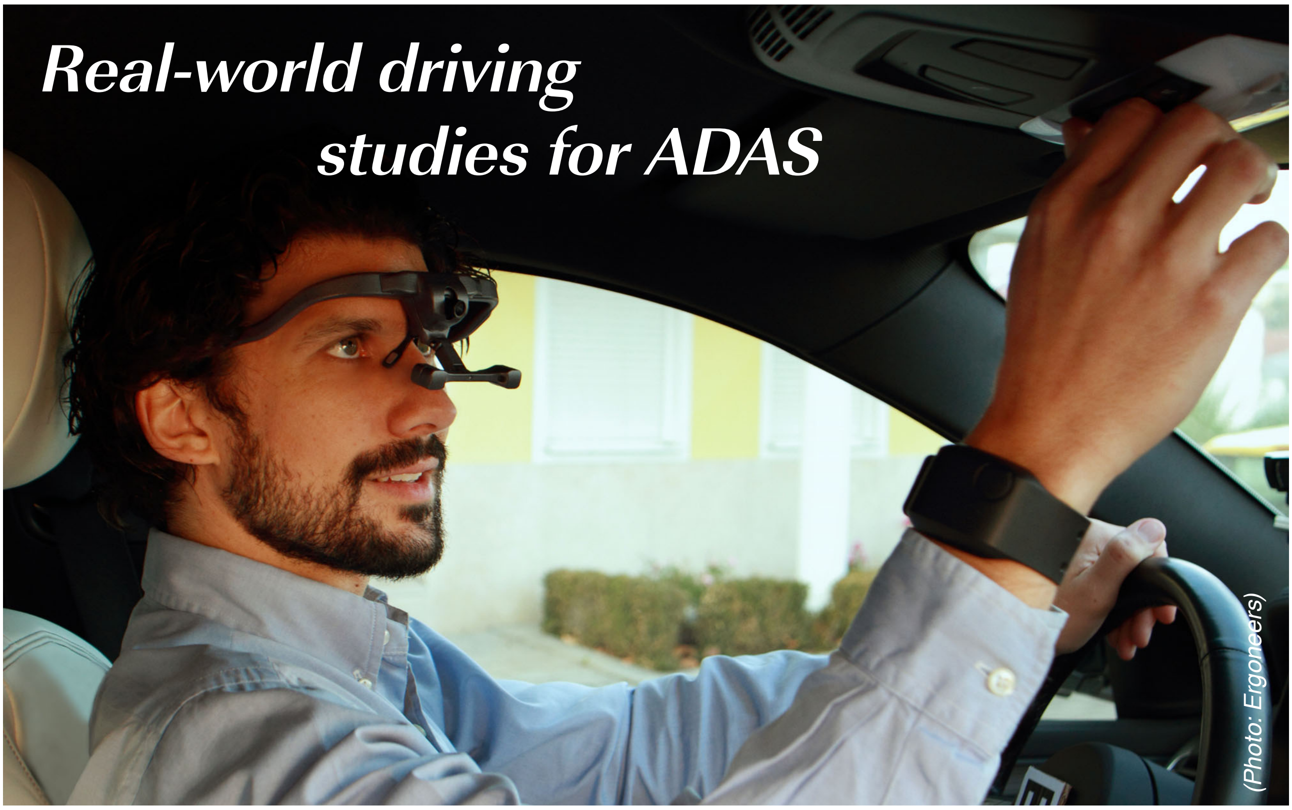
Real-world driving studies for ADAS



No doubt ADAS testing is important. But simulation only is not sufficient, real-world driving studies complement them.

The range of ADAS (advanced driver assistance systems) is growing – and not just since connected cars and autonomous driving has come increasingly to the fore of the automotive industry. Using sensors, ADAS detect the vehicle environment, interpret these, and aim to support drivers while traveling as well as improve driving comfort. Because ADAS (still) do not independently contribute to vehicle safety, it is particularly important that they do not jeopardize the safety of the driver by distracting or disrupting them. Before such systems are adopted in the vehicles, they should be tested under conditions that are as realistic as possible.

For several years now, renowned automakers have already been testing their ADAS using behavioral observation – before their products are launched. Frequently, a simulator is used to carry out such behavioral observations. A simulator provides most characteristics of an auto cockpit, such as a dashboard with a steering wheel, and it has high validity because experimental scenarios can be repeated on a 1:1 basis, delivering good possibilities of comparison. However, these results can only be transferred to the real world in a limited way, as the driver environment is only displayed on one screen. These limitations include in particular the driving dynamics, because driving characteristics and the driving impression in the simulated world does not correspond to those in the real world, and thus, the actual reaction of the driver may differ under certain conditions. A useful addition to the simulation studies is therefore so-called real-world driving studies, which present a method for driver behavioral observation in a real-world driving environment. In doing so, drivers sit in a real car and are on the road in everyday traffic. Their behavior during the journey is monitored by experts as well as specialized technology, which records and analyzes interaction between the driver and ADAS.

Ergoneers specializes in the development of hardware and software for behavioral research. The company has therefore developed the Vehicle Testing Kit (VTK), which features several hardware components and provides the modular D-Lab software platform to facilitate the execution of real-world driving studies. This specially designed tool minimizes work during real-world vehicle studies: So far, an enormous effort has been required in terms of technology, time and thus finances, to install the entire test equipment for test series in a suitable vehicle. VTK provides a cost-effective solution: It is portable, easy to manage, and can be integrated effectively into various vehicles. Data are then structured and systematically collected, and can then be evaluated from ▷

Figure 1: The VTK comprises several hardware components and the D-Lab software platform (Photo: Ergoneers)

▷

Figure 2: The VTK is put on the back-seats and linked to the CAN-based in-vehicle networks (Photo: Ergoneers)

various perspectives using the measuring and analysis software D-Lab.

Eye-tracking glasses, such as the Dikablis Glasses by Ergoneers, allow logging and retracind, when and where the gaze of the driver is directed while testing an ADAS. The retention time of the gaze at the system plays an important role here: Looking at the system – and thus not on road traffic – can compromise the safety of the driver as well as others in road traffic. For comprehensive data collection, audio and video data can also be used, leading to an even more precise measurement of the interaction between driver and ADAS. By also reading the CAN frames and interpret them. This important data of the vehicle itself can also be retrieved – in addition to driver information. In this way, it is possible to retrace when, for example, the car braked and how often the driver manually operated the assistance system.

However, collecting these data is not enough. In order to save valuable time, the exact evaluation is automated using the measuring and analysis software D-Lab; in this way, the variables can be defined flexibly yet comprehensively. Furthermore, using the marker technology developed by Ergoneers, the eye tracking data can be completed in a fully automated manner. In conjunction with the data from the CAN network, it is now possible to retrace very accurately why a driver braked or which system elements have induced any overly-long retention time during use. In this way, the operation of the elements is adapted so that the driver looks less at the system, allowing for more time for road traffic.

Testing such systems in advance constitutes an important point in the product cycle. In doing so, it can be guaranteed that ADAS support drivers and avoid putting them in danger. ADAS are particularly important for the drivers of the future; they are a stepping stone towards autonomous driving. ◀

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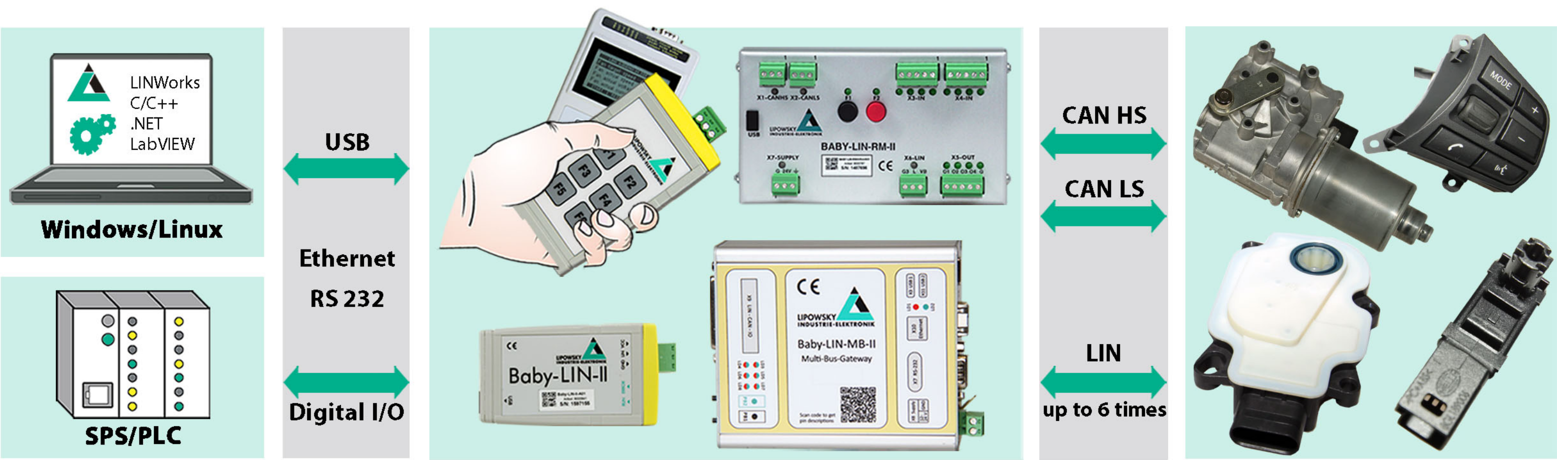

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