusion, and Target Recognition XXIV (DS127)

Conference Chair: Ivan Kadar, Interlink Systems Sciences, Inc. (USA)
Conference Co-Chairs: Erik P. Blasch, Air Force Research Lab. (USA); Kenneth Hintz, George Mason Univ. (USA); Thia Kirubarajan, McMaster Univ. (Canada); Ronald P. S. Mahler, Lockheed Martin Corp. (USA)
Program Committee: Mark G. Alford, Air Force Research Lab. (USA); William D. Blair, Georgia Tech Research Institute (USA); Mark J. Carlotto, General Dynamics Advanced Information Systems (USA); Alex Liptchun Chan, U.S. Army Research Lab. (USA); Kuo-Chu Chang, George Mason Univ. (USA); Chee-Yee Chong, Independent Consultant (USA); Marvin N. Cohen, Georgia Tech Research Institute (USA); Frederick E. Daum, Raytheon Co. (USA); Jean Dezert, The French Aeronautics Lab. (France); Mohammad Farooq, AA Scientific Consultants Inc (Canada); Laurie H. Fenstermacher, Air Force Research Lab. (USA); Charles W. Glover, Oak Ridge National Lab. (USA); I. R. Goodman, Consultant (USA); Lynne L. Grewe, California State Univ., East Bay (USA); Michael L. Himan, Air Force Research Lab. (USA); Jon S. Jones, Air Force Research Lab. (USA); Martin E. Liggins II, Consultant (USA); James Linhas, Univ. at Buffalo (USA); Raj P. Malhotra, Air Force Research Lab. (USA); Alastair D. McAulay, Lehigh Univ. (USA); Raman K. Mehra, Scientific Systems Co., Inc. (USA); Harley R. Myler, Lamar Univ. (USA); David Nicholson, BAE Systems (United Kingdom); Les Novak, Scientific Systems Co., Inc. (USA); John J. Salerno Jr., Air Force Research Lab. (USA); Andrew G. Tescher, AGT Associates (USA); Stelios C. A. Thomopoulos, National Ctr. for Scientific Research Demokritos (Greece); Wiley E. Thompson, New Mexico State Univ. (USA); Shanchieh Jay Yang, Rochester Institute of Technology (USA)

This conference will address a range of issues pertinent to the target recognition task, such as signal/image detection, multisensor/data/information fusion and, resource management, signal processing, computational complexity, information extraction, decision-making and human’s role, image compression, compressive sensing, and processor architectures. Military as well as dual-use and commercial applications of the acquisition, signal processing, and information fusion problems will be considered. Papers are solicited in the following and related topics:

- application of information fusion to smart cities
- information fusion in contested environments
- signal processing, information fusion, and understanding aspects of cyber physical systems
- situation/threat assessment and intent modeling
- behavior modeling
- social/cultural modeling
- cyber and networking aspects of information fusion
- adaptive and knowledge-based information/sensor fusion
- physics derived and human derived (aka hard and soft) information fusion
- resource and connection/communications management
- distributed communications issues and effects on performance: ad-hoc networks and network-centric service-oriented architectures
- human-computer interface and modeling
- measures of performance and measures of effectiveness
- target identification/recognition and feature extraction
- human’s role in analysis and decision making in information fusion
- model-based target recognition
- sensor and target modeling, and implementation issues
- evidential reasoning including Dempster Shafer, DSmT, and neural networks and fuzzy logic techniques
- image models and compression
- compressive sensing applications
- target classification utilizing individual and/or multiple sensors
- computational and optimization techniques
- dual-use concepts
- innovative architectures including high-performance computing (HPC) and optical implementation.

NOTES:
(1) As a new venue established in 2004, this conference plans to host in 2015 an Invited Panel composed of internationally recognized experts. The topic will be announced at a future date.
(2) Commencing in 2015, a conference awards committee will be established to evaluate the submitted papers and associated presentation to select “the Young Researcher Best Paper Award.”
Synthetic Aperture RADAR research is advancing in several key application areas:

- operating in contested environments
- video SAR for continuous surveillance
- image compression for large area coverage and video SAR streams
- moving target (vehicles, dismounts) detection, tracking, and imaging exploiting the long integration times provided by SAR based MTI
- ground, foliage, and building penetration
- advanced detection algorithms including coherent and non-coherent change detection for finding difficult targets (e.g., IED’s, tunnels, wires, etc.
- target discrimination and classification algorithms and characterization of performance tradeoffs
- 3D reconstruction and geolocation.

These enhancements are enabled by significant advancements in 2D and 3D imaging which are, in turn, driven by the incorporation of diversity into the imaging process. These diversities include: wide angle, polarization, waveform, frequency (e.g., Ka, Ku, X, L, UHF, VHF), and aperture (interferometric, MIMO, multi-static, passive sensing, and multi-pass sensing).

Concurrently, relevant advanced technologies are being developed which directly impact these challenges including:

- passive and multistatic imagery
- compressive sensing and other sparsity/structure driven approaches
- Bayesian-driven inverse techniques
- persistent (GOTCHA) sensing.

This conference invites SAR research contributions to the key application areas, to advanced imaging technology driven by sensing diversity, and to the advanced technologies as described above.

SAR 2015 BEST STUDENT PAPER AWARD

In order to be considered for this award, the student must be the presenter and the primary author. A panel of experts will evaluate the papers, both for quality and content with regard to: 1) innovation, clarity, and style, and 2) the importance of the work to the field.

Z-FORMAT

This conference follows a “Briefing, Poster Workshop, Panel Discussion” sequence known as the Z-format. During the first sessions of each day, authors highlight the results for their work in 10 minute oral briefings. After the presentations, these same authors are available for in-depth discussions in an extended poster session setting, which is held in or near the conference room. Following the Poster Workshop, experts and audience address pressing issues and extensions from the sessions that day in a Panel Discussion.

CONTEXT AND REPRODUCIBILITY

In order to provide context for technical contributions and enhance the reproducibility of results, authors are urged to explicitly characterize and state assumed models and model parameters/operating conditions affecting performance evaluations or simulations.

CHALLENGE PROBLEMS

Previous conferences have revealed emerging needs for the following types of problems: compressive sensing, sparse aperture processing systems, change detection systems, foliage and building penetration systems, and adaptive ATR systems that adapt to changing conditions and requirements. To facilitate the development of such systems, AFRL has published a number of challenge problems on the site: www.sdms.afrl.af.mil.
Another extremely important challenge for ATR is the evaluation and prediction of ATR performance given the practical limitation that data sets cannot represent the extreme variability of the real world. Methods are sought that allow a rapid insertion of new targets and adaptive algorithms capable of supporting flexible and sustained employment of ATR. A key technical challenge is the development of affordable ATR solutions that employ an open architecture to provide timely hardware and software insertion.

This conference will emphasize all aspects relating to the modern automatic and machine assisted target and object recognition technology: concepts such as model-based object/target recognition and tracking, neural networks, wavelets, information fusion, knowledge-based methods, adaptive and learning approaches, and advanced signal and image processing concepts for detection, tracking, and recognition for sonar/ acoustic, IR, radar, laser radar, multispectral and hyperspectral sensors. Papers dealing with the entire spectrum of algorithms, systems, and architecture in ATR/AOR will be considered.

In particular papers on the model-based solutions will be considered. This includes hypotheses of the initial sets of the sensor data, predictive models of the target features and their relationships, techniques of evaluations/ comparisons of the predicted models with the features extracted from the data. Suggested topics also include methods of imputation of missing or sparse data and subsequent evaluation of the results.

Another extremely important challenge for ATR is the evaluation and prediction of ATR performance given the practical limitation that data sets cannot represent the extreme variability of the real world. Methods are sought that allow a rapid insertion of new targets and adaptive algorithms capable of supporting flexible and sustained employment of ATR. A key technical challenge is the development of affordable ATR solutions that employ an open architecture to provide timely hardware and software insertion.

Papers presented at this conference will be automatically considered for inclusion in an ATR Special Issue in a refereed journal. Papers are solicited in the following and related topics:

**IR-BASED SYSTEMS**
- detection, tracking, and recognition
- phenomenological modeling of targets and background
- polarization diversity
- target/object and scene segmentation
- performance evaluation issues.

**HYPERSONSPECTRAL-BASED SYSTEMS**
- detection, tracking, and recognition
- phenomenological modeling of targets and background
- polarization and waveform adaptation
- target/object and scene segmentation
- performance evaluation issues.

**RADAR/LASER RADAR-BASED SYSTEMS**
- high-range resolution radar techniques
- joint radar target tracking and classification approaches
- ultra-wide band radar techniques
- Doppler, polarization, and waveform diversity for target classification
- detection, tracking, recognition, segmentation, target, and clutter modeling
- multisensor processing and fusion
- performance evaluation issues.

**SONAR/ACOUSTIC AND SEISMIC-BASED SYSTEMS**
- inverse scattering issues
- direct scattering of acoustic waves
- tomographic image formation
- material identification
- ultra-wide band methods for target detection and classification
- multisensor fusion
- biosensor systems
- performance evaluation issues.

**NEW METHODOLOGIES**
- information theoretical approaches in ATR
- distributed and centralized sensor decision making
- model-based object recognition
- neural networks for ATR applications
- wavelet decomposition methods for ATR
- machine learning techniques
- mission adaptive systems
- data characterization
- performance modeling
- ATR/AOR development tools
- ATR/AOR architecture
- algorithms for human detection, tracking, and activity recognition.
ANNOUNCING THE 2015 ATR BEST PAPER AWARDS

Lockheed Martin Corporation had generously offered to sponsor the Best Paper Awards for the Automatic Target Recognition (ATR) conference, part of the SPIE Defense and Security Symposium, which will be held in Baltimore, Maryland, 20-24 April 2015. Three awards are planned: one Best Student Paper Award, and two overall Best Paper Awards.

In order to be considered for these awards:

• Presenter must make their oral presentation as scheduled
• Manuscript must be submitted to SPIE no later than the week of 23 March 2015.

FOR STUDENTS: In addition to the above requirements, to be considered for the Best Student Paper Award:

• Student must be the presenting author at the conference
• Student must be the leading author of the manuscript
• Student must send a message to the conference chairs identifying them/you as a student. This should be one after you have submitted your abstract, and must include your Tracking Number and Paper Title.

Please send to:
Firooz Sadajdi - firooz.a.sadjadi@lmco.com
and
Abhijt Mahalanobis - abhijt.mahalanobis@lmco.com

A panel of experts headed by the ATR conference chairs will evaluate all the papers, both for quality and content. Attention will be given to 1) the innovation, clarity, and style of both the oral presentation at the conference and the manuscript submitted for publication, and 2) the importance of the work to the field of ATR. The winners will be recognized in person at the 2015 ATR conference. They will also be formally notified by email, and will receive a certificate of award.

THE 2014 BEST STUDENT PAPER AWARD WINNERS

Matthew Scherreik, Brian D. Rigling, Wright State Univ. (USA)

For their presentation on Ladar ATR via probabilistic open set techniques [9090-11]

Henry Xue, Izidor Gertner, The City College of New York (USA)

For their presentation on Automatic recognition of emotions from facial expressions [9090-23]

THE 2014 BEST PAPER AWARD WINNERS

Brandon Hamschin, John Clancy, Mike Grabbe, Matthew Fortier, Johns Hopkins Univ. Applied Physics Lab. (USA); John Novak, ASD Space and Sensor Systems (USA)

For their presentation on Passive detection, characterization, and localization of multiple LFMCW LPI signals [9090-8]

Daniela I. Moody, David A. Smith, Steven P. Brumby, Los Alamos National Lab. (USA)

For their presentation on Automatic detection of pulsed radio frequency (RF) targets using sparse representations in under complete learned dictionaries [9090-13]

These papers were selected based on the following criteria: Novelty, Depth, Completeness and Oral presentation.

These awards are made possible by the generous sponsorship from

LOCKHEED MARTIN
Optical Pattern Recognition XXVI (DS130)

Conference Chairs: David Casasent, Carnegie Mellon Univ. (USA); Mohammad S. Alam, Univ. of South Alabama (USA)

Program Committee: Vijayan K. Asari, Univ. of Dayton (USA); Tien-Hsin Chao, Jet Propulsion Lab. (USA); Katsushi Ikeuchi, The Univ. of Tokyo (Japan); Bahram Javidi, Univ. of Connecticut (USA); Jed Khoury, Lardec Inc. (USA); Wesam A. Sakla, Air Force Research Lab. (USA); Yunlong Sheng, Univ. Laval (Canada); Robert C. Stirbi, Jet Propulsion Lab. (USA); Ashit Talukder, National Institute of Standards and Technology (USA); B. V. K. Vijaya Kumar, Carnegie Mellon Univ. (USA); Rupert C. Young, Univ. of Sussex (United Kingdom)

This conference is an annual forum for new research on optical pattern recognition (OPR). It includes algorithm, architecture, and system approaches. Theoretical, simulation, and especially hardware optical realizations are encouraged. Special emphasis will be given to new advances in distortion-invariant filters. Papers on optical filters and systems that perform with real-world non-ideal optical devices are encouraged. Other optical pattern recognition architectures and approaches besides correlators are also encouraged, such as optical feature extractors for product inspection, and object identification and tracking. Papers on optical 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 pattern recognition (OPR) systems
- distortion-invariant (and controlled invariance) optical correlation filters
- optical 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
- OPR neural networks
- OPR hardware and use of non-ideal real-world devices
- photorefractive elements in OPR systems
- SBIR optical devices, components, systems, and products
- OPR as related to homeland defense.
- new recognition and tracking algorithms
- optical/digital biometric recognition
- wide-area surveillance.

IMPORTANT DATES

Abstracts Due: 6 OCTOBER 2014
Author Notification: 15 DECEMBER 2014
On-site Manuscript Due Date: Conference DS130 ONLY
9 FEBRUARY 2015

PLEASE NOTE: Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a full-length manuscript for publication in the conference proceedings.
Modeling and Simulation for Defense Systems and Applications X (DS131)

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

Program Committee: James P. Durbano, Northrop Grumman (USA); James N. Elele, Naval Air Systems Command (USA); Susan Harkrider, U.S. Army Night Vision & Electronic Sensors Directorate (USA); Jonathan D. Rogers, Georgia Institute of Technology (USA); Robert Wright, Capella Univ. (USA); Chen Wu, Defence Research and Development Canada, Ottawa (Canada)

Modeling and simulation plays a critical role in the development, testing, and acquisition of new military systems and technologies. Modeling and simulation of systems and applications allow us to explore future concepts, augment, quantify and simplify the decision-making process, safely replicate dangerous situations and environments, and advance information technologies. Modeling and simulation has been, and will continue to be, an essential element that promotes timely and cost effective development and analysis in a variety of fields.

Defense applications rely heavily on modeling and simulation technology. Everything from individual components to fully integrated systems to high-level military operations is tested through advanced modeling and simulation. As the fidelities of defense system models and environments move closer to reality, new methodologies have to be explored and developed including large data analysis and emerging computer architectures. This conference seeks to discuss these technologies. Papers are sought that address the development of modeling and simulation technology (both algorithms and implementation) and the application of modeling and simulation technology to component design, system analysis, or higher-level interaction.

Suggested topics for presentation include, but are not limited to:

**SYSTEMS AND ENVIRONMENTS**
- distributed mission operations (DMO)
- operationally focused simulation
- airborne networking and communication
- scenario, scene, and target generation
- imaging systems
- high fidelity models and military platforms and systems.

**ALGORITHMS AND APPLICATIONS**
- model-based engineering
- cyber network operations (CNO)
- command and control (C2)
- component and device design
- systems analysis (SA)
- scientific computing
- multi-physics simulation of complex dynamics
- simulation of defense and security vehicles
- computer-generated forces (CGF)
- big data driven modeling.

**PLATFORMS AND TOOLS**
- state-of-practice: M&S tools, scenarios, databases, testbeds, standards, environments, and exercises
- supercomputers, high-performance computing (HPC) and distribution computing
- alternative processing platforms (GPUs, vector coprocessors, FPGAs, etc.)
- asynchronous computing architectures
- integration and interoperability
- information visualization/animation
- performance analysis.

**VERIFICATION, VALIDATION AND ACCREDITATION OF MODELS AND SIMULATIONS**
- data VV&A
- VV&A for scenarios and M&S supporting facilities (e.g. constructive, live, and virtual M&S systems integration laboratories)
- VV&A for federations, their integration and interoperability
- VV&A processes for realistic battlespace environments
- VV&A for autonomous systems and agent-based simulations
- risk-based VV&A and its implementations
- practical applications of VV&A
- VV&A documentation and standards.
Open Architecture/Open Business Model Net-Centric Systems and Defense Transformation 2015 (DS132)

Conference Chair: Raja Suresh, General Dynamics Advanced Information Systems (USA)
Program Committee: Robert Bond, MIT Lincoln Lab (USA); Vasu D. Chakravarthy, Air Force Research Lab. (USA); Megan Cramer, U.S. Navy PEO LCS (USA); John S. Eicke, U.S. Army Research Lab. (USA); Thomas Green, SAIC (USA); Nickolas Guertin, U.S. Navy (USA); Michael A. Kolodny, U.S. Army Research Lab. (USA); Leo J. Rose, U.S. Air Force (USA); Jason R. Stack, Office of Naval Research (USA)

Defense transformation is the holistic process of examining the interaction of concepts, doctrine, organization, and technology to radically improve defense capabilities. As an element of defense transformation, net-centric systems use secure ubiquitous communications and distributed applications to break away from the traditional platform-centric paradigm to enable the development of survivable, rapidly deployable forces.

An open architecture (OA) is defined as a technical architecture that adopts open standards supporting a modular, loosely coupled and highly cohesive systems structure that includes publishing key interfaces within the systems and full design disclosure. The key enabler for open architecture is the adoption of an open business model (OBM) which requires doing business in a transparent way that leverages the collaborative innovation of numerous participants across the enterprise permitting shared risk, maximized asset reuse and reduced total ownership costs. The combination of open architecture and an open business model permits the acquisition of Open Systems Architectures (OSA) that yield modular, interoperable systems allowing components to be added, modified, replaced, removed and/or supported by different vendors throughout the life cycle in order to drive opportunities for enhanced competition and innovation.

Papers are solicited in all areas of defense transformation and OA/OBM net-centric systems including, but not limited to, the following topics:

- national strategies and acquisition plans for defense transformation and OA/OBM; philosophies, concepts, and enabling technologies
- metrics for and methodologies of measuring openness in OA architectures; strategies for standardizing and maintaining OA currency
- operational, technical, and system requirements and architectures for the net-centric battlespace; impact on human performance, operational and organizational factors and training; concepts for Contested Environment and Counter Insurgency (COIN) operations; System of Systems concepts
- OA/OBM predictive battlespace awareness and TcPED systems
- distributed collaborative robotic teams
- sensors and surveillance systems with special emphasis on WAMI and OA/OBM implementation
- OA service-oriented architectures, information management, and battle management
- unmanned systems (UMS) for urban ISR, collaborative engagement of heterogeneous UMS, sense and avoid technologies for UMS, and UMS sensing and control for target geo-location
- long endurance UAS for border patrol, micro and organic-UAS for persistent surveillance in caves and other difficult to access areas; counter-UAS technologies and secure UAS systems
- modeling and simulation techniques for development and validation of OA net-centric systems, as well as for planning, training, and mission rehearsal
- battlespace visualization, display systems, and the human dimension of C2
- communications and networking, with special emphasis on ad hoc wireless mobile networks, cross-layer techniques, network aware applications, spectrum management, cognitive radios and jammers
- autonomous intelligent systems, including smart sensor networks and application layer self-organization
- effects-based operations and precision engagement
- information assurance and security enabled digital policy management and policy-based routing in net-centric systems
- distributed net-centric computing architectures, heterogeneous computing and cloud computing; utilizing smart labels in content sensitive cloud environments
- OA net-centric system operational test, evaluation, experimentation, and lessons learned.

SPECIAL SESSION AND PANEL DISCUSSION ON OA/OBM SYSTEMS AND DOD STRATEGIES

A special session on DoD strategies for developing and implementing OA/OBM systems is jointly planned with the Unmanned Vehicles Systems Technology conference. We particularly invite papers on challenges for OA/OBM systems, lessons learned and future DoD plans for OA/OBM systems. A panel discussion is planned in conjunction with this special session.

SPECIAL SESSION ON SELF-ORGANIZING, COLLABORATIVE UNMANNED ISR ROBOTIC TEAMS

A special session on Self-Organizing, Collaborative ISR Teams is jointly planned with the Unmanned Vehicles Systems Technology conference. Net-centric systems are spawning a revolutionary transformation in multi-vehicle collaboration for autonomous teams of UVs with ISR missions. Human/robot partnerships can provide RSTA-on-demand and area effects.
AWARDS
Best Paper, Student, and Young Researcher Awards for Defense + Security 2015

Here is the current list of conference awards. Additional awards may be added, so be sure to check online for updates.

CONFERENCE DS122
Head- and Helmet-Mounted Displays XX: Design and Applications

Special emphasis will be placed on university research in general, and student-conceived and executed research in particular. As an incentive, a non-monetary award for Best Student Paper will be given.

CONFERENCE DS123
Display Technologies and Applications for Defense, Security, and Avionics IX

Each year a Best Paper Award is given based on originality, depth of research, significance of findings and/or historical interest. The award is based primarily on the oral presentation and is a joint decision stemming from input by conference committee members and chairs. The winner is determined shortly after the meeting and is notified by the conference chairs.

CONFERENCE DS127
Signal Processing, Sensor/Information Fusion, and Target Recognition XXIV

Commencing in 2015, a conference awards committee will be established to evaluate the submitted papers and associated presentations to select the Young Researcher Best Paper Award.

CONFERENCE DS128
Algorithms for Synthetic Aperture Radar Imagery XXII

SAR 2015 Best Student Paper Award

In order to be considered for this award, the student must be the presenter and the primary author. A panel of experts will evaluate the papers, both for quality and content with regard to: 1) innovation, clarity, and style, and 2) the importance of the work to the field.

CONFERENCE DS129
Automatic Target Recognition XXV

Announcing the 2015 ATR Best Paper Awards

Lockheed Martin Corporation has generously offered to sponsor the Best Paper Awards for the Automatic Target Recognition (ATR) conference, part of the SPIE Defense and Security Symposium, which will be held in Baltimore, Maryland, 20-24 May 2015. One or more in each category are planned: Best Student Paper Award and Best Paper Award.

To be considered for these awards:
· Presenter must make their oral presentation as scheduled
· Manuscript must be submitted to SPIE no later than the week of 23 March 2015.

FOR STUDENTS: In addition to the above requirements, to be considered for the Best Student Paper Award:
* Student must be the presenting author at the conference
* Student must be the leading author of the manuscript
* Student must send a message to the conference chairs identifying them/you as a student. This should be done after you have submitted your abstract and must include your Tracking Number and Paper Title.

Please send to:
Firooz Sadajdi firooz.a.sadajdi@lmco.com
and
Abhijt Mahalanobis abhijit.mahalanobis@lmco.com

A panel of experts headed by the ATR conference chairs will evaluate all the papers, both for quality and content. Attention will be given to 1) the innovation, clarity, and style of both the oral presentation at the conference and the manuscript submitted for publication, and 2) the importance of the work to the field of ATR. The winners will be recognized in person at the 2015 ATR conference. They will also be formally notified by email and will receive a certificate of award.
Independent Component Analyses, Compressive Sampling, Large Data Analyses (LDA), Neural Net, Biosystems, and Nanoeengineering XIII (ST121)

The conference below of related interest is part of SPIE Sensing Technology + Applications, co-located at SPIE DSS 2015. Read more: www.spie.org/stacall

Conference Chair: Harold H. Szu, U.S. Army Research Office (USA)
Conference Co-Chair: Liyi Dai, U.S. Army Research Office (USA)

Program Committee: Shun-ichi Amari, RIKEN (Japan); Richard G. Baraniuk, Rice Univ. (USA); John J. Benedetto, Univ. of Maryland, College Park (USA); Henry Chu, Univ. of Louisiana at Lafayette (USA); Ronald R. Coifman, Yale Univ. (USA); John Daugman, Univ. of Cambridge (United Kingdom); David Donohoe, Stanford Univ. (USA); Ronald G. Driggers, St. Johns Optical Systems (USA); Jide Familoni, U.S. Army Night Vision & Electronic Sensors Directorate (USA); Fredric M. Ham, Florida Institute of Technology (USA); Yutaka Hata, Univ. of Hyogo (Japan); Charles C. Hsu, Trident Systems Inc. (USA); Tzyy-Ping Jung, Univ. of California, San Diego (USA); Marc W. Kirschner, Harvard Medical School (USA); Keith A. Krapel, U.S. Army Night Vision & Electronic Sensors Directorate (USA); Horacio Lamela, Univ. Carlos III de Madrid (Spain); Joseph S. Landa, BriarTek. Inc. (USA); Douglas A. Lauffenburger, Massachusetts Institute of Technology (USA); Soo-Young Lee, KAIST (Korea, Republic of); Kevin W. Lyons, National Institute of Standards and Technology (USA); Anke D. Meyer-Bäse, The Florida State Univ. (USA); Uwe Meyer-Bäse, The Florida State Univ. (USA); Francesco Carlo Morabito, Univ. Mediterranea di Reggio Calabria (Italy); Hiroshi Nakajima, OMRON Corp. (Japan); Hyung-Min Park, Sogang Univ. (Korea, Republic of); Kitt C. Reinehard, Air Force Office of Scientific Research (USA); Zuowei Shen, National Univ. of Singapore (Singapore); Metin Sitti, Carnegie Mellon Univ. (USA); Jan-Olov Stromberg, Royal Institute of Technology (Sweden); John Tangney, Office of Naval Research (USA); Emmanuel Vincent, IRISA / INRIA Rennes (France); Ndarajen A. Vydelingum, National Institutes of Health (USA); Lipo Wang, Nanyang Technological Univ. (Singapore); Olaf Wolkenhauer, Univ. Rostock (Germany); Donald C. Wunsch II, Missouri Univ. of Science and Technology (USA); Ning Xl, Michigan State Univ. (USA); Takeshi Yamakawa, Fuzzy Logic Systems Institute (Japan); Yiping Zhao, The Univ. of Georgia (USA); Yufeng Zheng, Alcorn State Univ. (USA); Xiaowei Zhuang, Harvard (USA)

This conference, which is part of the SPIE DSS Sensing Technology + Applications symposium to be held in Baltimore Inner Harbor 20-24 April 2015, began over decade ago with the sponsorship of DARPA/ACMP in wavelet transforms (WT) and evolved to ear-eye-adaptive AWT pre-processing. It has further incorporated the brain-like post processing using fault-tolerant artificial neural network (ANN) learning algorithms and unsupervised independent components analyses (ICA), to smart system-on-chip (SoC) embodiment. We further emphasize that DSS needs human-like smart adaptive wavelet transform (AWT) to overcome the explosive growth of data in a digital smartphone age. Human-like orthogonal change of motion can help organize the sparseness which is not purely random, and yet remains to be reused orthogonal and supports therefore the compressive sampling in video data reduction.

We specifically seek contribution in the following topic areas:

• compressive sampling
• wavelets applications
• unsupervised learning and ICA
• learning theory and applications
• nanoeengineering
• smart sensor systems and miniaturization
• biomedical wellness applications
• wellness smart sensors
• system biology
• smart sensors applications.

This conference will feature six related S&T frontier awards: Compressive Sensing, Large Data Analyses, ICA, Nanoeengineering, Wellness Engineering, and System Biology. Together these technologies serve a wide-sense homeland security for an aging baby boomer population by means of an end-to-end smart plug-play test-bed system. Awardees are selected by past recipients and associated committee panelists, chaired by the immediately past recipients. The recipients are mandated to write a review paper, participate in keynote presentations, a panel discussion, and tutorial activities (if his or her proposal is chosen by SPIE Educational, Short Course, Business Committee).

Recipients of the following awards to be determined solely by the previous recipients of each topic:

- Compressive Sampling Pioneer Award Chair: Michael Lustig, Univ. of California, Berkeley (USA)
- Large Data Analyses Pioneer Award Chair: John Daugman, Univ. Cambridge (United Kingdom)
- Unsupervised Learning ICA Pioneer Award Chair: Jong-Hwan Lee, Korea Univ. (Korea, Republic of)
- Nanoengineering Pioneer Award Chair: Ritesh Agarwal, Univ. of Pennsylvania (USA)
- Biomedical Wellness Pioneer Award Chair: Elisa Konofagou, Columbia Univ. (USA)
- Systems Biology Pioneer Award Chair: Scott E. Fraser, Univ. of Southern California (USA)

FRONTIER AWARDS

This conference features six awards in human sciences and engineering annually:

1. Compressive Sensing,
2. Large Data Analyses,
3. ICA,
4. Nanoengineering,
5. Wellness Engineering, and

The nomination and selection procedure for these awards is done by the previous recipients, similar to other notable awards in science. Please see the Awards web page at www.ica-wavelet.org for history, a list of past recipients, and additional information.
Machine Intelligence and Bio-inspired Computation: Theory and Applications IX (ST122)

The conference below of related interest is part of SPIE Sensing Technology + Applications, co-located at SPIE DSS 2015. Read more: www.spie.org/stacall

**CALL FOR PAPERS**

**IMPORTANT DATES**

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstracts Due</td>
<td>6 October 2014</td>
</tr>
<tr>
<td>Author Notification</td>
<td>15 December 2014</td>
</tr>
<tr>
<td>Manuscript Due Date</td>
<td>23 March 2015</td>
</tr>
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**PLEASE NOTE:** Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a full-length manuscript for publication in the conference proceedings.

**BEST PAPER AWARD**

The Conference Chair and Program Committee for the Machine Intelligence and Bio-inspired Computation: Theory and Applications conference would like to recognize pioneers in the field with a Best Paper Award. All submitted papers will be considered, provided they meet the award eligibility requirements. For more information, please visit www.spie.org/STA-Awards. Five winners will be selected and notified by email.

Conference Chair: Misty Blowers, Air Force Research Lab. (USA)

Program Committee: Gus Anderson, MacAulay-Brown, Inc. (USA); Georgiy M. Levchuk, Aptima, Inc. (USA); John A. Marsh, State Univ. of New York Institute of Technology (USA); Clare D. Thiem, Air Force Research Lab. (USA); Robinson Pino, U.S. Dept. of Energy (USA); Daniel Stambovsky, Air Force Research Lab. (USA); Jonathan Williams, Air Force Research Lab. (USA); Bryant T. Wysocki, Air Force Research Lab. (USA)

Almost since its inception, machine intelligence and bio-inspired computation has been applied to the solution of military problems. Given the current global security environment, there has been increased interest within the military and security communities in novel techniques for solving challenging problems within their domains. The genesis of this interest lies in the fact that repeated attempts of using traditional techniques have problems unsolved and, in some cases, not addressed.

Additionally, new problems have emerged within the broad areas of the global war on terrorism, homeland security, and force protection that are difficult to tackle with conventional methods, since social, cultural, and human behavioral factors tend to be at the heart of these new types of problems.

The purpose of the conference is to continue the discussion of current and ongoing efforts in using genetic algorithms, particle swarm, artificial neural networks, artificial immune systems, emergent systems and behaviors, evolutionary and neuromorphic computing, and other novel intelligent, and bio-inspired computation techniques. These discussions will include, but are not limited to, the following areas:
- mission focused autonomy
- sensor exploitation
- cyber operations
- wavelets for signal processing
- knowledge discovery and data mining
- advanced modeling and simulation
- advanced next-generation wargaming
- cyber defense and security
- space situational awareness
- sensor networks and layered-sensing
- patterns of life
- exploitation of layered sensing for tracking and 3D reconstruction
- target classification.

We also welcome any suggestions you might have for workshops, tutorials, plenary talks, and/or panel discussions.
Confere...r in secure communications 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 programmable 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 and theoretical developments in the area of mobile multimedia/ imaging techniques in secure applications 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 computing environments.

Key topics discussed include, but are not limited to:
- multimedia analytics
- multimedia 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
- 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
- multidimensional imaging.
ANNOUNCING THE BEST PAPER AWARDS IN MOBILE MULTIMEDIA/ IMAGE PROCESSING, SECURITY, AND APPLICATIONS 2015!

Eight papers will be selected as the candidates for the Best Paper Award among the papers accepted for this conference. These papers will be presented in a special session, and one of the eight papers will be selected to receive the Best Paper Award. A panel of experts will evaluate all the papers for technical quality and merit. The criteria for evaluation will include:

• innovation
• clarity and quality of the manuscript submitted for publication
• significance and impact of the work reported.

In order to be considered for a Best Paper Award, authors must:
• choose “Nominate for Best Paper Award” as one of their paper topics
• present their oral presentation as scheduled
• submit their manuscript on time.

Conference Chairs will not participate in the evaluation process of the papers. All decisions regarding selection of the best paper will be made by the evaluation committee.

The paper you present will live far beyond the conference room
All proceedings from this event will be published in the SPIE Digital Library, promoting breakthrough results, ideas, and organizations to millions of key researchers from around the world.

Helping engineers and scientists stay current and competitive
www.SPIEDigitalLibrary.org
Multisensor, Multisource Information Fusion: Architectures, Algorithms, and Applications 2015 (ST124)

The conference below of related interest is part of SPIE Sensing Technology + Applications, co-located at SPIE DSS 2015. Read more: www.spie.org/stacall

Conference Chair: Jerome J. Braun (USA)

Program Committee: Sheela V. Belur, The Van Dyke Technology Group, Inc. (USA); David P. Benjamin, Pace Univ. (USA); Belur V. Dasarathy, Information Fusion Technologies (USA); Michael Heizmann, Fraunhofer-Institut für Optronik, Systemtechnik und Bildaustwertung (Germany); Charles F. Hester, U.S. Army Research, Development and Engineering Command (USA); Mieczyslaw M. Kokar, Northeastern Univ. (USA); Damian M. Lyons, Fordham Univ. (USA); Mirela Popa, Chemring Detection Systems, Inc. (USA); Firooz A. Sadjadi, Lockheed Martin Maritime Systems & Sensors (USA); Pramod Kumar Varshney, Syracuse Univ. (USA); Shanchieh Jay Yang, Rochester Institute of Technology (USA)

This conference is designed to highlight the advances being made in the exponentially growing field of multisensor, multisource information fusion and will cover all the different facets of information fusion systems starting from the conceptual design through development, testing, and fielding.

The main objective of the conference will be to promote synergistic exploitation of the ideas from the different areas of endeavor that together constitute the field of information fusion. In particular, the emphasis will be on the triplet: Architectures, Algorithms, and Applications. Papers dealing with intelligent techniques that are relevant to fusion processing are actively sought. Applications from both defense and civilian domains (such as robotics, medicine, and space, as well as those dealing with non-traditional information sources) are welcome to further a fruitful exchange of ideas and issues. Studies dealing with real-world issues, such as computational demands, real-time constraints, and the like, are particularly encouraged. Papers that address one or more of the questions of what, where, why, when, and how in the context of multisource information fusion fall within the scope of the conference.

Areas of interest include but are not limited to:

- multisensor, multisource fusion system architectures
- data, feature, decision, and multilevel fusion
- higher levels of JDL including situation awareness (SA), threat assessment, and impact assessment
- application of SA techniques to such areas as cyber, tactical, global, and asymmetric threats
- multi-classifier fusion, algorithmic processes fusion
- elucidative fusion systems, fusion benefits assessment and prediction, and associated metrics
- multi-look and temporal fusion
- active, passive, and mixed sensor suites as well as non-traditional data/information sources such as databases and HUMINT
- adaptive and self-improving fusion system architectures
- multisensor and distributed sensor system design
- fusion learning in imperfect, imprecise, and incomplete environments
- intelligent techniques for fusion processing
- computational resources optimization
- customized hardware dedicated to fusion applications
- system design and algorithmic issues
- linguistic information fusion, including fusion ontologies and semantic web
- neurophysiologically motivated architectures and applications
- biomedical applications, including ICU patient monitoring, health care, and diagnostics
- homeland defense including military and civilian
- other real-world applications such as robotics, mine detection, remote sensing, transportation systems, document analysis, character recognition, identity verification, multisensor intrusion detection, and the like.
Next-Generation Analyst III (ST125)

The conference below of related interest is part of SPIE Sensing Technology + Applications, co-located at SPIE DSS 2015. Read more: www.spie.org/stacall

Conference Chairs: Barbara D. Broome, U.S. Army Research Lab. (USA); Timothy P. Hanratty, U.S. Army Research Lab. (USA); David L. Hall, The Pennsylvania State Univ. (USA); James Llinas, Univ. at Buffalo (USA)

Program Committee: Nina M. Berry, Sandia National Labs., California (USA); John S. Eicke, U.S. Army Research Lab. (USA); James Fink, U.S. Army Intelligence Ctr. of Excellence (USA); James Hendler, Rensselaer Polytechnic Institute (USA); John E. Lavery, U.S. Army Research Lab. (USA); Bob Madahar, Defence Science and Technology Lab. (United Kingdom); Paul Sajda, Columbia Univ. (USA); Alan Steinberg, Georgia Tech Research Institute (USA); Edward L. Waltz, BAE Systems (USA)

Next Generation Analyst III: The Evolving Role of the Human as Observer, Collaborative Analyst, and Data Explorer

Several major trends affect the roles and capabilities of modern analysts. First, the global dissemination of sensors and the internet of things (in which physical entities have embedded sensors, processing and communications capabilities) provide near ubiquitous, global sensing, with a resulting tsunami of data. Second, cloud-based computing provides opportunities for individuals to access near infinite computing power for advanced modeling. Third, a new generation of intelligence analysts and intelligence information users is emerging. These net-generation analysts and users are thoroughly familiar with Open Source information, participate in social networks and “hive mind” collaboration, and generally utilize all of the emerging capabilities of hand-held computer/sensor systems (a.k.a. “smart phones”).

As a result, new roles are emerging for information and data analysts. Humans can act in several roles; i) as observers (both providing situational reports and using the sensors in their mobile devices), ii) as collaborative analysts interacting with local and global ad hoc teams to address complex problems, and iii) as data explorers who access huge data sources to discover new relationships and causalities. Applications for these new analysts range from traditional DoD applications such as situation awareness and threat assessment, to commercial and non-DoD areas such as environmental monitoring, business intelligence, emergency management, medical monitoring (e.g., of the spread of disease) and cyber security. We seek lessons that can be learned for the design and development of technology support to these human functions from both Department of Defense and non-DoD applications and applied synergistically.

The objective of this conference is to bring together researchers and practitioners to discuss these emerg-
Quantum Information and Computation XIII (ST126)

Conference Chairs: Eric Donkor, Univ. of Connecticut (USA); Andrew R. Pirich, ACP Consulting (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); Chip Brig Elliott, Raytheon BBN Technologies (USA); Reinhard K. Erdmann, Air Force Research Lab. (USA); Michael L. Fanto, Air Force Research Lab. (USA); Louis H. Kauffman, Univ. of Illinois at Chicago (USA); Vladimir E. Korepin, Stony Brook Univ. (USA); Alexander V. Sergienko, Boston Univ. (USA); Tai Tsun Wu, Harvard Univ. (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 communication, and quantum computation. Quantum cryptography exploits the non-cloning property of quantum states to implement secure cryptosystems, 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 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 and computing technologies requires interdisciplinary efforts from physicists, computer scientists, mathematicians, and engineers. This conference will provide a forum for discussion among 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 communication, quantum cryptography, and quantum computing are invited as well as papers that employ non-locality. 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 error correction
• quantum memory and erasure.

QUANTUM COMMUNICATION AND CRYPTOGRAPHY
• quantum repeaters
• entangled states and their creation
• information processing with entangled states
• teleportation
• quantum cryptography and cryptosystems
• QKD system architecture
• QKD engineering.

QUANTUM COMPUTING
• solid state computing
• ion-trap quantum computing
• NMR quantum computing
• neutral-atom quantum computing
• Josephson junction quantum computing
• photonic quantum computing
• cavity-QED quantum computing
• molecular quantum computing
• fault-tolerant quantum computing
• topological quantum computing.

HOMELAND DEFENSE
• secure communications
• information sharing and secrecy
• cyber attack countermeasures
• quantum computer threat assessment.

QUANTUM SYSTEMS AND SENSORS
• quantum architectural systems
• quantum imaging systems
• quantum sensors
• quantum games.
The conference below of related interest is part of SPIE Sensing Technology + Applications, co-located at SPIE DSS 2015. Read more: www.spie.org/stacall

Conference Chairs: Gay Pickrell, Virginia Polytechnic Institute and State Univ. (USA); Eric Udd, Columbia Gorge Research (USA); Henry H. Du, Stevens Institute of Technology (USA)
Conference Co-Chairs: Christopher S. Baldwin, Weatherford International Ltd. (USA); Jerry J. Benterou, Lawrence Livermore National Lab. (USA); Anbo Wang, Virginia Polytechnic Institute and State Univ. (USA)

Program Committee: Ole Bang, Technical Univ. of Denmark (Denmark); Eric A. Bergles, BaySpec Inc. (USA); Jeff Bush, Optiphase, Inc. (USA); Kevin Peng Chen, Univ. of Pittsburgh (USA); Brian Culshaw, Univ. of Strathclyde (United Kingdom); Abdessama Eliyama, Northrop Grumman Navigation Systems (USA); Xudong Fan, Univ. of Michigan (USA); Yoel Fink, Massachusetts Institute of Technology (USA); Eric Lee Goldner, US Sensor Systems, Inc. (USA); Tom W. Graver, Micron Optics, Inc. (USA); Ming Han, Univ. of Nebraska-Lincoln (USA); Daniel Homa, Virginia Polytechnic Institute and State Univ. (USA); Hajime Haneda, National Institute for Materials Science (Japan); Kazuo Hotate, The Univ. of Tokyo (Japan); Jiri Kanka, Institute of Photonics and Electronics of the ASCR, v.v.i. (Czech Republic); Gurbinder Kavi, Thapar Univ. (India); Victor I. Kopp, Chiral Photonics, Inc. (USA); Katerina Krebber, Bundesanstalt für Materialforschung und -prüfung (Germany); Steven T. Kreger, Luna Innovations Inc. (USA); David A. Krohn, Light Wave Venture Consulting, LLC (USA); Paul Lefebvre, LxDATA (Canada); Alexis Mendez, MCH Engineering LLC (USA); Stephen J. Mihailov, National Research Council Canada (Canada); Thomas D. Monte, KHV Industries, Inc. (USA); Glen A. Sanders, Honeywell Technology (USA); Fei Tian, Stevens Institute of Technology (USA); Dennis J. Trevor, OFS Labs. (USA); Xingwei Wang, Univ. of Massachusetts Lowell (USA); Reinhardt Willsch, Institut für Photonische Technologien e.V. (Germany); Hai Xiao, Clemson Univ. (USA); Yizheng Zhu, Virginia Polytechnic Institute and State Univ. (USA)

This conference covers all aspects of fiber optic sensor technology based on conventional optical fibers and photonic crystal fibers, for civil, defense, and oil and gas 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 optic acoustic sensors based on the Mach-Zehnder interferometer; fiber rotation gyro (FOG) 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 aeronautical areas; to downhole pressure and temperature sensors for oil and gas reservoir monitoring; to high-voltage and high-current sensing systems for the power industry, to name just a few. However, new components and technology are continually being developed to support enhancement and extensions of existing fiber optic sensor technology, as well as to allow totally new innovations. New innovations, such as photonic crystal fibers, offer the prospect of new highly efficient light sources as well as the potential for much higher levels of performance and utility not readily achievable using conventional optic fibers.

PHOTONIC CRYSTAL FIBERS FOR SENSING APPLICATIONS

The unique optical properties of Photonic Crystal Fibers (PCF) coupled with the development of new and improved fabrication techniques and availability of high-quality photonic bandgap crystals, has fueled the global interest in their theoretical and experimental studies. The optical properties such as bandgap and light propagation characteristics of photonic bandgap crystals and PCFs can be manipulated by structural design and defect engineering. These properties can also be altered by external stimuli that can be thermal, optical, electrical, magnetic, chemical, biological, and nuclear, etc. The great potential of photonic bandgap crystals and PCF has been well-recognized for a variety of applications, including optical communications, integrated optical circuits, and sensors.

This focus area aims to provide a forum for scientists and engineers involved in modeling, design, fabrication, device integration, and applications of PCFs to share the advances made in sensor-related research and development; to explore the frontier and offer insights into emerging and new sensing technologies in this rapidly expanding field; and to promote and nurture networking and collaboration amongst researchers with complementary experiences and applications.

(FST101) (continued next page)
Fiber Optic Sensors and Applications XII (ST101) (continued)

expertise. A particular focus will be placed on the science and technology of 1D and 2D hollow- or solid-core photonic crystal fibers for advanced sensing applications.

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 in gas and liquids
  - detection of nuclear radiation, warfare agents, explosives and toxic industrial compounds
  - genomics and biomedical analysis
  - monitoring of pollutants in environment.

SPECIAL SESSION ON OIL AND GAS APPLICATIONS

Over the past 15 years, optical fiber sensors have experienced an expansion in the number of applications for the oil and gas industry. Optical fiber sensors have gone from interesting field trials in the late 1990s to being a commercially accepted means for monitoring well parameters for the life of the well. Today, optical fiber sensors are used for distributed temperature monitoring, flow sensing, seismic sensing, leak detection, and pressure monitoring. Many types of optical fiber sensors are used to make these measurements including Bragg gratings, interferometric sensors, Raman scattering, Brillouin scattering, and coherent Rayleigh scattering. The purpose of this special session is to provide an opportunity to present the fiber sensing community with information on these commercial applications, recent advancements, and projects related to the use of optical fiber sensors in the oil and gas field.

Papers are solicited on, but not limited to, the following topics:

- applications of optical fiber sensors for the oil and gas industry
- optical fiber components and sensors for harsh oilfield environments
- laboratory or field trial results
- reliability of optical fiber systems related to oil and gas applications.

The Chairs would like to entertain suggestions for Invited and Tutorial Talks on emerging fiber sensor technology and historical reviews.
The emphasis in this conference is on advanced technologies for spectroscopic instrumentation, particularly the infrared, near-infrared, and Raman molecular techniques, but also including advances enabling miniature and portable spectrometers across the electromagnetic spectrum, including x-ray fluorescence, terahertz, electron spin resonance, nuclear magnetic resonance, and mass spectrometry. 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
- MEMS-based, miniature, handheld/portable, and robust spectrometers
- spectrometers based on tunable sources (quantum cascade lasers, sum-difference techniques, OPsOs, etc.)
- spectral-based sensors
- sources, point-, and imaging detectors
- spectroscopic imaging systems, including hyperspectral imaging
- Cell-phone-based spectrometers and imagers.

**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 spectrometers (NMR, plasma-based emission, XRF, etc.)
- combined/integrated techniques (e.g., Raman/LIBS)
- Consumer spectroscopy, imaging and data processing.

**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, and IED applications
- anti-counterfeiting and counterfeit detection
- biological and medical applications
- advanced materials characterization, including composites
- pharmaceutical and industrial processing, including PAT
- consumer goods safety
- usage in challenging 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.
Terahertz Physics, Devices, and Systems IX: Advanced Applications in Industry and Defense (STI04)

BACKGROUND

Radiation in the terahertz range, loosely defined as 0.1 - 10 THz, spans the relatively undeveloped gap between electronics at the low end of the spectrum, and optics at the high frequency end. The goal of the conference is to bring together researchers active in the general area of THz and related research to report their latest research findings and by providing a platform for the mutual exchange of ideas. The conference will address topics directed toward the fundamental understanding and advancement of the state of the art of the terahertz and millimeter and sub-millimeter portions of the spectrum emphasizing applications in industry, security, and military.

Initially, THz radiation was used exclusively by astrophysicists for applications such as the detection of antimatter. However, this extremely expansive and spectrally unique portion of the EM spectrum was initially of high interest for such applications as space-based communications, upper atmospheric interaction and detector technology to enable medium-range applications such as identification of biological and chemical agents with new breakthroughs in sensing science phenomenology and sensor architectures will be required for enabling far-future applications such as detailed spectroscopic characterizations of biological molecules and nanoscale systems. We invite papers and technical presentations in the following general areas of THz and millimeter wave systems is needed to enable very near-term payoffs such as security screening and the detailed characterization of materials such as explosives, pharmaceuticals or modern VLSI systems. Significant advancements are needed in THz source and detector technology to enable medium-range applications such as identification of biological and chemical agents, and new breakthroughs in sensing science phenomenology and sensor architectures will be required for enabling far-future applications such as detailed spectroscopic characterizations of biological molecules and nanoscale systems.

CHALLENGES

There remain significant phenomenological and technological challenges that will need to be resolved for many applications. In terms of defense/security applications, the refinement of THz and sub- and millimeter wave systems is needed to enable very near-term payoffs such as security screening and the detailed characterization of materials such as explosives, pharmaceuticals or modern VLSI systems. Significant advancements are needed in THz source and detector technology to enable medium-range applications such as identification of biological and chemical agents; and new breakthroughs in sensing science phenomenology and sensor architectures will be required for enabling far-future applications such as detailed spectroscopic characterizations of biological molecules and nanoscale systems.

We invite papers and technical presentations in the following general areas of THz and millimeter and sub-millimeter wavelengths:

- terahertz devices: electronics/photonics/plasmonics
- terahertz generation, propagation, and interaction
- passive components and materials issues in terahertz
- terahertz imaging
- terahertz sources, detectors and receivers
- terahertz system architectures and distributed networks
- terahertz diagnostics
- terahertz nanoelectronics
- terahertz spectroscopy
- terahertz systems
- advanced materials and concepts (e.g., metamaterials, memristor)
- novel concepts (e.g., plasmonic THz, quantum cascade lasers)
- terahertz to optical metamaterials, assemblies, and systems
- new frontiers and recent breakthroughs in terahertz research
• novel applications
  - VLSI trustworthiness and inspection – Counterfeit IC Detection
  - industrial inspection
  - security and military
  - biomedical
  - information processing and computing
  - electronics/information/communication systems
  - integration of advanced materials with conventional devices and systems.

WHO SHOULD ATTEND
This meeting will bring together researchers working on all aspects of THz radiation, from the coherent generation, transmission, and detection of THz waves to the individual opto-electronic devices needed to integrate them into viable systems. To further promote multidisciplinary interactions, we will recruit leading researchers from academia, government, and industry.

CALL FOR PAPERS

IMPORTANT DATES
Abstracts Due: 6 OCTOBER 2014
Author Notification: 15 DECEMBER 2014
Manuscript Due Date: 23 MARCH 2015

PLEASE NOTE: Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a full-length manuscript for publication in the conference proceedings.
Spectral Imaging Sensor Technologies: Innovation Driving Advanced Application Capabilities II (ST106)

The conference below of related interest is part of SPIE Sensing Technology + Applications, co-located at SPIE DSS 2015. Read more: www.spie.org/stacall

Conference Chair: David P. Bannon, Headwall Photonics, Inc. (USA)

Recent successes and key initiatives in theater have moved hyperspectral sensing to mainstream sensor technologies. Spectral imaging and, in particular sensor architecture design is a critical element of the recent DoD successes and there is now a needed forum linking the DoD community and industry to outline approaches, needs, and challenges.

This conference would be focused on the latest design and application innovation for the deployment of spectral imaging technologies. The focus of this conference will be on civilian/industrial application development particularly in areas such as 1) hyperspectral terrestrial imaging missions, 2) UAV-enabled spectral imaging applications, and 3) industrial inspection applications including advanced machine vision. In addition, session presentations on technical innovation, application performance, and data management are of significant interest to the community.

There are a number of sensor development companies ranging from small, technology companies to large, government primes who are looking to migrate defense technology sensor platforms to commercial application areas (particularly important given the US DoD budget constraints). Additionally, there are numerous companies in the unmanned vehicle industry that have great interest in increasing the functional utility of their platforms.

Focus would be placed on the intelligence agencies, and civilian agencies (e.g., EPA, NASA earth sciences) as well as the high profile university organizations working in the area of remote sensing, machine vision, and UAV design and deployment. Recruitment and focus would also be placed on European remote sensing communities (EARSEL, EUFAR, etc.) and remote sensing agencies throughout the Asia-Pacific region. The focus of this session is also with the intent of drawing in members of both the DoD community and civilian agencies.

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

CIVILIAN/INDUSTRIAL APPLICATIONS
- hyperspectral sensing and imaging sensors
- in-line machine inspection, machine vision
- cube-sat satellites for earth observation
- precision agriculture and crop science research
- spectral signatures
- chemical sensing
- imaging spectroscopy.

DEFENSE/SECURITY APPLICATIONS
- ISR sensing
- multispectral sensors and sensor fusion
- unmanned aerial vehicles (UAVs)
- remote sensing
- chemical and biological threat assessment.
Compressive Sensing IV (ST107)

The conference below of related interest is part of SPIE Sensing Technology + Applications, co-located at SPIE DSS 2015. Read more: www.spie.org/stacall

Conference Chair: Fauzia Ahmad, Villanova Univ. (USA)
Program Committee: Moeness G. Amin, Villanova Univ. (USA); Gonzalo R. Arce, Univ. of Delaware (USA); Abdesselam Salim Bouzerdoum, Univ. of Wollongong (Australia); Michael J. DeWeert, BAE Systems (USA); Matthew A. Herman, Inview Technology Corp. (USA); Eric L. Mokole, U.S. Naval Research Lab. (USA); Ram M. Narayanan, The Pennsylvania State Univ. (USA); Dimitris A. Pados, Univ. at Buffalo (USA); Athina P. Petropulu, Rutgers, The State Univ. of New Jersey (USA); Zhijun G. Qiao, The Univ. of Texas-Pan American (USA); Ervin Sejdic, Univ. of Pittsburgh (USA); Lei (Leslie) Ying, Univ. at Buffalo (USA)

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
- 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
- CS for ultra-wideband systems
- compression and superresolution
- waveform agility in CS
- efficient CS algorithms.

CALL FOR PAPERS

JOINT SESSION ON CS FOR RADAR APPLICATIONS

A special joint session between the Compressive Sensing (ST107) Conference and Radar Sensor Technology (DS111) Conference is being planned. This session will focus on the latest advances in theory and practice of CS for radar applications in Defense, Homeland Security, Space, and Health sectors.
Advances in Global Health through Sensing Technologies 2015 (ST114)

Conference Chair: Šárka O. Southern, Gaia Medical Institute (USA)
Conference Co-Chair: Isaac R. Rodriguez-Chavez, National Institute of Dental and Craniofacial Research (USA)
Program Committee: James Delehanty, U.S. Naval Research Lab. (USA); Theresa G. Evans-Nguyen, Draper Lab. (USA); Peter Kiesel, Palo Alto Research Ctr., Inc. (USA); Baochuan Lin, U.S. Naval Research Lab. (USA); Daniel Malamud, New York Univ. (USA); Igor Medintz, U.S. Naval Research Lab. (USA); Richard M. Ozanich, Pacific Northwest National Lab. (USA); Ava M. Puccio, Univ. of Pittsburgh Medical Ctr. (USA); Steven A. Ripp, The Univ. of Tennessee (USA); Albert Skip Rizzo III, The Univ. of Southern California (USA); Kim E. Sapsford, U.S. Food and Drug Administration (USA); Shadrian B. Strong, Johns Hopkins Univ. Applied Physics Lab. (USA); David E. Wolf, Radiation Monitoring Devices, Inc. (USA); Aurel Ymeti, Ostendum R&D BV (Netherlands)

MISSION: to host a discussion forum that will enable sharing applied scientific information, appraising the latest developments and facilitating the establishment of collaborations in projects within advanced sensing technologies linked to Global Health by connecting investigators, funding managers, commercialization experts and business developers.

BENEFITS: cross-disciplinary networking and new collaborations in life sciences, engineering, scientific marketing and governmental funding opportunities.

AREAS OF INTEREST:
- wearable biosensors and physiological monitors
- portable diagnostic systems
- field-expedient tests for pathogen detection
- traumatic brain injury (TBI) and post-traumatic stress disorder (PTSD)
- sensing technologies and biomarkers for cognitive deficits

GLOBAL HEALTH I: SENSING TECHNOLOGIES: FROM LAB TO MARKETPLACE
- assay platforms, collection devices and readers for noninvasive disease diagnostics (saliva, finger prick blood)
- microarray technologies for pathogen detection
- biomarker discovery and validation
- miniature optical sensors
- rapid scalable molecular assays
- technology transfer from R&D to commercial settings: legal, technical and logistical aspects
- product development cycle for sensing technologies
- challenges in manufacture and commercialization of sensing technologies
- regulatory compliance for product licensure: USA and developing countries
- scientific marketing of sensing technologies used in Global Health
- funding strategies for development of sensing technologies for Global Health.

GLOBAL HEALTH II: HIV/AIDS, MALARIA AND TUBERCULOSIS AND MRSA
- noninvasive rapid tests for point-of-care and field settings
- biomarkers for screening, diagnostics and therapeutic monitoring
- globally effective vaccines
- next-generation antimicrobials: biologically-derived MRSA prevention/treatment
- oral microbiome in health and disease
- Saliva-based diagnostics for HIV, Malaria and oral pathogens (viruses, bacteria and fungi)
- systemic diseases associated with HIV/AIDS
- oral cancers and oral opportunistic infections associated with HIV/AIDS and immunosuppression
- rapid tests to detect latent HIV reservoirs.

GLOBAL HEALTH III: APPLICATIONS TO MILITARY MEDICINE
- optimization of human performance: sensors, biomarkers, monitoring software
- environmental health: effects of extreme environments (heat, cold, altitude), metabolic stressors, toxins and operational stress
- sensing technologies and biomarkers for monitoring dehydration, heat injury, fatigue, cognitive deficits
- traumatic brain injury (TBI) and post-traumatic stress disorder (PTSD)
- field-expedient tests for pathogen detection
- portable diagnostic systems
- wearable biosensors and physiological monitors

sensor fusion, bioinformatics and wireless platforms. Advanced communication technologies such as satellite networks are used to bridge global data sharing. Main trends include rapid in vitro diagnostics, point-of-care tests, saliva diagnostics, disease biomarkers, wearable sensors and telemedicine.

Papers are solicited for the following topics:

Click the image to view the full paper.
• technologies for Integrated Soldier Sensor System
• telemedicine.

GLOBAL HEALTH IV: APPLICATIONS TO SPACEFLIGHT MEDICINE
• sensing technologies and biomarkers for monitoring space radiation exposure, microgravity, decompression sickness, fatigue, cognitive deficits and effects of prolonged bedrest
• undersea habitat as a research analog for space missions
• telemedicine.

GLOBAL HEALTH V: APPLICATIONS TO ENVIRONMENTAL MONITORING
• impact of climate change on public health and national security
• chemical and biological sensors for health outcome studies
• biomarkers for emerging disease and zoonotic infections
• satellite-based environmental sensors.

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The limitations in silicon-based microelectronics and nanoelectronics has led researchers to identify new material platforms that can operate and survive within high temperature, high radiation, high shock and chemically corrosive environments for extended periods. As a result, new materials science, advanced process technology and compelling demonstrations of transducers that operate well beyond the operation regimes of silicon have been conducted using wide bandgap semiconductor materials such as silicon carbide, aluminum nitride and gallium nitride. Ultimately, the ability to collect data and transduce signals within harsh environments will change the way we engineer automotive engines, industrial gas turbines, aircrafts and well-bore systems (e.g. geothermal and oil and gas exploration). In addition, harsh-environment sensing will allow us to understand environments that are challenging to assess such as the bottom of the ocean, space environments and the human body.

The Sensors for Extreme Harsh Environments conference will provide a critical update on the status of realizing sensors and sensing systems for prohibitive environments. Hence, we solicit articles and original research papers on materials development, sensor development, electronic devices, and energy harvesting for operation within harsh environments. Articles that address manufacturing, packaging and system integration methodologies are also considered.

Papers are solicited in, but not limited to, the following topics:
- sensors for harsh environments
- high-temperature instrumentation
- ocean sensors
- automotive sensors
- oil and gas sensors
- sensors for space exploration
- wide bandgap NEMS and MEMS technology
- synthesis and analysis of wide bandgap materials
- high-temperature energy harvesting and conversion devices
- interface electronics of harsh environment sensors
- wireless sensor networks for harsh environments
- structural health monitoring for harsh environments
- robust packaging for harsh-environment electronics.
Advanced Photon Counting Techniques IX (ST116)

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

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Energy Harvesting and Storage: Materials, Devices, and Applications VI (ST117)

This conference will consider existing and new harvesting and storage techniques as well as recent advances in novel harvesting and storage materials and devices. 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 nanopillars, nanotubes, quantum dots, quantum wires, and bio-inspired materials) for energy scavenging including energy storage techniques and their applications are attracting increasing interest in the scientific community.

This special meeting will be of interest to researchers in next generation harvesting or scavenging energy and their storage technology. We hope to bring together researchers from the wide fields of materials science, science, devices, optics, physics, chemistry, biology, electrical engineering, etc.

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

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 concepts from heat, light, ultraviolet, infrared, and motion sources, and high-capacity energy storages such as batteries, fuel cells, ultra-capacitors, supercap 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 ranges 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 micro- to macro-scale energy is also covered in this conference area.

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 across 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 and government agencies.

The conference below of related interest is part of SPIE Sensing Technology + Applications, co-located at SPIE DSS 2015. Read more:

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Conference Chairs:
Nibir K. Dhar, U.S. Army Night Vision & Electronic Sensors Directorate (USA);
Achyut K. Dutta, Banpli Photonics, Inc. (USA)

Program Committee:
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Paul Boieriu, EPISOLAR, Inc. (USA);
Deryn Chu, U.S. Army Research Lab. (USA);
M. Saif Islam, Univ. of California, Davis (USA);
Nobuhiko P. Kobayashi, Univ. of California, Santa Cruz (USA);
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Robert Olah, Banpl Photonics, Inc. (USA);
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A. Fred Semendy, U.S. Army Research Lab. (USA);
Sivalingam Sivanathan, EPIR Technologies (USA);
Ashok K. Sood, Magnolia Optical Technologies, Inc. (USA);
Patrick J. Taylor, U.S. Army Research Lab. (USA);
Sudhir B. Trivedi, Bromrose Corp. of America (USA); Rama Venkatasubramanian, RTI International (USA);
Chunlei Wang, Florida International Univ. (USA);
Priyalal Wijewarnasuriya, U.S. Army Research Lab. (USA)
• 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.

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
• solar powered wireless sensing systems for border security.

CALL FOR PAPERS

IMPORTANT DATES
Abstracts Due: 6 OCTOBER 2014
Author Notification: 15 DECEMBER 2014
Manuscript Due Date: 23 MARCH 2015

PLEASE NOTE: Submissions imply the intent of at least one author to register, attend the conference, present the paper as scheduled, and submit a full-length manuscript for publication in the conference proceedings.
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Available January 2015

The comprehensive Advance Technical Program will list conferences, paper titles, and authors in order of presentation; an outline of all planned special events; and hotel and registration information.

REGISTRATION
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All participants, including invited speakers, contributed speakers, session chairs, co-chairs, and committee members, must pay a registration fee. Fee information for conferences, courses, a registration form, and technical and general information will be available on the SPIE website in January 2015.

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• Only original material should be submitted.
• Abstracts should contain enough detail to clearly convey the approach and the results of the research.
• Commercial papers, papers with no new research/development content, and papers where supporting data or a technical description cannot be given for proprietary reasons will not be accepted for presentation in this conference.
• Please do not submit the same, or similar, abstracts to multiple conferences.

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• To ensure a high-quality conference, all submissions will be assessed by the Conference Chair/Editor for technical merit and suitability of content.
• Conference Chair/Editors reserve the right to reject for presentation any paper that does not meet content or presentation expectations.
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