

Programme of Work  
Working Party on Automated/Autonomous and Connected Vehicles (GRVA)

**Considerations Concerning Lighting and Light-Signalling**

Following its presentation to the 15th ITS/AD session (ITS AD-15-05a-Rev1), and recognising the contribution from the expert of the USA (GRVA-01-03), GTB appreciates the opportunity to submit the following observations to facilitate the discussion foreseen at the forthcoming session of GRVA.

At the 79th session of the Working Party on Lighting and Light-Signalling, GTB introduced an overview of the work currently underway in various groups in relation to special light-signalling requirements that may be necessary on road safety grounds for vehicles equipped with automated driving systems (GRE informal document GRE-79-36). The purpose of this overview was to highlight the work already being undertaken in Europe and the USA by industry and standardisation groups. GTB is concerned that this work is taking place at national level, instead of being focused upon identifying globally acceptable technical requirements, and believes that it is time to focus all efforts under the direction of the World Forum (WP.29) to develop one set of global technical requirements. This is necessary to ensure that unnecessary regulatory hurdles and non harmonised solutions are not being created for the future.

GTB welcomes the decision of WP.29 to create the Working Party on Automated/Autonomous and Connected Vehicles working under the auspices of the 1998 Agreement. Further, GTB assumes that, if it is agreed that there is action needed to develop special technical requirements for lighting and light signalling devices for AV's, this will be carried out by a GRE Informal Working Group where the expertise is to be found.

Although there are various activities underway to address the need for AV's to provide signals, to indicate their status and intended actions, it is clear that it will be necessary for GRVA to reach a consensus on a) whether it is necessary for AV's to provide such signals and b) what would be the nature of these signals, i.e. visual, audible, or a combination. Whilst there are arguments for and against the need for these signals WP.1, at its 77<sup>th</sup> session, will consider document ECE/TRANS/WP.1/2018/4/Rev.2 where the proposed text of paragraph 4 states "Automated driving systems in highly and fully automated vehicles should: ..... (h) Communicate with their users and other road users, in a clear, effective and consistent way, by providing sufficient information about their status and intention, and enabling an appropriate interaction;"

In addition to the question concerning the need for signals for AV's, GTB notes that the list of rule making topics includes "Night Vision" proposed by China (WP.29-175-08). GTB understands that the intention is to provide recognition of traffic participants and road infrastructure at night time and to warn the driver. Presumably the term "vision" implies the use of light in the visible or infra-red spectra.

There is also a topic introduced by the European Union and Japan (WP.29-175-29) on the subject of "Driver Availability Recognition". This may be a connecting factor for AV signalling issues because, once the availability or non availability of a driver is identified, it raises the question of whether information should be provided to other road users or simply stored in the Event Data Recorder.

In conclusion, there are a number of fundamental questions to be answered including:

- a) What are the human factors to be taken into account? (Can light help other road users to avoid uncertainty or fear associated with the activities of AV's.?)
- b) Is there a safety requirement for AV's to provide signals to indicate their status and to communicate their next intended actions? If so shall such signals, be visual, audible, or a combination?
- c) How to address the night vision aspects associated with the operation of AV's? (e. g. light distribution designed for camera needs)

As stated in the GRE informal document, GRE-79-36, GTB has been working on this subject since 2016. This includes a review of research findings and activities of standards organisations and other groups working in Europe and the USA. Additionally GTB is sponsoring independent research by internationally recognised institutes that will be published during 2019.

Finally, over the past six years, fifteen workshops have been held in USA, Asia and Europe to discuss the requirements for globally harmonised technical requirements. At the last workshop in Tokyo, with participation of representatives of contracting parties and industry stakeholders there was a clear consensus to encourage the launch of an activity to develop GTR's for lighting and light-signalling. The expectation is that a GRE IWG will be launched that could initially develop a GTR for the night vision and the signalling needs of AV's. GTB is prepared to provide the secretariat and its expert input to such an IWG.