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Automated driving

Vehicles with automated driving systems:

The concept of activities other than driving

**Submitted by Canada, Finland, France, Germany, Japan, the
Netherlands, Sweden, Switzerland and the United Kingdom**

This document proposes a draft text for a resolution on “activities other than those related to driving” that the driver of a vehicle equipped with an automated driving system could undertake when the automated driving system is engaged. The draft text takes into account both 1949 and 1968 Conventions on Road Traffic.

Other activities: draft resolution

Global Forum for Road Traffic Safety (WP.1) resolution on the activities other than those related to driving, that a driver of a vehicle equipped with an automated driving system, could undertake when the automated driving system is engaged

Background

The Global Forum for Road Traffic Safety (WP.1) of the United Nations Economic Commission for Europe has prepared and adopted this Resolution on DATE on the understanding of the duty in Article 8(6) of the Vienna Convention on Road traffic in regards to the duty to ‘minimise any activity other than driving’ and the duty in the Geneva Convention on Road traffic (Article 7) to ‘conduct himself in such a way as not to endanger or obstruct traffic’ and ‘avoid all behaviour that might cause damage to persons, or public or private property’, and to ‘drive reasonably and prudently’ (Article 9)

Article 8(6) of the Vienna Convention on Road Traffic provides:

A driver of a vehicle shall at all times minimize any activity other than driving. Domestic legislation should lay down rules on the use of phones by drivers of vehicles. In any case, legislation shall prohibit the use by a driver of a motor vehicle or moped of a hand-held phone while the vehicle is in motion.

Article 7 of the Geneva Convention on Road Traffic provides:

Every driver, pedestrian or other road user shall conduct himself in such a way as not to endanger or obstruct traffic; he shall avoid all behaviour that might cause damage to persons, or public or private property.

Article 10 of the Geneva Convention on Road Traffic provides:

The driver of a vehicle shall at all times have its speed under control and shall drive in a reasonable and prudent manner. He shall slow down or stop whenever circumstances so require, and particularly when visibility is not good.

Preamble

The Global Forum for Road Traffic Safety,

1. Considering that road traffic safety is increasingly defined and influenced by the combination of and interaction between automated driving system capabilities, human behaviour and infrastructure requirements,
2. Noting that automated driving systems may in some circumstances ask their driver to resume control¹, and that it may be either necessary, in the case of conditional automation, or desirable, in the case of high automation, for the driver to be ready, willing and able to resume control of the vehicle;

¹ For example, as a fall-back-ready user, or because parts of the journey lie outside the parameters of the system’s operational design domain

3. Noting that, in its 75th session, WP.1 confirmed that the following principles will be applied by the contracting parties to the Vienna Convention as well as considered/followed by those applying the Geneva Convention's equivalent requirements in Articles 7 and 10:

“When the vehicle is driven by vehicle systems that do not require the driver to perform the driving task, the driver can engage in activities other than driving as long as:

1: these activities do not prevent the driver from responding to demands from the vehicle systems for taking over the driving task, and

2: these activities are consistent with the prescribed use of the vehicle systems and their defined functions.”

4. Intending that this Resolution will come into effect when safe conditionally automated and/or highly automated driving systems are developed;
5. Exhorting States to apply the precautionary approach when regulating the introduction of new road technologies in order to protect road safety, especially where there are threats of fatalities or serious injuries. The lack of full scientific certainty shall not be used as a reason for postponing the introduction of such regulations;
6. Noting the ongoing work in WP.1 and WP.29 on automated driving systems;

Has prepared and adopted this Resolution on [date?].

Purpose of this Resolution

7. This Resolution aims at providing a framework for contracting parties, relating to drivers undertaking activities other than those related to exercising dynamic control. This is intended to help these parties applying the Vienna and Geneva Conventions on Road Traffic in establishing domestic traffic laws for the driving of vehicles equipped with conditionally automated or highly automated driving systems.

Application of this Resolution: assumptions

8.

OPTION 1 This Resolution should be applied when safe conditionally or highly automated driving systems have been developed, clear technical standards are available to verify the safety of these systems, and these systems safely allow a driver to undertake activities other than driving. Such technical standards should address all of the following areas but are not limited by them:

OPTION 2 This Resolution should be applied when clear technical standards are available, and used, to verify the safety of conditionally or highly automated driving systems, and when these systems safely allow a driver to undertake activities other than driving. Such technical standards should address all of the following areas but are not limited by them:

- a. An effective and intuitive Human-Machine Interface which enables the driver to safely interact with the automated driving system;
- b. A safe transition scenario, including sufficient lead time for safe take-over, when established so that the driver is able to complete safe take-over process;

- c. A driver availability recognition system, to determine if the driver is able to drive (for example a safe conditionally automated driving system needs to manage the driver's attention so that they are alert enough to resume control of the vehicle in response to a take-over demand from the vehicle);
 - d. Emergency manoeuvres, as drivers cannot be expected to take-over in situations that are safety- and time-critical, the automated driving system automatically needs to perform emergency manoeuvres (for example automatic emergency braking to avoid collisions); and
 - e. Effective risk mitigation manoeuvres (including where the automated driving system takes action if drivers disregard a take-over request or are engaged in a non-driving activity that may interfere with the driver's readiness to resume safe and proper control of their vehicle).
9. Assuming that a safe conditionally or highly automated driving system and technical verification standards as described above are established, WP.1 establishes the performance of other activities a driver may undertake which are unrelated to exercising dynamic control of the vehicle, in line with the following 'Frame':

'Frame' comprising four criteria for drivers to engage in activities other than driving

10. Assuming that it is possible to develop a safe conditionally or highly automated driving system, and that clear technical standards are available to verify the safety of the system, a driver using a vehicle in which a conditionally or highly automated driving system is activated may engage in activities other than driving provided the following four criteria are met, in combination with each other:
- a. these activities do not prevent the driver from responding to demands from the vehicle systems for taking over the driving task;
 - b. these activities are consistent with the prescribed use of the vehicle systems and their defined functions;
 - c. the driver complies with traffic laws applicable in the country regarding activities other than driving; and
 - d. the driver has and maintains the capabilities necessary to safely drive the vehicle in any available mode.

Should one or more of these four criteria not be met, there is a potential that road safety and/or traffic flow would be compromised.

11. The above criteria are expanded and explained as below.

Criterion a:

12. Each time the conditionally or highly automated driving system issues a clear take-over request the driver is expected to resume timely, safe and proper control of the vehicle.
13. In conditionally automated driving systems, any activities other than driving undertaken by the driver should not compromise the ability, readiness, and willingness of the driver to resume dynamic control.
14. In the case of highly automated driving systems, the driver is expected to resume dynamic control of the vehicle when notified that the vehicle will be exiting the parameters of its operational design domain. Therefore, the driver would need to further adapt their other activities to safely continue the rest of their journey.

15. In all instances of a take-over request the automated driving system will maintain safe and proper control of the vehicle until the driver has safely resumed control. If the driver does not safely take control, the vehicle will take necessary risk mitigation manoeuvres.
16. In all cases the driver must not interfere with any part of the automated driving system that could compromise safety.

Criterion b:

17. Criterion a has to be considered by the manufacturer in the design of the system's Human-Machine Interface (including the transition scenario and the lead time provided for a safe take-over).
18. A driver availability recognition system should be included in the vehicle by the manufacturer. The system should also be designed so as to confirm that the driver has safely resumed control of the vehicle in response to a take-over demand.
19. If the driver does not resume safe and proper control in response to a take-over demand, the system should take all adequate steps so as to support continued road safety and endeavour not to obstruct traffic flow.
20. The system provider is obligated to provide the driver with clear explanations about the prescribed use of the vehicle system before the driver uses it and consequently the driver must be aware of these explanations before using the system. This should include the implications for the driver's responsibility and their expected behaviour in the case of a transition.
21. The system must communicate clearly with its driver so that the driver can understand any instruction given by the system.

Criterion c:

22. Contracting parties to one or both Convention should establish domestic legislation to regulate the undertaking of activities other than driving.

Criterion d:

23. The driver of a vehicle equipped with conditionally automated or highly automated driving system must have the physical and mental capabilities to drive that vehicle. This is currently guaranteed by the driving licence.
24. Drivers should recognize their individual capabilities to perform activities other than driving. Some drivers may not have the mental or physical capability to safely perform activities other than driving under any circumstances.

Conclusions about the frame within which activities other than driving are permitted

25. Provided a driver meets all four of the above criteria at all times while the automated system is engaged, and provided the assumptions set out in paragraph 8 are correct, a driver may at that moment undertake activities other than driving, unless and until any one of these criteria is not met.
26. It is important to manage the driver's attention, so that they are alert enough and have sufficient situational awareness to resume control from the automated driving system. The automatic suspension of activities that rely on technologies integrated with, or connected to, the vehicle in case of a take-over request has been identified as one effective measure to offer activities other than driving in a safe way. However, it is yet not

clear what specific activities other than driving manage the driver's attention appropriately, and thus achieve the road safety outcomes sought by the criteria above. Therefore, further research is needed.

Terminology

27. In addition to the terminology existing in the Global Forum for Road Traffic Safety (WP.1) resolution on the deployment of highly and fully automated vehicles in road traffic, two terms are defined as follows:
- a. 'Conditionally automated driving system' refers to systems used to exercise dynamic control of the vehicle for sustained periods, with the expectation that the human driver is receptive to take-over demands issued with sufficient lead-time by the system for the driver to resume dynamic control of the vehicle – i.e. act as a fall-back – before operational design domain limits are reached.
 - b. 'Highly automated driving system' refers to a system used to exercise dynamic control in a highly automated vehicle.
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