IoT-based interaction of automated vehicles with Vulnerable Road Users in controlled environments

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Abstract

As automated features begin to permeate the market and the possibility of full automation becomes more likely, it is essential to both review potential impacts on traditionally vulnerable populations as well as reimagine vulnerability under this emerging market [Meyer & Beiker Eds, 2016].

With regard to the safety of highly automated cars, their continuous development and implementation raise new issues in traffic research, as e.g. the effect of automated vehicles on the driver and the surrounding traffic participants. For the efficient implementation of such technologies, it is therefore a prerequisite to offer a safe and sustainable shared mobility environment.

During the last decade a large number of IoT technologies have been developed by the research community [Vermesan and Friess Eds, 2014]. These technologies empower IoT researchers and solutions providers to develop and deploy novel IoT applications in key application areas. Such an area is highly automated driving, where it is expected to highly benefit from IoT services, especially in controlled environments, both for technological advancement of the vehicle automation per se but also on emerging business perspectives.

The overall objective of the AUTOPILOT project is to bring together relevant knowledge and technology from the automotive and the IoT value chains in order to develop IoT-architectures and platforms which will bring Automated Driving towards a new dimension [AUTOPILOT, 2016].

One of the project focused studies is to investigate the interaction and coexistence of highly automated cars with vulnerable road users, especially on pedestrians and cyclists. Potential conflicts between automated vehicles and pedestrians in shared traffic spaces, like parking places or public points of interest, need to be identified and solved in a collaborative way; the knowledge on the intention of the vulnerable road users in traffic situations play an important role in this context.

In particular, many complex traffic situations between an automated vehicle and a VRU need communication between the participants to ensure safe and reliable operation. Consequently, high automated cars should be able to assess if, for example a pedestrian

intends to cross a street; then it needs to react in a cooperative way to avoid a conflict situation in advance [Schulze, Müller and Meyer Eds., 2016].

This abstract aims to present the technical framework of an IoT-based interaction platform between highly automated cars and vulnerable road users (pedestrians and cyclists) at a controlled touristic environment, located at the Versailles castle in Paris, France. This platform will both target the development of innovative algorithms for calculating the intentions of the vulnerable participants, and the necessary required wearable platform (using off-the-self wearables such as smartphones, smart glasses, smart watches, etc.) that will communicate with the automated cars through IoT-based technology available through the infrastructure. The relevant large scale pilot will provide the required missing knowledge in order to create a safe shared mobility environment for all traffic participants and promote the acceptability and reliability of high automation, especially in controlled environments that encompass high risk of conflict.