This conference on ATR emphasizes all aspects relating to the modern automatic and machine assisted target object recognition technologies. Novel methods in these key areas are of particular interest: deep-learning and model-based object/target recognition and tracking, information fusion, knowledge-based methods, adaptive and learning approaches, and advanced signal and image processing concepts for detection, multi-target and HVT tracking, and recognition for sonar/acoustic, EO, 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.

An 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.

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Papers are solicited in the following and related topics:

**MACHINE LEARNING FOR ATR**
- deep learning
- adversarial learning
- multi-view learning
- training methodologies.

**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
- multisensory processing and fusion
- performance evaluation issues.

**HYPERSPECTRAL-BASED SYSTEMS REGISTRATION ISSUES**
- detection, tracking, and recognition
- phenomenological modeling of targets and background
- polarization diversity
- target/object and scene segmentation
- passive autonomous navigation
- performance evaluation issues.

**GEOSPATIAL REMOTE SENSING SYSTEMS**
- object recognition from multi-view 3D
- object level change detection, recognizing the object from the change
- wide-area search: finding the object of interest in a scene
- scene understanding/Sensemaking – inference of activity from a single image
- performance evaluation issues.

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

**CONFERENCE CHAIRS:**
- Riad I. Hammoud, TuSimple, Inc. (United States)
- Timothy L. Overman, Prime Solutions Group, Inc. (United States)
- Abhijit Mahalanobis, The Univ. of Arizona (United States)

**PROGRAM COMMITTEE:**
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- Frederick D. Garber, Wright State Univ. (United States)
- Izidor Gertner, The City College of New York (United States)
- Megan King, U.S. Army Combat Capabilities Development Command (United States)
- Bing Li, Lockheed Martin Corp. (United States)
- Jason P. Luck, Lockheed Martin Missiles and Fire Control (United States)
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- Olga Mendoza-Schrock, Air Force Research Lab. (United States)
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- Lakshmanan Nataraj, Mayachitra, Inc. (United States)
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- Yahid R. Rasatli, California State Univ. Northridge (United States)
- Firooz A. Sajjadi, Emerging Concepts Laboratory LLC (United States)
- Cem Safak Sahin, Systems & Technology Research (United States)
- Angel D. Sappa, ESPOL Polytechnic Univ. (Ecuador)
- Larry T. Schwoch, Air Force Research Lab. (United States)
- Donald Waagen, Air Force Research Lab. (United States)
- Edmund Zelnio, Air Force Research Lab. (United States)

**WWW.SPIE.ORG/DCS109CALL**
NEUROMORPHIC (EVENT) BASED SYSTEMS
- detection, tracking, and recognition
- phenomenological modeling of targets and background
- target/object and scene segmentation
- passive autonomous navigation
- 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 approaches such as deep-learning, transfer-learning, dictionary-learning, and manifold-learning applications to ATR
- mission adaptive systems
- data characterization
- performance estimation and modeling
- ATR/AOR development tools
- ATR/AOR architecture
- algorithms for human detection, tracking, and activity recognition.

JOINT SESSION
A joint session on artificial intelligence/deep learning (AI/DL) is being planned with the Infrared Technology and Applications Conference (DCS204) conference. We expect to cover AI/DL in design of IR systems, subsystems, and components (military as well as commercial), and DL in IR-based detection, tracking, and recognition systems. DCS204 Call for Papers

PANEL DISCUSSION ON MACHINE LEARNING FOR AUTOMATIC TARGET RECOGNITION (ML4ATR)
Following the great success of past ML4ATR sessions, we intend to organize another session in 2023. The Machine Learning for Automatic Target Recognition (ML4ATR) session at SPIE Defense + Security (ATR conference) highlights the accomplishments to date and challenges ahead in designing and deploying deep learning and big data analytics algorithms, systems, and hardware for ATR. It provides a forum for researchers, practitioners, solution architects and program managers across all the widely varying disciplines of ATR involved in connecting, engaging, designing solutions, setting up requirements, testing and evaluating to shape the future of this exciting field. ML4ATR topics of interest include training deep-learning-based ATR with limited measured/real data, multi-modal satellite/hyperspectral/sonar/FMV imagery analytics, graph analytic multi-sensory fusion, change detection, pattern-of-life analysis, adversarial learning, trust, and ethics. We invite experts in the field to join this panel discussion in 2023. Each panelist gives a short keynote talk about their projects on machine learning for ATR.

BEST PAPER AWARD AND BEST STUDENT PAPER AWARD
To be eligible for this award, you must submit a manuscript, be accepted for an oral presentation, and you or your co-author must present your paper on-site. All students are eligible if the abstract was accepted during the academic year the student graduated. Students are required to be enrolled in University degree granting program. Manuscripts will be judged on technical merit, presentation/speaking skills, and audience interaction. Winners will be announced after the meeting and will be included in the proceedings. All winners will receive an Award Certificate and recognition on SPIE.org.
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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**

<table>
<thead>
<tr>
<th>Event</th>
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<tr>
<td>Abstracts Due</td>
<td>19 October 2022</td>
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<tr>
<td>Registration opens</td>
<td>January 2023</td>
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<tr>
<td>Authors notified and program posts online</td>
<td>16 January 2023</td>
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<tr>
<td>Submission system opens for manuscripts and poster PDFs*</td>
<td>27 February 2023</td>
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<tr>
<td>Poster PDFs due for spie.org preview and publication</td>
<td>5 April 2023</td>
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<tr>
<td>Manuscripts due</td>
<td>12 April 2023</td>
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<tr>
<td>Advance upload deadline for oral presentation slides**</td>
<td>28 April 2023</td>
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*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
- 250-word abstract for technical review
- 100-word summary for the program
- Keywords used in search for your paper (optional)
- Check the individual conference call for papers for additional requirements (for example, some conferences require two- to three-page extended summary for technical review, or have 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/DCS109call](http://www.spie.org/DCS109call)
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- Click the “Submit An Abstract” button on the conference page.
- Sign in to your SPIE account or create an account if you do not already have one.
- Follow the steps in the submission wizard until the submission process is completed.

If your submission is related to an application track below, indicate the appropriate track when prompted during the submission process.

**Application tracks**

Listed below are the application tracks available for this meeting. Application tracks aggregate presentations and focus on emerging technical and societal needs that require a multidisciplinary approach. Learn more.

**AI/ML:** Papers that showcase the use of artificial intelligence, machine learning, and deep learning to create and implement intelligent systems

**Net Zero:** Papers that feature solutions to achieving net zero energy consumption, waste, and carbon emissions within optics and photonics

**Submission agreement**

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

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- Poster presenters: submit a poster PDF and optional preview video, by the advertised due dates, for publication in the Proceedings of SPIE on the SPIE Digital Library
- Ensure that all clearances, including government and company clearance, have been obtained to present and publish. If you are a DoD contractor in the USA, allow at least 60 days for clearance
- Attend the meeting.
- Present at the scheduled time.

**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

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<tbody>
<tr>
<td>Tien Pham</td>
<td>Lead, The MITRE Corporation</td>
</tr>
<tr>
<td>Doug Droege</td>
<td>Sr. Director Technology Systems, L3Harris (USA)</td>
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