

7th International Workshop on Safety and Security of Intelligent Vehicles – SSIV 2021

Michaël Lauer
Université de Toulouse
LAAS-CNRS
France
mlauer@laas.fr

Kalinka Branco
Universidade de São Paulo
Brazil
kalinka@icmc.usp.br

João Carlos Cunha
Polytechnic Institute of Coimbra – ISEC
CISUC
Portugal
jcunha@isec.pt

Mobile robot systems, like aerial and ground vehicles, have been receiving an increased number of electronic components, connected through wireless networks, and running embedded software. This strong integration between the physical environment, dedicated computing devices, and networking, composes a Cyber-Physical System (CPS). CPS have thus become part of common vehicles, accessible to everyone, such as automobiles or unmanned aerial vehicles (UAVs). Furthermore, as processing power increases and software becomes more sophisticated, these vehicles gain the ability to perform complex operations, becoming more autonomous, efficient, adaptable, comfortable, safe, and usable. These are known as Intelligent Vehicles (IV).

A prominent representative of Intelligent Vehicles are automobiles which are now able to offer active safety, adaptive cruise control, park assistance, automatic climate control, navigation support and, in a near future, vehicle to vehicle communication. With networking capabilities, the myriad of devices inside the vehicles become part of the IoT (Internet of Things) world.

These systems are classified as critical, since failures may cause the loss of human lives or high-value assets, meaning that safety is one of the main concerns for developers and users. However, the combination of high mobility and wireless communications has further increased the exposure of such systems to malicious threats and to faults deriving from uncertain connectivity or communication timeliness. Non-functional requirements like security and real-time operations have thus become harder to fulfill, creating new challenges to these safety-critical embedded systems. The humans' environment will continue to evolve to interactive IoT, that will include mobile (flying, driving, floating, rolling, diving, walking, etc) objects that will raise numerous challenging issues.

Observing the current trend in the development of self-driving cars, one can only infer that artificial intelligence (through machine learning) is going to play a crucial role in the future intelligent vehicle. However, the complexity of such algorithms decreases their level of trust, and integrating them in critical systems is a far-reaching research issue. Even advanced hardware components like multi-core processors, GPUs, or FPGAs that represent a formidable opportunity to deploy complex functionalities in intelligent vehicles, will raise new difficulties for certification, verification of real-time properties, safety and security.

This will be the seventh edition of the workshop, aimed at continuing the success of previous editions. The vast range of open challenges to achieve Safety and Security in Intelligent Vehicles (with or without connection with the Internet) is a fundamental reason that justifies the numerous research initiatives and wide discussion on these matters, which we are currently observing everywhere.

This year's edition will run in Taipei, Taiwan, in conjunction with the 51st Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN). Due to the COVID-19 pandemic, the conference runs virtually. Previous editions took place in Rio de Janeiro, Brazil (2015), Toulouse, France (2016), Denver, USA (2017), Luxembourg (2018), Portland, USA (2019) and València, Spain (2020). SSIV 2021 will be organized in 4 sessions that include the presentations of the 8 accepted papers and one panel:

- **Session 1** will have a **Welcome Address** and the presentation of 2 papers about **Security Attacks to Road Vehicles**, one addressing platoon communication and the other threats identification and safety-security analysis.
- **Session 2** is devoted to **Safety Evaluation and Verification of Autonomous Driving**, and includes 3 papers presentations addressing topics on perception capabilities with respect to safety, fail-over mechanisms, and neural network controlled systems.
- **Session 3** is devoted to **Safety Certification, Assessment and Architectures**, and also includes the presentations of 3 papers about certification of emergency landing for UAV, a semi-formal language for specifying safety cases, and a safety architecture for E/E centralized architectures.
- **Panel Session** will feature a strong debate between 3 invited speakers about "Future Challenges in Safety and Security of Intelligent Vehicle".

We would like to express our gratitude to the Program Committee members of SSIV 2021 for their hard work and dedication in providing insightful feedback to the authors, and also to the DSN 2021 conference Organizing Committee for their support in the setup and arrangements of the Workshop, mainly in this pandemic time, keeping safety and well-being of all conference participants as a priority.

For further information, visit: sites.google.com/view/ssiv.