

WP.29/GRE Task Force Automated/Autonomous Vehicle Signalling Requirements

Request for guidance by the TF AVSR

Participation

GRE TF AVSR

CP	NGO	Academia
France	CLEPA	BASt, Germany
Germany	GTB	NTSEL, Japan
Japan	IEC	RISE Viktoria, Sweden
United Kingdom	ISO	VTTI, USA
	OICA	
	SAE, USA	

Task

GRE TF AVSR

The following questions had to be addressed:

1. Is there a safety requirement for AVs to provide signals to indicate their status and to communicate their next intended actions?

2. If so, shall such signals
 - be visual,
 - audible,
 - or a combination of both?

Conclusions

GRE TF AVSR

1. The Task force discussed the question #1 and came to the conclusion that the decision about this principal question is not in the mandate of this task force, as it is a general/political decision.

The following discussion was based on the assumption, that a “driving mode indicator” is needed.

2. As a consequence of the discussion about the second question the group concluded, that it should be a visible function (under normal traffic conditions and autonomous driving activated).

For the visible function it must be defined, when and under which conditions this signal should be activated. In this context, e. g. interaction with police, the interaction with other road users shall be taken into account, depending from the level of autonomous driving.

This does not exclude in further discussions that audible signals, which could support e.g. handicapped peoples in communicative scenarios, may be taken into account.

GRE is seeking further guidance from WP.29.

Backup GRE TF AVSR

List of available studies

Short title	Full title	Origin	Filename
AVIP	Autonomous vehicles' interaction with pedestrians	Chalmers University of Technology, SE	AVSR-02-02e.pdf
CityMobil2	What do Vulnerable Road Users think about ARTS?	ITS, University of Leeds / DLR, German Aerospace, UK / DE	AVSR-02-03e.pdf
Duke Display	Evaluation of Vehicle-to-Pedestrian Communication Displays for Autonomous Vehicles	Duke University, US	AVSR-02-04e.pdf
Ghost Driver	A Field Study Investigating the Interaction between Pedestrians and Driverless Vehicles	Stanford Center for Design Research, US	AVSR-02-05e.pdf
InterACT	Deliverable 1.1 Definition of InterACT use cases and scenarios	DLR, German Aerospace, DE	AVSR-02-06e.pdf
SWOV	Safe interaction between cyclists, pedestrians and automated vehicles	SWOV Institute for Road Safety Research, NL	AVSR-02-07e.pdf
InMotion-Summary	Light-based communication between automated vehicles and other road users (Summary)	Chemnitz University of Technology, DE	AVSR-02-08e.pdf
Daimler-eHM	eHM of Autonomous Vehicles Should autonomous vehicles communicate with pedestrians, and if so, how?	Daimler AG, DE	AVSR-02-09e.pdf
ISO	AV Exterior Communications ISO TC 22/SC 39	ISO	AVSR-02-10e.pdf
GTB	Lighting for automated vehicles – Discussion on ways forward	GTB-Forum, Pernkopf / Tiesler-Wittig	AVSR-02-11e.pptx
Ford	VR light bar results	Ford, US	AVSR-02-13e.pdf
Audi-VDI	VDI-Paper_Reschke_et_al_(German_only)	Audi AG, DE	
Audi-SAE	Ideas for Next Lighting Generations in Digitalization and Autonomous Driving	Audi AG, DE	
Audi	Assistance System for Vehicle-Pedestrian-Interaction	Audi AG, DE	
InMotion	Light-based communication between automated vehicles and other road users	Chemnitz University of Technology, DE	
PIRE	Communication and Interaction between Automated Vehicles and other Road Users	Munich University of Technology, DE	
SAE	Abstract of J3134	SAE, US	
BASI_d	Statement BASI - Evaluation of state of knowledge regarding eHM for AV (German only)	Federal Highway Research Institute, DE	
BASI_e	Statement BASI - Evaluation of state of knowledge regarding eHM for AV (English translation)	Federal Highway Research Institute, DE	
VTTL_Ford	Evaluation of AV External Communication in the Wild	Virginia Tech Transportation Center, US	
Uni-Tueb	New colours for Autonomous Driving: An Evaluation of Chromaticities for the External Lighting Equipment of Autonomous Vehicles	University Eye Hospital Tübingen, DE	
ISO TR 23049	Technical report describing principles for visual external communication development of Automated Vehicle. Discussion on interactions between human and AV	ISO TC22 SC 39 WG8	
Light.Sight.Safety	Signalling for Automated Driving Systems	Light.Sight.Safety, BE / Tech	
Light.Sight.Safety_2	Labeling of Autonomous Driving Vehicles (Phase 1)	Light.Sight.Safety, BE / Tech	
BMI_d	Report of Ethics Commission - Automated and connected driving (German only)	Federal Ministry of Transport, DE	
BMI_e	Report of Ethics Commission - Automated and connected driving (English translation)	Federal Ministry of Transport, DE	

Questionnaire

Research Studies	Questions				Additional information
	Does the research shows a need for an operational state HMI (AV signal)?	Does the research shows a need for a HMI of the vehicle intent?	Which level of automation should be addressed?	Should such signal be visible or audible?	
	Possible answers				
	YES, NO, Not scope of the study	YES, NO, Not scope of the study	L3, L4, L5, ALL	Visible, Audible, both	
AVIP					
CityMobil2					
Duke Display					
Ghost Driver					
InterACT					
SWOV					
InMotion-Summary					
Daimler-eHM					
ISO					
GTB					
Ford					
Audi-VDI					
Audi-SAE					

[AVSR-05-06e](#)

[AVSR-02-25e](#)