

Industry Homework for 3rd meeting of ACSF IWG September 2-3, 2015 in Munich

Reference document: German proposal ACSF-03-03

Definition of ACSF categories

Industry proposal

- 2.3.4.1. "Automatically commanded steering function" (ACSF) means ~~the~~ a function within a complex electronic control system where actuation of the steering system can result from automatic evaluation of signals initiated on-board the vehicle, possibly in conjunction with passive infrastructure features, to generate continuous control action in order to assist the driver.
- 2.3.4.1.1. "ACSF Category A [(Low Speed Manoeuvring Function)]" means a function which performs low speed manoeuvres e.g. parking operations.
- 2.3.4.1.2. "ACSF Category B [(Continuous Lane Guidance Function)]" means a function which keeps the vehicle within its travel lane by influencing the lateral movement of the vehicle.
- 2.3.4.1.3. "ACSF Category C [(Basic Lane Change Function)]" means a function which actuates the vehicle's steering system to perform a single lane change manoeuvre when commanded by the driver.
- 2.3.4.1.4. "ACSF Category D [(Advanced/Smart] Lane Change Function]" means a function able to automatically detect a safe lane change environment and able to actuate the vehicle's steering system to perform a single lane change manoeuvre - upon confirmation by the driver.
- 2.3.4.1.5. "ACSF Category E [(Automatic Lane Change Function)]" means a function [including continuous lane guidance as defined in category B] able to automatically detect a safe lane change environment and able to actuate the vehicle's steering system to perform lane change manoeuvres - without confirmation by the driver.

Justification:

- Letter replaces number to avoid confusion with "levels of automation"
- The different categories are named, to be more explicit on what they mean
- Category B is added to cover vehicles equipped with "continuous lane guidance" only
- Category C and D defines "lane change" categories as standalone functions, i.e. independent from continuous lane guidance (e.g. C may be combined with B, or not)
- Category E is defining a kind of automatic lane change which is likely not relevant without a continuous lane guidance. Still the proposal "[including continuous lane guidance as defined in category B]" is kept between brackets for discussion
- It must be noted that the definitions above will defined the "structure" of the requirements (i.e. how the requirements will be "packaged")
- Note: the limitation on maximum speed of [130km/h] is not kept in the definition. The proposal is to have it as a requirement.

Definition of motorway

Proposal from D ACSF-03-03:

- 2.4.8.1 “Motorway” means, a road section, dedicated exclusively to motor vehicles, having [a speed limit of more than 100 km/h and] at least two traffic lanes for each direction of travel and having a physical separation of traffic moving in opposite directions.

Industry proposal

- 2.4.8.1 **[“ACSF road [for lane change manoeuvres]”]** “Motorway” means, a road section, dedicated exclusively to motor vehicles, having ~~[a speed limit of more than 100 km/h and]~~ **at least two traffic lanes for each direction of travel and having a physical separation of traffic moving in opposite directions and which does not cross at level with any road, railway or tramway track, or footpath.**

Justification:

- The meaning of “motorway” may differ between different CPs, and may have different names (highway, expressway...). The proposal here is making the definition more general and defines only the technical attributes of the roads relevant for ACSF.
- The minimum and maximum speed limit should not be defined in the definition, rather in the requirements, if needed.
- The lane change use limitation to motorways with at least two lanes should be a requirement, not in the definition.
- **Note:** Another alternative would be to delete the definition of “motorway / ACSF road” and put all restrictions in the requirements for ACSF category C, D and E (Lane Change ACSF).

Detection of motorway condition by the system

Proposal from D ACSF-03-03:

5.6.1.2. Operation of ACSF

5.6.1.2.1. Any lane change manoeuvre shall be initiated only if:

- the vehicle is travelling on ~~motorway~~ a road as defined in paragraph 2.4.8. and
- any traffic that can affect the safe manoeuvre shall be identified by equipment installed on the vehicle and
- the vehicle equipment can analyze speed and distance of the identified traffic to ensure a safe manoeuvre (e.g. does not cause a deviation to the flow or direction of other traffic).

Industry Proposal (draft for discussion)

5.6.1.2. Operation of ACSF

5.6.1.2.1 Any lane change manoeuvre shall be initiated only if:

- **the system detects that the** vehicle is travelling on ~~motorway~~ a road as defined in paragraph 2.4.8. and
- **any no** traffic that can affect the safe manoeuvre **has been detected** shall be **identified** by the equipment installed on the vehicle and
- the vehicle equipment **can has** analyzed speed and distance of the **identified** **detected** traffic to ensure a safe manoeuvre (e.g. does not cause a deviation to the flow or direction of other traffic).

System boundaries (definition and documentation)

Proposal from D ACSF-03-03:

- 2.4.8.10 "Conditions for safe operation" mean all circumstances like traffic situation, road category, quality of lane markings, vehicle speed, curvature of the road, lighting, sensor capacities etc. specified by the vehicle manufacturer that have to be fulfilled when an ACSF shall be able to be activated by a driver.] (put it in the requirements?)
- 2.4.8.11 "System boundaries" mean all circumstances from which on the conditions for safe operation are not fulfilled anymore, that cannot be dealt with by an activated ACSF anymore and thus request a take-over of manual steering control by the driver.

Industry proposal

- 2.4.8.10 "Conditions for safe operation" mean ~~all~~ circumstances like traffic situation, road category, quality of lane markings, vehicle speed, curvature of the road, lighting, sensor ~~capacities~~ **capabilities** etc. specified by the vehicle manufacturer, **where the system is designed to operate safely** ~~that have to be fulfilled when an ACSF shall be able to be activated by a driver.~~
- 2.4.8.11 "System boundaries" mean ~~all~~ circumstances from which on the conditions for safe operation **of the system** are not fulfilled anymore, ~~that cannot be dealt with by an activated ACSF anymore and thus request a take-over of manual steering control by the driver.~~

ACSF system status definitions and HMI

- ACSF-03-xx - System status ESC-LKAS-ACSF v1.pptx

Detection of driver presence/activity

Proposal from D ACSF-03-03:

- 2.4.8.13 "Attention recognition system" means a ~~device~~ system to detect if the driver is vigilant, is attentive, is aware of the traffic situation

Industry proposal

- 2.4.8.13 "Driver [status] recognition" means a function able to assess driver's physical availability to respond to a transition demand from an ACSF system, based e.g. on the monitoring of driver activity, presence in driver's seat etc.

Justification: no system can recognize driver attention. One can only monitor activities, presence etc. to make an assessment of driver's physical availability.

Test scenarios and performance

See industry documents:

- ACSF-03-xx - Industry proposal for a new FU2.pptx
- ACSF-03-xx - Industry proposal for a new TR1.docx
- ACSF-03-xx - Industry proposal for a new EM1.docx

Evaluation of ACSF during periodic technical inspection

- ACSF-02-09 is amended as in document ACSF-02-09 - rev 1 - PTI.pptx

Minimal risk manoeuver

- ACSF-03-xx - Minimal risk manoeuvre.docx