Self-driving vehicles: new safety ambition

RoSPA's response to Centre for Connected and Autonomous Vehicles' consultation

October 2022

Response to Centre for Connected and Autonomous Vehicles' consultation: Self-driving vehicles: new safety ambition

Introduction

This is the response of The Royal Society for the Prevention of Accidents (RoSPA) to the Centre for Connected and Autonomous Vehicles' (CCAV) consultation on self-driving vehicles: new safety ambition. It has been produced following consultation with RoSPA's National Road Safety Committee. We have also surveyed our members as part of the formulation of this response. We have no objection to our response being reproduced or attributed.

The consultation seeks views on the CCAV's proposed safety ambition for self-driving vehicles.

Following a review of the law relating to self-driving vehicles, CCAV are creating a new legal and safety framework for these vehicles. CCAV believes that self-driving vehicles should be held to the same high standard of behaviour as that expected of human drivers. Current law expects human drivers to be competent and careful. Self-driving vehicles should, therefore, be expected to achieve an equivalent level of safety to a competent and careful human driver. This is safer than the average human driver.

Response to Centre for Connected and Autonomous Vehicles' consultation: Self-driving vehicles: new safety ambition

About you

Your name

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Are you responding as an individual or on behalf of an organisation?

On behalf of an organisation.

What is the name of your organisation?

The Royal Society for the Prevention of Accidents (RoSPA)

Your organisation's work is?

Safety and road user groups.

Your organisation is in?

The UK (with road safety teams in England, Scotland and Wales).

Proposals

Following a world-leading multi-year review of the law relating to self-driving vehicles, government is creating a new legal and safety framework for these vehicles.

Connected and Automated Mobility 2025: Realising the benefits of self-driving vehicles in the UK sets out CCAV's proposals.

CCAV believes that self-driving vehicles should be held to the same high standard of behaviour as that expected of human drivers. Current law expects human drivers to be competent and careful. Self-driving vehicles should, therefore, be expected to achieve an equivalent level of safety to a competent and careful human driver. This is safer than the average human driver.

What are your views on the approach that self-driving vehicles should be expected to achieve an equivalent level of safety to that of a competent and careful human driver?

RoSPA response

RoSPA agrees that self-driving vehicles should be expected to achieve an equivalent to that of a competent and careful human driver.

RoSPA surveyed its members on their views on this proposal. Of the 76 responses received, 83% agreed or strongly agreed with this proposal. Those who did not agree tended to state that they felt that safety standards should be higher than that of a competent and careful human driver.

RoSPA believes that self-driving vehicles must be as safe as a competent and careful human driver in all situations. These vehicles must abide by traffic rules, avoid collisions and treat other road users with consideration. We do not believe that these vehicles should be deployed on our roads before they meet these standards. RoSPA believes that this is a sensible approach, as these standards will be high enough to avoid the safety benefits being very low or non-existent. Members also commented on the proposals in our survey, with some stating that they felt that the software and capabilities of these vehicles must be established before they are able to be trialled or operated on public roads.

As the paper states, society has, over time, improved road safety through the rules it has set and the standards it expects. Road traffic law clearly sets out the expected standard of behaviour as that of a 'competent and careful driver', with the Highway Code providing further guidance on what this means in practice. These standards should be upheld for self-driving vehicles, as innovation should not come at the price of safety. Any standard below this is likely to reduce public trust and acceptance of these vehicles. RoSPA surveyed its members on their level of confidence in self-driving vehicles. Of the 76 responses received, 35% were not at all confident, 28% were slightly confident, 28% somewhat confident, 7% moderately confident and 1% extremely confident.

The paper also considers the notion of fairness. Even an overall positive effect on safety may negatively affect some groups more than others – this would not be an acceptable outcome. Unfortunately, there are already

examples of where bias has crept into the design of self-driving vehicles, for example, current facial recognition software may exhibit a bias towards white, male faces. For non-white and non-male faces, the accuracy of facial recognition systems may decline significantly. Before these vehicles can be used and trialled on Britain's roads, there needs to be extensive testing to provide evidence that self-driving vehicles can identify individuals of all races and ethnicities in different daylight conditions, individuals wearing robes and skirts (if the system works by identifying leg movements) and individuals in different kinds of wheelchairs and mobility scooters. RoSPA would like reassurance that any facial recognition systems would be accurate and do not show a bias towards any individual.

Do you have any further comments?

RoSPA response

In 2021, 1,558 people were killed, 25,892 were seriously injured and 100,699 were slightly injured as a result of a reported collision on Great Britain's roads[1]. Human error is a contributory factor in over 80% of collisions. As automated vehicles are not subject to being driven impaired, driven while texting or subject to other forms of distraction such as being fatigued, it is likely that there will be a reduction in collisions. However, it must not be believed that human error has been correctly identified as a contributory factor in collisions or that all crashes could have been otherwise avoided by addressing that error. Many crashes that involve human error also involve other factors that may have still contributed to the crash even if the human had not made a mistake. Errors linked to poor roadway design or faulty vehicle design are often attributed as human factors, when they are in fact design errors[2]. 74% of members that responded to our survey considered the reduction of road casualties to be the biggest benefit of these vehicles.

One way in which self-driving vehicles could reduce the number of road casualties is through speed limit compliance. Currently on 30mph roads, over half of car drivers tend to travel above the speed limit and 11 per cent travel at 35mph or more[3]. However, in future, driving speeds will be controlled by the system. Sensors that

[1] Department for Transport (2022) 'Table RA0201: Reported road casualties by severity and road user type, Great Britain, ten years up to 2021
URL: https://www.gov.uk/government/statistical-data-sets/ras30-reported-casualties-in-road-accidents
Date Accessed: 30/09/2022.

[2] International Transport Forum (2018) 'Safer Roads with Automated Vehicles?'
URL: https://www.itf-oecd.org/sites/default/files/docs/safer-roads-automated-vehicles.pdf
Date Accessed: 30/09/2022.

[3] Department for Transport (2022) 'Table SPE0111: Free flow vehicle speeds by road type and vehicle type in Great Britain, 2021'
URL: https://www.gov.uk/government/statistical-data-sets/spe01-vehicle-speeds#table-spe0111
Date Accessed: 30/09/2022.

are expected to be installed in self-driving vehicles are likely to be much faster and more reliable at detecting and avoiding vulnerable road users than most drivers today. This could lead to large reductions in road casualties for vulnerable groups such as children, the elderly and cyclists[4].

There is an expectation that self-driving cars will deliver a 'near zero' harm solution for everyone, including vehicle occupants and those termed 'vulnerable road users' such as pedestrians and cyclists. However, 'near zero' does not mean absolutely zero, as there could be times where the vehicle will be forced to choose between options where there is no outcome that avoids harm to all road users.

Therefore, a full application of the Safe System approach is still recommended, taking into account the possibility of technology failures of self-driving vehicles, acting as a fall-back solution. The system should be built to tolerate human and machine errors, preventing death and serious injury in the event of a collision[5]. Safe System measures include central and nearside barriers that prevent vehicles striking one another head-on and dedicated facilities for vulnerable road users that provide separation such as cycle lanes[6].

As automation in the vehicle increases, the role of the driver will move from one of a vehicle operator to a system supervisor[7]. The difficulty stems from ensuring safe driving performance when vehicles are semi or highly autonomous. The challenge of this is keeping the driver, who may need to take control of the vehicle at any time if the system requires them to be kept 'in the loop'. Drivers may not pay much attention to their 'driving' if they believe that the technology will prevent them from crashing no matter what. Of the members we surveyed, 23 people felt that a lack of understanding of the capabilities of these vehicles was the biggest challenge faced in operating these vehicles safely.

The issue of transition of control and being 'out of the loop' potentially becomes a serious problem in interactions with vulnerable road users such as cyclists and pedestrians. If it takes too much time for the driver to take over when needed, they may not be able to avoid a crossing pedestrian or cyclist in time. The occasionally rather

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[4] WSP (2016) 'Making Better Places: Autonomous vehicles and future opportunities'
URL: https://www.wsp.com/en-GB/insights/autonomous-vehicles
Date Accessed: 30/09/2022.

[5] International Transport Forum (2018) 'Safer Roads with Automated Vehicles?'
URL: https://www.itf-oecd.org/sites/default/files/docs/safer-roads-automated-vehicles.pdf
Date Accessed: 30/09/2022.

[6] EuroRAP (2018) 'Roads that Cars Can Read Report III: Tackling the Transition to Automated Vehicles'
URL: http://www.eurorap.org/new-report-tackles-the-transition-to-automated-vehicles-on-roads-that-cars-can-read/
Date Accessed: 30/09/2022.

[7] Bainbridge, L. (1983) cited in Merat, .N and Jamson, A. H. (undated) 'How do drivers behave in a highly automated car?', *Proceedings of the Fifth International Driving Symposium on Human Factors in Driver Assessment, Training and Vehicle Design:* 514-521.

unpredictable behaviour of pedestrians and cyclists could well be the reason that the automated system malfunctions and the human driver is asked to take over[8].

So far, automated vehicle technology has mainly focussed on the detection and recognition of pedestrians and cyclists by the vehicle and although good progress has been made, many difficulties are yet to be overcome. Technology to reliably predict intentions and behaviour of cyclists and pedestrians, so that the self-driving vehicle can adjust its behaviour is crucial for safe interaction between these vehicles and pedestrians and cyclists. However, this is not straightforward as it can be very difficult for an automated system to predict behavioural intentions of pedestrians and cyclists[9]. The idea that pedestrians and cyclists will respond differently to partly automated vehicles also cannot be ignored. Of the members that we surveyed, 19 people viewed the interaction between self-driving vehicles and pedestrians and cyclists as the biggest challenge to their safe operation.

RoSPA also notes that there is a lack of information and evidence on how self-driving vehicles will recognise and react to horses and riders. It is not yet clear whether consideration has been given to the way horses may react or behave on a road. The horse and rider are the vulnerable road user together and should be considered as such. A self-driving vehicle will need specific programming to enable it to recognise horse behaviour and ensure the recently updated Highway Code advice is adhered to.

In current interactions between pedestrians, cyclists, horse riders and conventional vehicles, informal rules and non-verbal communication are important aspects of communication. However, with the increasing level of automation, this type of communication will lose its function from the perspective of the vehicle and the pedestrian or rider. It will be very difficult for the vehicle to predict the behaviour of vulnerable road users if they do not use the formal non-verbal communication cues such as using an arm to indicate a change of direction. Informal cues are generally subtle and therefore difficult to read. For pedestrians and cyclists, interaction with self-driving vehicles implies that they cannot rely on informal communication cues anymore. The effect of making eye contact with or smiling to a 'car driver' is not the same if the driver is not the person who is controlling the car and may be involved in completely other tasks, such as reading the newspaper or typing a text message[10].

As vehicles become increasingly autonomous, it is essential that drivers understand the technology in their vehicles, what it does, how to use it safely and the potential risks of misuse. Drivers should receive vehicle

[8] SWOV (2016) 'Safe interaction between cyclists, pedestrians and automated vehicles'
URL: https://www.swov.nl/publicatie/safe-interaction-between-cyclists-pedestrians-and-automated-vehicles

[9] SWOV (2016) 'Safe interaction between cyclists, pedestrians and automated vehicles'
URL: https://www.swov.nl/publicatie/safe-interaction-between-cyclists-pedestrians-and-automated-vehicles
Date Accessed: 30/09/2022.

[10] SWOV (2016) 'Safe interaction between cyclists, pedestrians and automated vehicles'
URL: https://www.swov.nl/publicatie/safe-interaction-between-cyclists-pedestrians-and-automated-vehicles
Date Accessed: 30/09/2022.

familiarisation training when they receive new vehicles, including the safe use of technology, particularly if their previous vehicle did not have it. Drivers need to be alert and ready to take control of their vehicle at any time and therefore must not engage in other tasks such as making phone calls or writing texts or emails during driving time, as they are still in charge of the vehicle.

As the paper states, making education available for the general public will be essential to ensure that they know whether they are using a self-driving vehicle (as opposed to a driver assistance system),that they know how to use it appropriately and that they understand the responsibilities that they retain when in a self-driving vehicle. It's also important for there to be understanding amongst those not using the vehicles, for example pedestrians, cyclists, public transport users and other road users.

Clearly, there are still challenges to be overcome and some time before the majority or even some vehicles on our roads are self-driving. At this stage, RoSPA urges that very careful consideration is given to safety before trialling these vehicles on public roads, given that trialling new vehicles can put all road users who are exposed to them at risk. We also note a lack of a publicly accessible risk assessment for these plans, which could reduce confidence in these vehicles. Public trust and acceptance of any new technology is key to its success.

If used properly, self-driving vehicles have enormous potential to reduce crashes and casualties, but if they are not used properly, they can also increase risk, especially if drivers over-rely on the technology.

RoSPA has no further comments to make on the consultation process, other than to thank The Centre for Connected and Autonomous Vehicles for the opportunity to comment. We have no objection to our response being reproduced or attributed.