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Improving the Safety of Cyclists

Giving way to modern assistance systems – unlocking the full potential of connected and automated mobility

More and more people want to use the diverse opportunities provided by modern mobility. Easily reachable and combinable means of transportation strengthen bus, train, bike, and foot traffic. Digitisation is bringing us ever closer to interlinking all traffic opportunities, creating one integrated mobility system that includes all modes of transport. Fostering bicycle traffic is an important part of this mobility transition. Improving road traffic safety, especially for bicycle traffic in urban areas, will continue to be an important issue.

Europe committed to the Vision Zero, the reduction of the number of road deaths to zero in the middle term. Cyclists continue to be particularly vulnerable in road traffic. According to the German Statistical Office, a total of 88,850 cyclists were involved in accidents on German roads in 2018, 445 of which were fatal. In Europe, every second fatal accident involving a cyclist was the result of a collision with motor vehicles manoeuvring in cities. Respondents of the TÜV Mobility Study 2020 were also aware of this severe risk potential. Forty-four percent of respondents stated that cyclists were the most vulnerable and that they wish to see the improvement of general road safety for these traffic participants among the top 3 of all traffic policy measures.

Opportunities and Limitations of Assistance Systems

Current vehicles have a range of assistance systems at their disposal for preventing accidents and protecting more vulnerable road users. Vehicles equipped with modern assistance systems have numerous sensors for environment recognition (radar, lidar, ultrasound, cameras, etc.). Using these sensors, which are dependent on light and weather conditions, speed and distance of vehicles within the detection range can be recorded, analysed, and evaluated by such assistance systems.

The ability to detect objects and persons depends on the system and the manufacturer. Radar-based systems are suitable for early detection of objects even at great distances. However, the combination of both additional lidar and camera systems is required, for example, to classify objects (pedestrian, cyclists, etc.). For this reason, regulation governing the development of ACSF at the UNECE level is currently defining the ability for motorcycle detection on motorways as a requirement for this system.

All these systems continue to call for the undivided attention of drivers. They merely serve to support them in performing their driving tasks. To increase safety for cyclists and pedestrians, manufacturers of goods vehicles have been offering turning assistants or blind spot information systems since 2015, which visually or acoustically warn drivers if cyclists or pedestrians are close-by or in a blind spot. Accident researchers from TU Dresden recently investigated the causes for cycling accidents and estimated the potential of turning assistants for preventing accidents with utility vehicles at up to 60 percent. The German Insurance Association (GDV) estimates that turning assistants could help avoid about half of all accidents involving lorries and pedestrians, or cyclists, respectively. Ideally, this could reduce the number of fatalities by a third; the number of severely injured by more than 40 percent.

There is now a range of retrofitted systems available that recently received an operating license. An ADAC test from April 2019 revealed that some of the tested systems produce a considerable number of false alarms. A high rate of erroneous triggering, however, has negative effects on drivers' acceptance and trust in the system. The tested turning assistants that were able to distinguish between traffic participants, such as cyclists and pedestrians, and traffic signs, lights, and trees gave out less false warnings. Some car manufacturers have been working on turning assistants with active braking systems that intervene directly in driving manoeuvres. Due to their technical complexity, it will take several more years until such standardised and technically reliable systems can be brought to market. Going forward, they will increase traffic safety, especially in urban areas.

In the future, highly complex driving situations in an urban environment will not be tackled by environment recognition and vehicle sensors alone. Combining data from traffic control centres and/or roadside units (RSUs) will result in significantly higher data precision regarding object recognition and classification and therefore have a more far-reaching effect on improving traffic safety.

Micromobility Robotics

Communication between different road users must fulfil sophisticated requirements in view of new technological trends in 'micromobility robotics'. Micromobility robotics will revolutionise the availability of on-demand mobility on the 'first & last mile' and make it more independent of car traffic. According to current research projects self-driving bicycles, freight bicycles, rickshaws, and e-scooters will possibly be used to complement local public transportation. To do so, these vehicles must be capable of analysing their own location and that of other road users and of forecasting how other participants will behave, i.e., in which direction a car, bike or pedestrian will move at which speed.

In addition to matters of technical security, there is a demand for regulating logistical and especially legal issues regarding driver-less means of transportation. In any case, these systems will be an effective ecological and economic addition to the public and individual local transportation.

VdTÜV proposes the following measures to improve traffic safety of cyclists:

1. Standardisation of approval requirements for turning systems in goods vehicles, including new vehicles and retrofitted systems, should be adjusted to meet real-world requirements. Errors are damaging to the acceptance of such systems and, in the worst case, endanger people's lives.
2. International approval requirement for level 4+ vehicles should specify how to standardise environment recognition systems in new cars.
3. Requirements for approval of future highly and fully automated vehicles must be standardised in a way that allows to reliably identify and classify relevant objects in a vehicle's respective area of operation and to appropriately react to them when planning its own driving manoeuvres. For fully automated vehicles used in an urban environment, for instance, relevant objects or road users include cyclists and pedestrians.
4. Creating approval guidelines and a safety concept for driver-less vehicles (level 5) for the entire system, including the means of transport itself, the infrastructure, and, where necessary, appropriate control centres.
5. Furthermore, it should be noted that the opportunities of a comprehensive traffic safety screening system should be better used. The existing data base gleaned from roadside units (RSUs), police, traffic control centres, and recordings from emergency services and hospitals should be appropriately anonymised and made available to authorised parties for the purpose of increasing road safety. Road safety screening serves to identify accident-prone road sections and to use this information to initiate efficient optimisation measures.