



The
Federal Government

The Federal Government's action plan

on the report by the Ethics Commission on Automated and
Connected Driving (Ethical rules for self-driving computers)



Introduction: Findings of the Ethics Commission

The digital revolution is a key ethical challenge of the 21st century. The leap from informatics involving computing and programming to cognitive informatics, to artificial intelligence and learning systems is associated with new ethical issues and makes it necessary to transfer the general principles governing our social relations to the new technologies.

At the heart of the matter is the following question. On the basis of what ethical principles are machines to operate if they react in a specific way in different situations and impact on human life? One of the topics at the centre of the debate is automated and connected driving, which is one of the first fields of application of human-machine interaction to affect society as a whole. In a few years' time, the public will be using automated vehicles, encountering them in traffic and thus also handing over “decision-making powers” to algorithms. They must be able to rely on absolutely clear ethical principles being observed in the development and design of the technology.



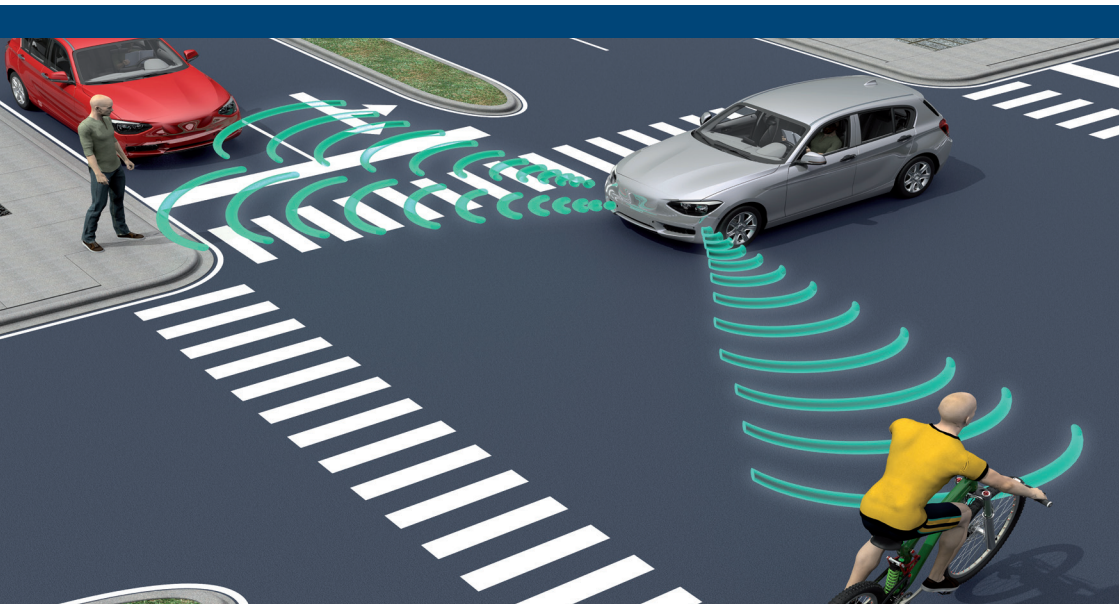
For this reason, the Federal Ministry of Transport and Digital Infrastructure appointed an Ethics Commission comprising distinguished experts from the fields of philosophy, theology, law and engineering who developed the first guidelines in the world for the algorithms of automated and connected driving systems.

The Ethics Commission focused its attention on Level 4 (high automation) and Level 5 (full automation, i.e. driverless vehicles) automated driving functions – technologies that are not yet available but that will be available in the years ahead.

The Ethics Commission has summarized the outcome of their deliberations in a total of 20 ethical rules. Its key findings include the following:

The licensing of automated and connected driving systems is ethically justifiable if due regard is paid to safety, human dignity, personal freedom of choice and data autonomy and may be socially and ethically mandated if it can unlock existing potential for damage limitation. The protection of individuals must take precedence over all other utilitarian considerations.

The Commission stresses that the new systems are likely to significantly reduce the probability of accidents and that technologically unavoidable residual risks do not militate against the introduction of such systems if the balance of risks is fundamentally positive.



Should an accident be unavoidable, the Commission has stated in its ethical rules: damage to property or harm to animals must always take precedence over personal injury. In the case of “dilemmatic” situations, in which injury to persons cannot be ruled out, the Commission states that there must be no distinction based on personal features (age, gender, etc.). In addition, there must be no offsetting of victims against one another, nor must non-involved parties be sacrificed by parties involved in the generation of mobility risks. Provided that these rigorous conditions are met, general programming to reduce the number of personal injuries could be justifiable. At this point, the Ethics Commission suggests that there should be further studies and discussions.

In addition, the Ethics Commission calls for cyber security and data protection to be adequately ensured. As far as data protection is concerned, it is incumbent upon lawmakers to strike an appropriate balance between collecting and using data and ensuring informational self-determination. The Commission believes that automated and connected driving requires data protection that is conducive to innovation and innovations that are conducive to data protection. It is the vehicle keepers and vehicle users who will decide whether their vehicle data that are generated are to be forwarded and used. As far as cyber security is concerned, the Ethics Commission states that the state has a protective mandate to ensure the integrity of the technological systems and that manufacturers and the state should significantly step up their efforts to promote cyber security.



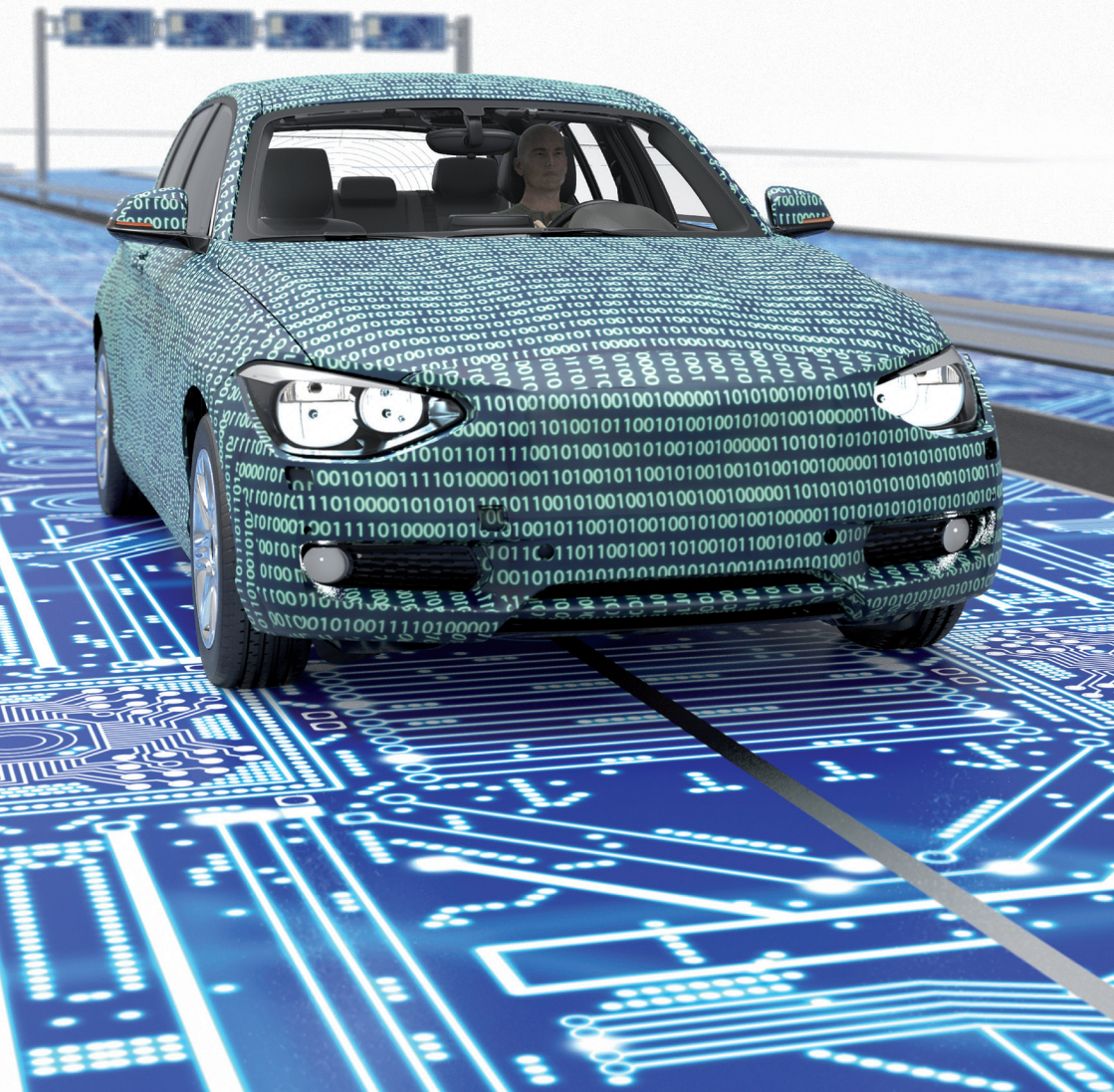
From an automotive engineering perspective, the handover procedures and thus accountability must be clearly regulated, identifiable and documented at all times. An appropriate handover time for resumption of control of the vehicle must always be ensured and the systems must be able to revert to a “minimal risk condition” without human assistance.

To achieve the necessary societal acceptance of the deployment of automated and connected driving systems, the Ethics Commission suggests an appropriately nuanced campaign to raise public awareness of the new technologies, the requirements to be met by their safety and the parameters of their use, including the publication of transparent guidelines for their deployment.

At a cross-cutting level, the Ethics Commission suggests that the proper use of automated systems should be part of general digital education, with the proper operation of automated driving systems being taught in driver training.

As regards self-learning systems, the Commission states that its ethical assessment depends on whether, and if so to what extent, they meet safety requirements and comply with the existing rules.

The complete connectivity and central control of all vehicles is deemed ethically questionable if total surveillance of road users and manipulation of vehicle control cannot be ruled out. Moreover, the Ethics Commission states that, as an expression of their autonomy, human beings, who take responsibility for their own actions, are at liberty to avail themselves of technological possibilities.



The Federal Government's action plan – ethical rules for self-driving computers

The Federal Government welcomes the findings of the Ethics Commission on Automated and Connected Driving and will progress the evolution of the technology on their basis. It will launch the necessary measures, including those to ensure the integrity of the technological systems, at national and international level and continue any activities that have commenced.

Against this background, the Federal Government will speedily implement the following action plan, thereby creating clear ethical rules for self-driving computers.

- Building on the amendment of the Road Traffic Act to cover the operation of conditionally (Level 3) and highly (Level 4) automated driving functions, which has already been made, the adaptation of German road traffic law to the technological advances made in the field of automated systems will be continuously reviewed and, if necessary, consistently updated.
- Taking as a starting point the proposals made by the Ethics Commission on the data protection requirements – and complying with the legal aspects, especially those of the EU's General Data Protection Regulation – measures to strike a balance between the collection of data required for safety, the ensuring of innovation and a level playing field and the safeguarding of informational self-determination, including the necessary protection of parties in the vehicle's surroundings, will be identified and implemented. It will be assumed that drivers are always to be able to decide themselves whether their vehicle data are to be forwarded and used (data sovereignty).
- Automated and connected systems, especially learning and self-learning systems, must not result in total surveillance of road users. They must re-

liably satisfy stringent safety requirements to be met by functions relevant to vehicle control, including protection against manipulation of the vehicle control, and must comply with the ethical guidelines. A category of scenarios will be developed and submitted to a neutral entity (yet to be determined), which will draw up corresponding universally valid guidance.

- The examination and discussion of “dilemmatic” accident scenarios will be continued in greater depth. The conditions for the monitoring of the process by a public sector institution will be created.
- To develop broad-based acceptance among the public and to promote mobility-related inclusion of all sections of the population, the targeted societal dialogue will be continued and intensified. Nobody must be forced to use automated driving systems. There is to be a comprehensive campaign to raise public awareness of the new technologies, the requirements to be met by their safety and the parameters of their use, including the publication of transparent guidelines for their deployment. In addition, it is imperative that automated and connected driving be made accessible and comprehensible for all road users and that they can experience it at first hand.
- Work on the international standardization of automated and connected systems will be continued on the basis of the ethical guidelines now available in order to enable and progress safe, cross-border use of the technology. One focus will be the development of uniform parameters at international level, for which the Federal Government has already developed suitable templates with its initiatives.
- The Federal Government will expedite the development of an appropriate regulatory framework for the programming of self-driving computers that will mandate the principles governing unavoidable accident situations set out in the ethical guidelines. The principles here are: these situations are to be prevented wherever possible; the prevention of personal injury must always take precedence over the prevention of damage to property; and any distinction between individuals based on personal features is impermissible.

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