SPIE. SENSORS+ IMAGING

Conferences: 16 - 19 September 2024
Exhibition: 17–18 September 2024
Edinburgh International Conference Centre
Edinburgh, United Kingdom

Submit abstracts by
3 April 2024

Electro-optical and Infrared Systems: Technology and Applications XXI (SD102)

Conference Chairs: **Duncan L. Hickman,** Tektonex Ltd. (United Kingdom); **Helge Bürsing,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany)

Programme Committee: **Gianni Barani,** Leonardo (Italy); **Piet Bijl,** TNO Defence, Security and Safety (Netherlands); **Rainer Breiter,** AIM INFRAROT-MODULE GmbH (Germany); **Lounis Chermak,** Cranfield Univ., Defence Academy (United Kingdom); **Bernd Eberle,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); **Linda Höglund,** IRnova AB (Sweden); **Natan S. Kopeika,** Ben-Gurion Univ. of the Negev (Israel); **Malgorzata Kopytko,** Wojskowa Akademia Techniczna im. Jaroslawa Dabrowskiego (Poland); **Daniel A. Lavigne,** Defence Research and Development Canada, Valcartier (Canada); **Gino Putrino,** The Univ. of Western Australia (Australia); **Stanley R. Rotman,** Ben-Gurion Univ. of the Negev (Israel); **Frank Rutz,** Fraunhofer-Institut für Angewandte Festkörperphysik IAF (Germany); **Philip J. Soan,** Defence Science and Technology Lab. (United Kingdom); **Dilusha Silva,** The Univ. of Western Australia (Australia)

Developments in electro-optical (EO) and infrared (IR) systems are key to providing the enhanced capability needed by military forces to meet the current and emerging challenges created through an increasingly difficult and complex range of operational conditions. Such enhanced operational capability must often be delivered against commercial demands for lower costs and reduced timescales together with operational requirements on size weight, and power (SWaP) and sustainability criteria.

This conference will address current and emergent sensor technology and system developments which will deliver the required future capability of all military applications and platform types covering the maritime, land, air and space domains. Current military operations have highlighted the growing importance of UAVs and drones for data gathering, combat operations, and damage assessment, and contributions on these topics are encouraged.

The performance challenges faced by future military systems will continue to evolve and grow. To address these challenges, EO/IR system designers will need to draw upon the ongoing developments in underpinning technologies such as new materials, MOEMS-MEMS, focal plane arrays, image processing, ML and AI technology, data fusion, and emergent sensor concepts such as multi-spectral and hyperspectral processing, computational imaging, and polarimetry. Modelling and simulation is increasingly becoming an enabler for maximizing performance and optimizing operational adaptability, and its interaction with trials and validation is a subject of topical concern. VR/AR designs and systems are seen as an evolving technology with benefits across the military spectrum including integration with battlefield and training systems.

EO and IR systems are likely to benefit from recent advances in material research, for example new carbon-based materials (including graphene), nanomaterials, and metamaterials. These new materials promise new EO properties that could significantly change the way EO and IR systems are designed and built, e.g. new detector systems with enhanced properties or negative refractive index materials which could radically change the way optics are designed. The potential benefits of MOEMS-MEMS technology, combined with new materials and device designs, are now being realized.

Computational Imaging, e.g. Pupil Plane Encoding, Coded Aperture Imaging, Compressive Imaging, etc., is another family of emerging technologies that will radically alter the way sensor systems are designed. These techniques combine optics and processing to provide a usable output from the sensor and can provide functionality not possible or practical with conventional system designs. Computational Imaging will require developments in specialist sub-components, non-standard optics design and algorithm development to reconstruct the image.

Quantum techniques are also being investigated to assess their potential for sensing systems. Quantum Imaging and Ghost Imaging are examples of quantum techniques being investigated by different teams. Any Quantum system will require specialist components e.g. sources, optics, detectors, electronics, and signal processing as well as providing scope for unconventional system design. Processing of sensor information has become a vital component of EO/IR sensor systems for display-driven, semi-autonomous, and autonomous applications. The timely extraction and presentation of pertinent information in a usable format is the ultimate goal in most developments, although the design flexibility to support hardware upgrades and meet emergent operational needs must be considered. Dual and multi-sensor system designs provide additional information and offer increased performance under a wider variety of conditions. The combination of such sensor information to provide both increased performance and robustness continues to present many design challenges despite the ongoing research into data fusion technology.

Advanced technology by itself is not sufficient to give new and/or advanced capabilities. Systems must be designed and developed in a way that will enable their reliable and cost-effective manufacture. This will involve adopting rigorous development and system engineering techniques. These are as crucial for the successful exploitation of sensor technology as the detector, optics, and electronics. The performance and required characteristics of sensor systems are critically dependent on the platform and the application. Many sensor payloads are now being fitted to autonomous vehicles and drones which present new challenges in design and integration. Applications areas that are currently receiving interest include target detection and tracking, area monitoring, mine and IED detection, environmental monitoring, and border security. There is also growing interest in wearable imaging devices which have their own unique challenges at the sensor design level, the exploitation of the sensor data, and the interconnection of multiple sensors.

SPIE. SENSORS+ IMAGING

Conferences: 16 - 19 September 2024
Exhibition: 17–18 September 2024
Edinburgh International Conference Centre
Edinburgh, United Kingdom

Submit abstracts by
3 April 2024

The innovation required to meet these future challenges will be drawn from a broad spectrum of organisations ranging from government laboratories, through international companies to SMEs and research centres. This conference will provide a technology and applications forum for EO/IR research and development teams, academia, and business and government stakeholders. Contributions from a diverse range of disciplines covering areas such as sensor components and supporting technology, EO/IR systems engineering, optical materials and design, sensor manufacture and test, materials science, image processing algorithms design and associated software methodologies, and modelling and simulation are also sought. Presentations are encouraged on dual-use applications, and for active and passive technologies systems covering the wavebands from UV to LWIR.

Papers are solicited in the following specific areas:

- advanced materials for EO/IR, e.g. metamaterials, nanomaterials, carbon based materials and their application
- focal plane array detector technologies, covering wavebands UV to LWIR including multi-band FPAs
- detector packaging, fabrication, temperature stabilization and integration technologies
- MOEMS-MEMS architectures, designs, micro-fabrication, performance, and applications
- passive imaging: technology, modelling, system design and hardware
- active imaging: technology, modelling, system design and hardware
- novel sensor technologies and their applications
- integrated and miniaturized sensors – reduced SWaP+C for applications such as autonomous and remote-control vehicles, and the dismounted soldier
- computational imaging: techniques, components, designs, and algorithms
- optical domain processing methods
- broadband, multiband, and hyperspectral sensors
- polarisation sensitive sensors and polarimetry applications
- imaging through the atmosphere
- signal and image processing
- autonomous processing including detection, tracking and classification
- the design of ML and AI technology for military system applications
- data fusion technology including image fusion and sensor fusion concepts
- modelling and analysis of EO/IR systems and sub-systems
- AR/VR designs and applications
- test, verification, and validation techniques
- compressive sensing in imaging systems
- quantum sensing components and system designs: theory and implementation
- defence and security applications of EO and IR sensor technology
- sensor payloads for autonomous vehicles and drones
- design and applications of wearable sensor systems
- remote sensing and surveillance for military applications
- dual use of military EO/IR sensor technology for environmental imaging and analysis (including ocean monitor)
- border and area security including air-to-ground detection and tracking for applications such as drug trafficking
- system integration design and development issues
- sensor demonstrators and prototypes
- sensor trials and performance evaluation
- system engineering approaches.

CONTINUED NEXT PAGE➡

SPIE. SENSORS+ IMAGING

ABSTRACT SUBMISSION GUIDELINES

Present your research at SPIE Sensors + Imaging

Below are abstract submission instructions, the accompanying submission agreement, conference presentation guidelines, and guidelines for publishing in the Proceedings of SPIE on the SPIE Digital Library. Submissions subject to chair approval.

Important dates

Abstract submissions due	3 April 2024
Registration opens	3 June 2024
Author notified and programme posts online	10 June 2024
Submission system opens for manuscripts and poster PDFs*	3 July 2024
Poster PDFs due for spie.org preview and publication	21 August 2024
Manuscripts due	28 August 2024
Advance upload deadline for oral presentation slides**	13 September 2024

**Contact author or speaker must register prior to uploading*
***After this date slides must be uploaded onsite at Speaker Check-in*

What you will need to submit

- Title
- Author(s) information
- Speaker biography (1000-character max including spaces)
- Abstract for technical review (200-300 words; text only)
- Summary of abstract for display in the program (50-150 words; text only)
- Keywords used in search for your paper (optional)
- Check the individual conference call for papers for additional requirements (i.e., special abstract requirements or instructions for award competitions)

Note: Only original material should be submitted. Commercial papers, papers with no new research/development content, and papers with proprietary restrictions will not be accepted for presentation.

How to submit your abstract

- Visit the conference page: **www.spie.org/sd102call**
- Choose one conference that most closely matches the topics of your abstract. You may submit more than one abstract, but submit each abstract only once
- Click the title of the conference to view the full description
- Sign in to the late submission system (now closed) or create an account if you do not already have one
- Follow the steps in the submission wizard until the submission process is completed

Submission agreement

All presenting authors, including keynote, invited, oral, and poster presenters, agree to the following conditions by submitting an abstract

- Register and pay the author registration fee
- Oral presenters: recording and publication of your onsite presentation (slides synched with voice) for publication in the Proceedings of SPIE in the SPIE Digital Library
- Poster presenters: submit a poster PDF by the advertised due dates for publication in the Proceedings of SPIE in the SPIE Digital Library; poster PDFs may also be published and viewable in the spie.org programme during and immediately after the event. Each poster must have a unique presenter; one person may not present more than one poster
- Email messaging for the conference series
- Submit a manuscript by the advertised due date for publication in the Proceedings of SPIE in the SPIE Digital Library
- Obtain funding for registration fees, travel, and accommodations
- Attend the meeting
- Present at the scheduled tim

Review and program placement

- To ensure a high-quality conference, all submissions will be assessed by the conference chair/editor for technical merit and suitability of content
- Conference chairs/editors reserve the right to reject for presentation any paper that does not meet content or presentation expectations
- Final placement in an oral or poster session is subject to chair discretion

Publication of Proceedings in the SPIE Digital Library

Increase your professional visibility and publish in the world's largest collection of optics and photonics research. Your peers access approximately 18 million papers, presentations, and posters from the SPIE Digital Library each year.

- Only manuscripts, presentations, and posters presented at the conference and received according to publication guidelines and due dates will be published in the Proceedings of SPIE in the SPIE Digital Library
- Manuscripts, presentations, and posters will be officially published after the event in the SPIE Digital Library
- Conference chairs/editors may require revision before approving publication and reserve the right to reject for publication any manuscript or presentation that does not meet acceptable standards for a scientific publication
- Conference chair/editor decision to accept or reject a manuscript, presentation, or poster for publication is final
- Authors must be authorized to provide a suitable publication license to SPIE; Authors retain copyright of all scientific material
- SPIE retains rights to distribute and market the official SPIE recording of the presentation and/or submitted video/poster
- SPIE partners with relevant scientific databases and indexes to enable researchers to easily find papers published in the Proceedings of SPIE. The databases that abstract and index these papers include Astrophysical Data System (ADS), Ei Compendex, CrossRef, Google Scholar, Inspec, Scopus, and Web of Science
- More publication information available on the SPIE Digital Library.

Contact information

For questions about your presentation, submitting an abstract, or the meeting, contact your Conference Program Coordinator.

SYMPOSIUM CHAIRS

Ric Schleijpen
TNO Defence, Security and Safety (Netherlands)

Lorenzo Bruzzone
Univ. degli Studi di Trento (Italy)

SYMPOSIUM CO-CHAIRS

Chantal Andraud
Ecole Normale Supérieure de Lyon (France)

Robert Lamb
Leonardo MW Ltd. (United Kingdom)

Claudia Notarnicola
Eurac Research (Italy)

COOPERATING ORGANISATIONS

CENSIS

UKRI Innovate UK KTN

Cranfield University

technology SCOTLAND

BARSC

PHOTONICS21

SPIE.