Guest Editors' Introduction

Intelligent Cars: Are We There Yet?

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The automotive industry is experiencing disruptive changes at all levels—from design, and production, to community and business models. A previously rigid and very closed business environment is forced to open and embrace new methods to survive. In particular, it has become clear that a previously strongly deterministic approach has to be replaced with flexible adaptive approaches. This opened a path to new methods, which are reportedly necessary to bring the industry to the ultimate goal—driverless vehicles in any driving condition. The artificial intelligence (AI) has a significant role in this development, but it has not reached the full potential yet due to rigorous requirements that automotive-grade outputs need to satisfy. Nevertheless, an access to a paramount source of data has pushed AI methods to front rows, while all other processing methods are grouped in the "pre-AI era," or even labeled as "vintage methods."

Futuristic predictions just a few years ago were very optimistic, and foreseen time span until deployment decreased from several decades to several years. After the first wave of the excitement has passed, the closer look at the whole picture revealed that the problems of the ecosystem apply not just to actual engineering of the vehicles, but to the impacts this technology has on the society. This made us aware, that although we have a technology to answer to the challenge, the technology needs to mature further to cover all critical use cases.

An automotive field has always been classified as an industry, rather than consumer, although a consumer mass market of a final product—a vehicle, is huge: according to the world association of car manufacturers Organisation Internationale des Constructeurs d'Automobiles (OICA), in 2017, the global average annual turnover was 2.75 trillion, with production of 73.4 million cars and 23.84 million trucks. As modern vehicles architecture changes inside, and hardware and software take roles of mechanical parts, so changes the interior of the vehicle. We witness the integration of products and services from creative industries and other common consumer electronics products and services into cabins [1]. This affected terminology and expectations. This nicely illustrates why the term "*consumer electronics*" (CE) has become obsolete and the term "*consumer technology*" has become more appropriate, reflecting the social changes due to technology accomplishments and shifts in consumer expectations. Thus, before we hit the big milestone—complete switch to driverless vehicles, also known as L5, we are continuing research to make this experience better, smoother, and safer.

The articles in this special section are carefully chosen with the help of the Editor-in-Chief (EIC), are part of this legacy. The articles are extended versions of presentations at the

Digital Object Identifier 10.1109/MCE.2020.2972084
Date of current version 8 June 2020.

2162-2248 © 2020 IEEE
Published by the IEEE Consumer Electronics Society

Zooming Innovation in Consumer (ZINC) Conference held annually in Novi Sad, Serbia organized by Consumer Electronics Society (CESoc) Chapter in Serbia, and sponsored by RT-RK Institute from Novi Sad.

SCANNING ARTICLES OF THE SPECIAL SECTION

The article "Traffic Light Detection in Autonomous Driving Systems" by D. Vitas *et al.* explores the use of a single sensor—camera, to extract information about surrounding. The use case is focused on traffic lights. For humans, detection of the traffic lights and the action taken is considered a relatively simple task. However, for future implementations in the automotive industry, the process is more complex. We have to break the process into steps, from preprocessing of desired data, decisions on what to track, to metrics that will eventually support a decision of the best method. In addition, two points are important in this article: single sensor—camera, for data acquisition, and - to stay true to the AI trend, deep learning technics for traffic light localization.

The article "TTEthernet Mixed-Critical Communication: Overview and Impact of Faulty-Switches" by M. Sandic *et al.* touches the importance of determinism, and what to do when determinism is compromised. To preserve determinism, the synchronization is crucial. However, if the system resets, due to some critical event, such as storm, how we boot the system fast, and which parameters should stay default? Do we need to compromise safety, or determinism, or neither? A view on everlasting problem in areas between critical and noncritical elements, problems that may arise, and how to solve them is described in this article.

After reading the article "Developing Consumer Electronics Software Using A-SPICE: Infotainment Development Experience" by J. Vlaovic *et al.,* we can wonder where the line between the mentioned fields is. This article is an example of interdisciplinary bridge between the automotive industry and consumer technologies.

ACKNOWLEDGMENTS

We would like to thank all the authors for their valuable contribution to this editorial. However, the choice is not valid without efforts of the reviewers, and we would like to acknowledge and thank the reviewers for their valuable and timely efforts to ensure the high quality of the papers. We hope that the chosen papers will serve as a valuable resource for the CE community.

REFERENCE

1. F. Pieri, C. Zambelli, A. Nannini, P. Olivo, and S. Saponara, "Is consumer electronics redesigning our cars? challenges of integrated technologies for sensing, computing, and storage," *IEEE Consum. Electron. Mag.*, vol. 7, no. 5, pp. 8–17, Sep. 2018.

Gordana Velikic is currently a Director for Science Programs with the RT-RK Institute, Novi Sad, Serbia. Her research interests are diverse, from healthcare to automotive. She to applies "classic" and "modern" techniques to novel fields, while learning from emerging fields. Contact her at Gordana.Velikic@gmail.com.