

INSTRUCTIONS:

Fill out the hazard analysis and risk assessment below.

HA-001 should be for the lane departure warning function as discussed in the

HA-002 should be for the lane keeping assistance function as discussed in the

Then come up with your own situations and hazards for the lane assistance function.

When finished, export your spreadsheet as a pdf file so that a reviewer can easily review it.

Hazard ID			
	Operational Mode	Operational Scenario	Environmental Details
HA-001	OM03 - Normal Driving	OS04 - Highway	EN06 - Rain (slippery road)
HA-002	OM03 - Normal Driving		
		OS03 - Country Road	EN01 - Normal conditions
HA-003	OM03 - Normal Driving	OS04 - Highway	
			EN01 - Normal conditions
HA-004	OM03 - Normal Driving		
		OS03 - Country Road	EN01 - Normal conditions

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 system. Fill in the HA-003 and HA-004 rows.
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Situational Analysis			
Situation Details	Other Details (optional)	Item Usage (function)	Situation Description
SD02 - High speed		IU01 - Correctly used	Normal driving on a highway during rain (slippery road) with high speed and correctly used system.
SD02 - High speed		IU01 - Incorrectly used	Normal Driving on Country Road during Normal conditions with High speed and incorrectly used system
SD02 - High speed		IU01 - Correctly used	Normal driving on highway in normal condition with high speed and correctly used system
SD02 - High speed		IU01 - Correctly used	Normal driving on highway in normal condition with high speed and correctly used system

Hazard Identification			
Function	Deviation	Deviation Details	Hazardous Event (resulting effect)
Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver with haptic feedback	DV04 - Actor effect is too much	The Lane Departure Warning function applies an oscillating torque with very high torque (above limit.)	EV00 - Collision with other vehicle.
Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	DV03 - Function always activated	Lane keep assistance is always activated	EV00 - Collision with other vehicle.
Lane Keeping Assistance (LKA) function shall apply the steering oscillating torque to give the driver a haptic feedback	DV02 - Function unexpectedly activated	Camera sensor fails to get the correct location though the LDW function is active	EV00 - Collision with other vehicle.
Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	DV02 - Function unexpectedly activated	Camera sensor fails to detect merging situation at construction site and therefore keeps on following the merging lane without any situation	EV-02 - Side collision with other traffic

Event Details	Hazardous Event Description	Exposure (of situation)
High haptic feedback can affect driver's ability to steer as intended. The driver could lose control of the vehicle and collide with another vehicle or with road infrastructure.	The Lane Departure Warning function applies an oscillating torque with very high torque (above limit.)	E3 - Medium probability
Driver misuses the system and consider it as an autonomous system	driver misuses the function	E2 - Low probability
The LKA remains active and produces random torque which may lead the driver to loose control and may lead to collision with other vehicle	When the camera is not working the LKA start working randomly	E3 - Medium probability
Entering on the construction sites on highways lead to collision in most of the cases	Due to merging lanes the vehicle steer randomly and collides with the vehicle in the adjacent lane	E4 - High probability

Hazardous Event Classification			
Rationale (for exposure)	Severity (of potential harm)	Rationale (for severity)	Controllability (of hazardous event)
Driving on a highway with rain could happen between 1% and 10% of the time operating the vehicle.	S3 - Life-threatening or fatal injuries	Collitions at high speed could cause fatal injuries.	C3 - Difficult to control or uncontrollable
Driving on the country road and missusing the system	S3 - Life-threatening or fatal injuries	Collitions at high speed could cause fatal injuries.	C3 - Difficult to control or uncontrollable
Driving on a highway with rain could happen between 1% and 10% of the time operating the vehicle.	S3 - Life-threatening or fatal injuries	Collitions at high speed could cause fatal injuries.	C3 - Difficult to control or uncontrollable
Ecncountering counstruction sites on highway occurs in almost every drive on average	S3 - Life-threatening or fatal injuries	Collitions at high speed could cause fatal injuries.	C3 - Difficult to control or uncontrollable

Determination of ASIL and Safety Goals		
Rationale (for controllability)	ASIL Determination	Safety Goal
It is difficult to stay calm and react properly when the steering wheel is moving too much.	C	The oscillating steering torque from the Lane Departure Warning function shall be limited.
When the driver loses control from driving it becomes difficult for him to get back the control immediately to avoid collision	B	The LKA assistance should be time limited and torque applied on steering wheel should be for a specific duration so that the driver cannot misuse the system
The reaction time for the driver is too less to get back the control once he loses it	C	LKA should be deactivated and warning light should be displayed if camera is not working
Quick appropriate evaluation and reaction is required while driving at high speed	D	LKA should figure out the different coloring of the line so as to react properly on merging lane lines