IEEE TRANSACTIONS ON
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Call for Papers:
Special Collection on "*Event-based Vision for Robotics*"

23 October 2024

Aims and Scope:

Event-based cameras have known a growing success in recent years, and they hold an important place in robotics today. In fact, these bio-inspired, asynchronous sensors offer unique opportunities compared to conventional frame-based cameras (low latency, large dynamic range, low power consumption, etc.). In the last decade, important strides have been made in the design, modeling and evaluation of complex robotic systems integrating event cameras, pushing the envelope of existing sensing technologies. Since the area has reached a sufficient level of maturity (international workshops dedicated to event-based vision have been organized at IROS'15, IROS'18, IROS'24, ICRA'15, ICRA'17 and CVPR since 2018, a highly influential survey paper was published in the IEEE Transactions on Pattern Analysis and Machine Intelligence in January 2022), the time has come to critically review the work done so far, to identify current and emerging applications in robotics, and to discuss promising future research directions. Researchers from academia and industry are invited to submit original contributions or review papers on "*Event-based vision for robotics*".

The scope of this special collection includes, but is not limited to, the following topics:

- *Algorithms*: motion estimation, visual-(inertial) odometry, SLAM, 3D reconstruction, image intensity reconstruction, optical flow estimation, recognition, segmentation, feature/object detection, visual tracking, calibration, sensor fusion (event and RGB, RGB-Depth, LiDAR, radar, etc.)
- *Applications in robotics*: navigation, manipulation, obstacle avoidance, human-robot interaction, automotive, aerospace science, automated inspection
- Model-based, embedded, or learning-based approaches
- Event-based representation, control, bandwidth control
- Event-based active vision, event-based sensorimotor integration
- Event camera datasets and/or simulators
- Novel hardware (cameras, neuromorphic processors, etc.) and/or software platforms, such as fully event-based systems (end-to-end)
- New trends and challenges in event-based and/or biologically-inspired vision (Spiking Neural Networks, Reservoir Computing, etc.).

Top-quality original (unpublished) articles and review papers are welcomed, following the IEEE T-RO journal instructions for authors. Each submission will be peer-reviewed and the selection of papers will be based on their originality, impact, and relevance to the scope of the special collection. To ensure that all manuscripts are correctly identified for evaluation

for the special collection, please select "*Event-based vision*" in the submission process. The organizers of this special collection hope that research in neuromorphic vision for robotics, will be further stimulated by the publication of an ensemble of high-quality papers.

Important Dates (tentative):

- Submissions open: January 1st, 2025
- Submissions close: ~~May 1st, 2025~~. June 30, 2025
- Expected publication date: End of 2025

Overseeing Editor:

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Guest Editors:

- Friedrich Fraundorfer (fraundorfer@icg.tugraz.at), Full Professor, TU Graz, Austria
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- Pascal Vasseur (pascal.vasseur@u-picardie.fr), Full Professor, University of Picardie Jules Verne, France

Short Biographies of the Guest Editors:

Friedrich Fraundorfer is Full Professor at the Institute of Computer Graphics and Vision at Graz University of Technology. With his team consisting of 7 Ph.D. students, he works in the research areas of 3D computer vision, robot vision and machine learning with a special focus on computer vision for unmanned aerial vehicles (drones). He currently serves as Associate Editor for the IEEE Transactions on Robotics (since June 1st, 2023) and for the Journal of Artificial Intelligence Research. He acted as Area Chair for ECCV 2020, ICCV 2021, ICCV 2023 as Senior PC Member for IJCAI 2019, 2020, 2021 and as Associate Editor for IROS 2016, ICRA 2019, ICRA 2020, ICRA 2021. He coordinated the DACH project VMAV (2014-2016), has been part of the PHC AMADEUS (2017-2018) project and is now Co-PI of the EVELOC project, about localization methods for event-based cameras. He has been involved in multiple national and international projects like SLIM (EU-H2020, 2016-2020), Resist (EU-H2020, 2018-2021) and Holomine (EIT KIC, 2019-2022). He is the author of a well-received two-part tutorial about visual odometry in the IEEE Robotics and Automation Magazine. His work on autonomous UAVs got nominated for the Best Paper Award at IEEE IROS 2012.

- **Guillermo Gallego** (Senior Member, IEEE) received the Ph.D. degree in electrical and computer engineering from the Georgia Institute of Technology, Atlanta, GA, USA, in 2011. He is currently an Associate Professor with Technische Universität Berlin, Berlin, Germany, and with the Einstein Center Digital Future, Berlin, where he leads the Robotic Interactive Perception Laboratory. He is also a Principal Investigator with the Science of Intelligence Excellence Cluster, a member of the Robotics Institute Germany (RIG) and co-director of the HEIBRiDS research school, Berlin, Germany. Dr. Gallego was the recipient of the Fulbright Scholarship. He is an Associate Editor for IEEE Transactions on Pattern Analysis and Machine Intelligence, IEEE Robotics and Automation Letters, and International Journal of Robotics Research.

- **Fabio Morbidi** (Senior Member, IEEE) received the Ph.D. degree in control engineering and robotics from the University of Siena, Italy, in 2009. He was a visiting researcher at the University of California, Santa Barbara, USA, in 2008, and he held post-doctoral positions at Northwestern University, University of Texas at Arlington, USA, and at Inria Grenoble Alpes, France. Since 2014, he has been an Associate Professor of robotics with the University of Picardie Jules Verne, France. Since 2022, he has been the head of the Robotic Perception group at the MIS laboratory. He is the local coordinator of the ANR CERBERE (*Event cameras for perception of rapid objects around an autonomous vehicle*) project and he locally coordinated the Interreg France (Channel) England ADAPT project (2019-2022). He currently serves as Associate Editor for the IEEE Transactions on Robotics (since April 1st, 2022) and for the IEEE Robotics and Automation Letters. He is the co-author of a monography on omnidirectional vision published by ISTE-Wiley in 2023 and of more than 70 papers in the areas of multi-robot systems and robotic vision.

- **Pascal Vasseur** is Full Professor at the University of Picardie Jules Verne (MIS laboratory) and he is the head of the Department of Informatics. His research activities deal with robotics perception (vision, lidar, radar, etc.) and methods for pose estimation, mapping and localization for robotics and automotive applications. He has been a member of the National University Council (Section 61) since 2016. He was Associate Editor for the IEEE Robotics and Automation Letters from 2016 to 2002, and he currently serves as Senior Editor. He coordinated the ANR projects CaViAR (2005-2008) and pLaTINUM (2015-2019), the international ANR/NRF DrAACaR project (2011-2015), and the international PHC STAR (2008-2009) and AMADEUS (2017-2018) projects. He is currently involved in the ANR CERBERE, EVELOC, and DEVIN projects on event-based vision.