Press Release

Findings from the DEKRA Road Safety Report 2023

Correctly adjusted sensors essential for safety

- Self-diagnosis is not sufficient to ensure functional behavior
- Sensors should definitely be checked during vehicle inspection
- Issue gains further importance with increasing automation

Modern vehicles with driver assistance systems usually detect when something is wrong with the sensors and warn the driver of a system failure. But what if the sensors are so minimally adjusted that the vehicle does not yet report a fault? DEKRA experts investigated this question in driving tests at the DEKRA Technology Center at the Lausitzring in Brandenburg, Germany. The consequences of so-called sensor misalignments were examined. “We found that even the smallest impairments below the so-called self-diagnosis threshold can lead to a malfunction that endangers safety”, Christoph Bahnert, Team Leader for Driver Assistance Systems and Highly Automated Driving at DEKRA Automobil GmbH in Klettwitz, points out. The results of the driving tests are also taken up in the DEKRA Road Safety Report 2023 “Technology and People”.

Sensors play a very central role around the functionality of driver assistance systems. As “"sensory organs” in the vehicle, they have the task of detecting driving or traffic situations and converting the measurement results into electrical signals. The sensor technology is often camera-based, and modern systems also use radar or lidar sensors to generate reliable results even in the dark and in adverse weather conditions – for example, to identify road markings and traffic signs as well as people and vehicles.

However, sensor misalignments can significantly limit the functionality of the assistance systems. This is the result of two driving tests conducted by DEKRA. In one case (A), the experts deliberately manipulated the front camera below the self-diagnosis threshold – i.e. the driver does not expect any restrictions as a result of the apparently error-free self-diagnosis – and evaluated the effects on vehicle behavior in standardized emergency braking scenarios. In the second case (B), they investigated the behavior of the blind spot assistant when the rear radar is in the wrong position, as can happen after a parking bump.

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Contact Wolfgang Sigloch
Phone +49.711.7861-2386
Fax +49.711.7861-742386
E-Mail wolfgang.sigloch@dekra.com

DEKRA e.V.
Corporate Communications
Handwerkstraße 15
70565 Stuttgart, Germany
www.dekra.com/en/press-overview

Impact not prevented

Case A was carried out with three different test vehicles, each of which had an emergency brake assistant and was also equipped with high-precision measurement technology. The DEKRA experts ran two standard Euro NCAP scenarios: approaching a stationary vehicle or target and detecting a dummy pedestrian on the roadway. The speeds driven were 20, 40 and 60 km/h respectively (12, 25 and 37 mph). When the camera was correctly aligned, all three vehicles warned the driver in good time and braked to a standstill in front of the respective target.

Subsequently, the alignment of the front camera was misaligned below the self-diagnostic threshold in each case. One of the vehicles subsequently failed to avoid impact with the stationary vehicle even at 20 km/h (12 mph), another test vehicle could have avoided impact only at 20 and 40 km/h (12 and 25 mph), and only one test vehicle still warned and braked in time at all three speeds. “The pedestrian would have been hit by all three vehicles at 60 km/h with minimally impaired sensors”, reports DEKRA expert Bahnert. He added that it was also worrying that even at 40 km/h (25 mph) two of the three vehicles tested had shown neither warning nor braking intervention by the assistance system.

A front camera that is only slightly misaligned can thus quickly lead to a safety-endangering malfunction that the driver cannot even recognize in advance in this form. Such maladjustments can occur, for example, when windshields are not replaced correctly.

“As the sensor system is essential for the assistance functions, it should therefore definitely be checked as part of the periodic vehicle inspection”, emphasizes Jann Fehlauer, Managing Director of DEKRA Automobil GmbH. Since purely visual inspection of the sensors, which are usually concealed, is just as insufficient as reading out the vehicle's self-diagnosis, DEKRA is already working on appropriate technological testing methods. “With the increasing degree of automation of vehicles, this topic will become even more important in the future”, Fehlauer continues.

Danger when changing lanes

The need to test sensor technology as part of periodic vehicle monitoring naturally applies not only to the front camera but also to other sensors such as rear radar, as test case B illustrates.

The DEKRA experts simulated a scenario that occurs again and again on freeways: a vehicle is driving in the outside lane at a higher speed, the driver of a second vehicle in the inside lane is planning to overtake and wants to pull out. For the test, the rear

radar was minimally adjusted transversely to the direction of travel – again without an error message from the self-diagnosis and not visible due to the obscuring by the rear bumper.

“The blind spot assistant only warned when the distance to the vehicle approaching from behind was far too small and thus clearly too late to prevent an accident when a lane change was actually carried out”, says Christoph Bahnert, summing up the test.

Further background information on this topic and on the area of conflict between technology and people can be found in the DEKRA Road Safety Report 2023, which is available at www.dekra-roadsafety.com.

About DEKRA

DEKRA was originally founded in 1925 to ensure road safety through vehicle inspection. With a much wider scope today, DEKRA is the world’s largest independent non-listed expert organization in the testing, inspection, and certification sector. As a global provider of comprehensive services and solutions, we help our customers improve their safety, security, and sustainability outcomes. In 2022, DEKRA generated sales totaling nearly EUR 3.8 billion. The company currently employs almost 49,000 people who offer qualified and independent expert services in approximately 60 countries on five continents. With a platinum rating from EcoVadis, DEKRA is now in the top one percent of sustainable businesses ranked.