TU Delft

Delft University of Technology

Guest Editorial Special Issue on Sensing and Machine Learning for Automotive Perception

Santra, Avik; Pandharipande, Ashish; Wang, Pu Perry; Gurbuz, Sevgi Zubeyde; Ibanez-Guzman, Javier; Cheng, Chih Hong; Dauwels, Justin; Li, Guofa

DOI
10.1109/JSEN.2023.3267662

Publication date
2023

Document Version
Final published version

Published in
IEEE Sensors Journal

Citation (APA)
Santra, A., Pandharipande, A., Wang, P. P., Gurbuz, S. Z., Ibanez-Guzman, J., Cheng, C. H., Dauwels, J., & Li, G. (2023). Guest Editorial Special Issue on Sensing and Machine Learning for Automotive Perception. *IEEE Sensors Journal*, *23*(11), 11116. https://doi.org/10.1109/JSEN.2023.3267662

Important note
To cite this publication, please use the final published version (if applicable).
Please check the document version above.

Copyright
Other than for strictly personal use, it is not permitted to download, forward or distribute the text or part of it, without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license such as Creative Commons.

Takedown policy
Please contact us and provide details if you believe this document breaches copyrights.
We will remove access to the work immediately and investigate your claim.

This work is downloaded from Delft University of Technology.
For technical reasons the number of authors shown on this cover page is limited to a maximum of 10.

Green Open Access added to TU Delft Institutional Repository

'You share, we take care!' - Taverne project

https://www.openaccess.nl/en/you-share-we-take-care

Otherwise as indicated in the copyright section: the publisher is the copyright holder of this work and the author uses the Dutch legislation to make this work public.

Guest Editorial Special Issue on Sensing and Machine Learning for Automotive Perception

THERE has been tremendous interest in self-driving and advanced driver assistance systems for automotives over the recent past. According to market predictions, achieving advanced levels of autonomous driving may still be significantly far from large-scale commercial deployment. One of the challenges is to obtain reliable environmental perception from onboard automotive sensors, and possibly external sensors, to support safety-critical driving. Automotive perception includes processed and learned information from multimodality sensors like lidar, camera, ultrasonic, and radar. Conventionally, this sensor information has been supporting functions like emergency braking, adaptive cruise control, and self-parking. This Special Issue explores advances in sensors, sensor system architectures, data processing, and machine learning for automotive perception. This Special Issue also aims to bridge the traditional model-based automotive sensing field with the rapidly emerging data-driven field that uses machine learning methods and focuses on feature representation for high-level semantic understanding. Driven by the efforts on automotive sensor hardware platforms and open datasets, vision-inspired deep learning has shown great potential to achieve state-of-the-art performance and yield better results than traditional signal processing methods in multiobject detection and tracking, simultaneous localization and mapping, multimodal sensor fusion, scene understanding, and interference mitigation. This Special Issue highlights advances in machine learning architectures and methods for automotive perception, alongside performance evaluation methodologies and field test results.

The Guest Editors of this Special Issue accepted 18 manuscripts from a total of 41 received submissions covering the following aspects.

1) The first review paper from the guest editors introduces sensors and data processing methods for exterior and interior automotive perception, also highlighting machine learning considerations in automotive perception.
2) Six papers focus on object detection and tracking using radar, optical, or Lidar sensors, including fusion among multiple modalities.
3) Three papers present collision avoidance and decision-making strategies using reinforcement learning and imitation learning.
4) Three papers deal with aspects of odometry, localization, and mapping functionalities of automotive perception.
5) Two papers present in-cabin monitoring for people counting and analyzing driver-driving behavior scenes.
6) Two papers deal with target estimation/classification and one paper deals with simulation framework in an automotive context.

Finally, the Guest Editors thank the authors and reviewers for their contributions to this Special Issue. They are grateful to the editorial board, administration, and publication staff for their everlasting support in putting together this Special Issue.

AVIK SANTRA
Infineon Technologies
Irvine, CA 92618 USA
e-mail: avik.santra@infineon.com

ASHISH PANDHARIPANDE
NXP Semiconductors
5656 AE Eindhoven, The Netherlands
e-mail: pashish@ieee.org

PU (PERRY) WANG
Mitsubishi Electric Research Laboratories
Cambridge, MA 02139 USA
e-mail: pwang@ieee.org

SEVGI ZUBEYDE GURBUZ
Department of Electrical and Computer Engineering
The University of Alabama
Tuscaloosa, AL 35487 USA
e-mail: szgurbuz@eng.ua.edu

JAVIER IBANEZ-GUZMAN
Renault, 78064 Guyancourt, France
e-mail: javier.ibanez-guzman@renault.com

CHIH-HONG CHENG
Fraunhofer IKS, 80686 Munich, Germany
e-mail: chih-Hong.cheng@iks.fraunhofer.de

JUSTIN DAUWELS
Department of Microelectronics
Delft University of Technology (TU Delft)
2628 CD Delft, The Netherlands
e-mail: justin@dauwels.com

GUOFA LI
College of Mechanical and Vehicle Engineering
Chongqing University
Chongqing 400044, China
e-mail: hanshan198@gmail.com

Digital Object Identifier 10.1109/JSEN.2023.3267662

1558-1748 © 2023 IEEE. Personal use is permitted, but republication/redistribution requires IEEE permission.
See https://www.ieee.org/publications/rights/index.html for more information.