

6th ACSF meeting Tokyo, 19-21 April 2016

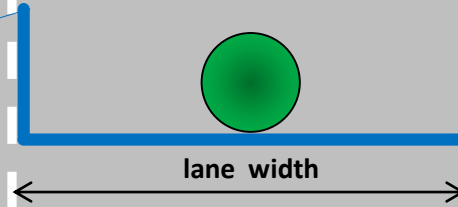
Boundaries between CSF and ACSF

version 1.5

Proposed Principles

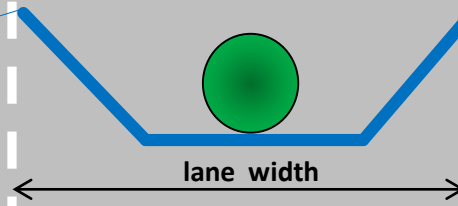
Lane Keeping Assist System (LKAS)

Steering Torque
→ override able



Discontinuous control

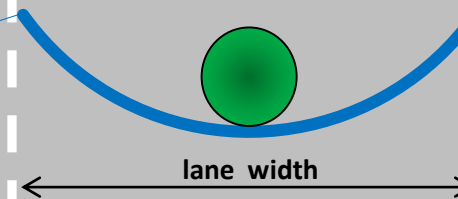
Steering Torque
→ override able



CSF

Lane Guidance (Assist) System

Steering Torque
→ override able



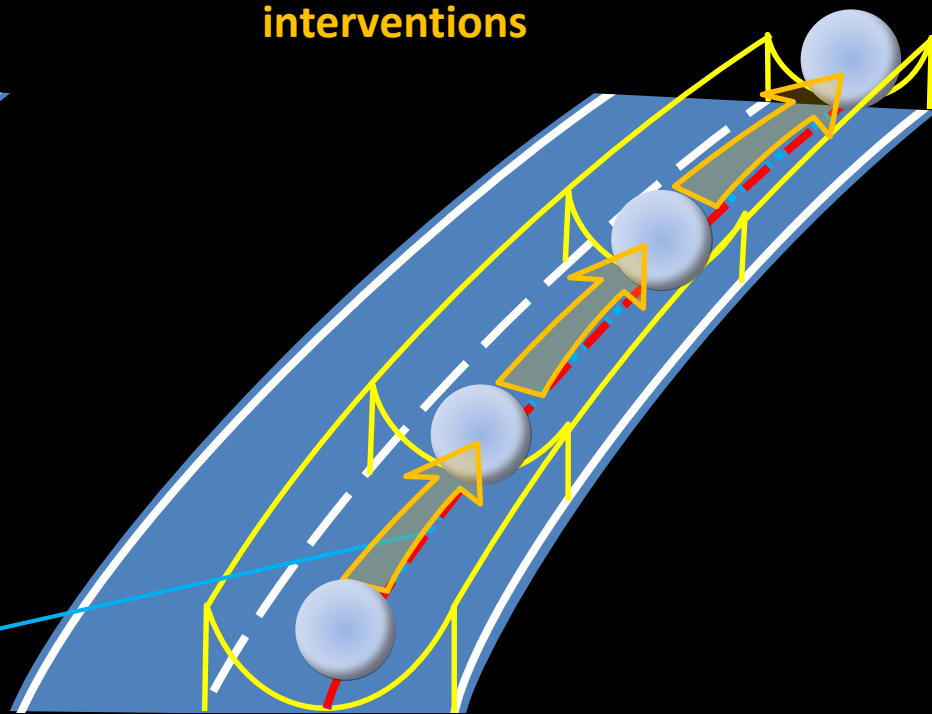
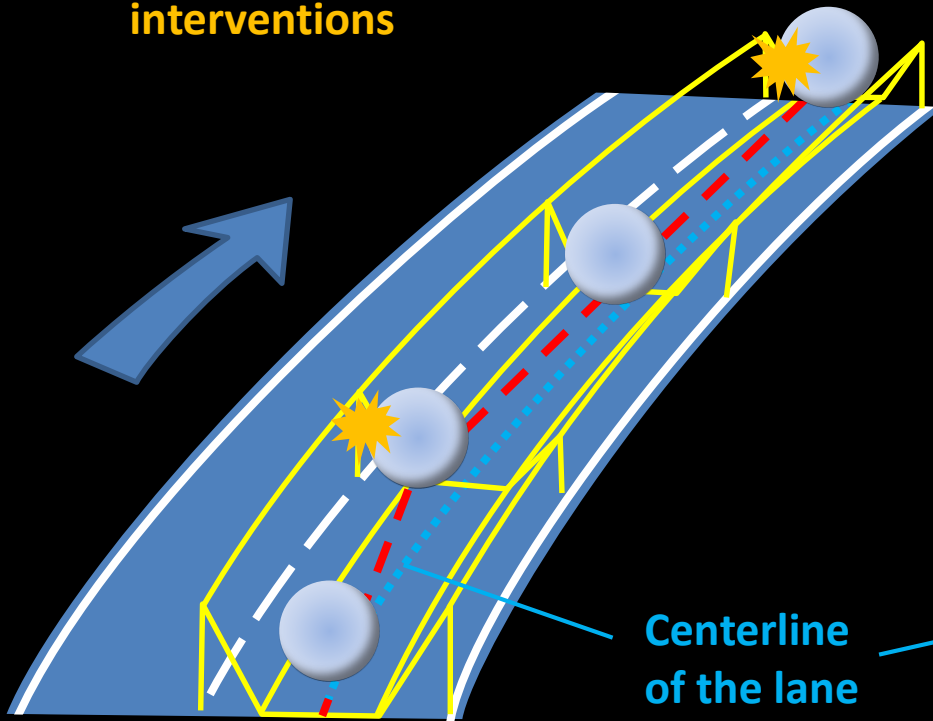
ACSF

Continuous control

Proposed Principles

Single interventions

Continuous interventions



Centerline of the lane

CSF

ACSF

Proposed Principles

Boundaries between LKAS and Lane Guidance

Function	Examples of systems	Purpose	System Intervention	Speed Range	Monitoring of the driver by the system
CSF	Lane Keeping Assist System	Limited intervention to prevent lane departure	Requirement: each LKAS intervention shall be shorter than 15s	0...Vmax	<ul style="list-style-type: none"> no requirement
ACSF-B1	Lane Guidance <u>Assist</u> System	Keep the vehicle within the lane	continuously	0...Vmax	<ul style="list-style-type: none"> Monitoring of lateral control applied by the driver or hands-on detection Warning latest [30s....180s] (depending on speed) after detection that driver likely not in control. See next slide.
ACSF-B2	Lane Guidance System	Keep the vehicle within the lane	continuously	0...130km/h	<ul style="list-style-type: none"> Monitoring seat belt and presence in driver's seat → immediate warning Monitoring driver availability → Warning latest [15 min]

Vmax: as defined by the vehicle manufacturer

Proposed Principles

1500 m

Proposal:

- System shall detect and warn that driver is likely not in control in less than 1500m or 180s, whatever is shorter.
- Alternative: System shall detect and warn that driver is likely not in control in less than:

$$t = 30s \times 180 / V \text{ (km/h)}$$
 where V is the speed of the vehicle in km/h
 t shall not be longer than 180s.
- The requirement does not apply for speed below or equal to 10km/h.

Speed		Warning latest
2,8 m/s	10 km/h	NA
5,6 m/s	20 km/h	180 s
8,3 m/s	30 km/h	180 s
11,1 m/s	40 km/h	135 s
13,9 m/s	50 km/h	108 s
16,7 m/s	60 km/h	90 s
19,4 m/s	70 km/h	77 s
22,2 m/s	80 km/h	68 s
25,0 m/s	90 km/h	60 s
27,8 m/s	100 km/h	54 s
30,6 m/s	110 km/h	49 s
33,3 m/s	120 km/h	45 s
36,1 m/s	130 km/h	42 s
38,9 m/s	140 km/h	39 s
41,7 m/s	150 km/h	36 s
44,4 m/s	160 km/h	34 s
47,2 m/s	170 km/h	32 s
50,0 m/s	180 km/h	30 s
52,8 m/s	190 km/h	28 s
55,6 m/s	200 km/h	27 s

Proposed Principles

If two sub-categories of category B are created, i.e.

- B1 for Lane guidance Assist (continuous ACSF with hands-on) and
- B2 for Lane guidance (hands-off),

the question of combination of B1 and B2 with C, D, and E have to be addressed...

Vehicle Approval

Basic combinations

	Vehicle #1	Vehicle #2	Vehicle #3	Vehicle #4	Vehicle #5	Vehicle #6	Vehicle #7	Vehicle #8	Vehicle #9	Vehicle #10	Vehicle #11	Vehicle #12
B1	X	-	X	X	-	X	X	-	X	X	-	X
B2	-	X	X	-	X	X	-	X	X	-	X	X
C	-	-	-	X	X	X	-	-	-	-	-	-
D	-	-	-	-	-	-	X	X	X	-	-	-
E	-	-	-	-	-	-	-	-	-	X*	X	X

Example

Vehicle #12
X
X
-
-
X



Off-Highway like roads: B1 functionality only


On Highway like roads: B2 + E functionality

Backup slides


Current Status

Advanced Driver Assistance Steering System (ADASS)

2.3.4. "**Advanced Driver Assistance Steering System**" means a system, additional to the main steering system, that provides assistance to the driver in steering the vehicle but in which the driver remains at all times in primary control of the vehicle. It comprises one or both of the following functions:



2.3.4.2. "**Corrective steering function**" means the discontinuous control function within a complex electronic control system whereby, for a limited duration, changes to the steering angle of one or more wheels may result from the automatic evaluation of signals initiated on-board the vehicle, in order to maintain the basic desired path of the vehicle or to influence the vehicle's dynamic behaviour. Systems that do not themselves positively actuate the steering system but that, possibly in conjunction with passive infrastructure features, simply warn the driver of a deviation from the ideal path of the vehicle, or of an unseen hazard, by means of a tactile warning transmitted through the steering control, are also considered to be corrective steering.





2.3.4.1. "**Automatically commanded steering function**" means the 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 in following a particular path, in low speed manoeuvring or parking operations.

Autonomous steering

2.3.3. "**Autonomous Steering System**" means a system that incorporates a function within a complex electronic control system that causes the vehicle to follow a defined path or to alter its path in response to signals initiated and transmitted from off-board the vehicle. The driver will not necessarily be in primary control of the vehicle.

Current Status

Key words...

Advanced Driver Assistance Steering System (ADASS)		Autonomous Steering
Corrective Steering (CSF)	Automatically Commanded Steering (ACSF) 	<i>Out of scope</i> 
<ul style="list-style-type: none"> • Driver in primary control 	<ul style="list-style-type: none"> • Driver in primary control 	<ul style="list-style-type: none"> • Driver not necessarily in primary control
<ul style="list-style-type: none"> • Discontinuous control, for a limited duration 	<ul style="list-style-type: none"> • Continuous control 	
<ul style="list-style-type: none"> • Changes to the steering angle • To maintain the desired path of the vehicle or to influence the vehicle's dynamic behaviour. 	<ul style="list-style-type: none"> • Actuation of the steering system • To assist the driver in following a particular path, in low speed manoeuvring or parking operations 	<ul style="list-style-type: none"> • Control system that causes the vehicle to follow a defined path or to alter its path
<ul style="list-style-type: none"> • Signals initiated on-board the vehicle 	<ul style="list-style-type: none"> • Signals initiated on-board the vehicle 	<ul style="list-style-type: none"> • Signals initiated and transmitted from off-board the vehicle