

INSTRUCTIONS:  
Fill out the hazard analysis and risk assessment below.  
HA-001 should be for the lane departure warning function as discussed in the lecture.  
HA-002 should be for the lane keeping assistance function as discussed in the lecture.  
Then come up with your own situations and hazards for the lane assistance system. Fill in the HA-003 and HA-004 rows.  
When finished, export your spreadsheet as a pdf file so that a reviewer can easily see your work.

Hazard ID	Situational Analysis						Hazard Identification				Hazardous Event Classification				Information of ASIL and Safety Goals						
	Operational Mode	Operational Scenario	Environmental Details	Situation Details	Other Details (optional)	Item Usage (function)	Situation Description	Function	Deviation	Deviation Details	Hazardous Event (initiating effect)	Event Details	Hazardous Event Description	Exposure (if situation)	Rationale (for assessment)	Severity (of potential harm)	Consequence (for hazardous event)	Rationale (for controllability)	ASIL Determination	Safety Goal	
HA-001	CM03 - Normal driving	OS04 - Highway	EN05 - Rain (slippery road)	SD02 - High speed		LU01 - Correctly used	Normal driving on a highway in rain (slippery road) at high speed and correctly used system	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 that is very high (above limit).	EV00 - Collision with other vehicle	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.	Collision with other vehicle due to reduced vehicle control if the actor effect is too high	E3	This is a frequent scenario, as drivers can be driving on a wet slippery road frequently.	S3	Life-threatening injuries (survival uncertain), fatal injuries because of collision with other vehicle at high speed	C3	Most drivers would have difficulty controlling the vehicle if the lane departure warning system causes the steering wheel to oscillate with high amplitude or frequency.	ASIL C	The function should limit the torque applied to the steering wheel to an acceptable upper limit.
HA-002	CM03 - Normal driving	OS03 - Country Road	EN01 - Normal conditions	SD02 - High speed		LU02 - Incorrectly used	Normal driving on a country road in normal conditions at high speed (the driver is misusing the lane keeping assistance function as a fully autonomous function)	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	DV03 - Function always activated	The lane keeping assistance is always on and has no time limit	EV00 - Collision with other vehicle	The driver makes the assumption that the lane keeping assistance function will always keep the vehicle inside the lanes, even though it is not intended for this purpose. This can result in a vehicle departing the lane, potentially colliding with another vehicle.	Collision with other vehicle due to absence of vehicle control if the driver leaves control to the lane keeping system	E2	The situation that the driver is misusing the system should not arise very often.	S3	Life-threatening injuries (survival uncertain), fatal injuries because of collision with other vehicle at high speed	C3	Difficult to control or uncontrollable, as the driver is misusing the lane keeping assistance system as an autonomous driving system, implying that both hands are off the steering wheel, resulting in a completely uncontrollable scenario	ASIL B	The function should not always be activated. It should be time limited so that it cannot be misused.
HA-003	CM03 - Normal driving	OS04 - Highway	EN01 - Normal conditions	SD02 - High speed		LU01 - Correctly used	Normal driving on a highway in normal conditions at high speed and correctly used system	Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver with haptic feedback.	DV01 - Function not activated	The lane departure warning function fails to activate	EV00 - Collision with other vehicle	If the lane departure warning system fails to activate, the driver can be lulled into a sense of security and believe that he/she is within the correct lane	Collision with other vehicle because of absence of warning from lane departure warning system	E4	This is a frequent scenario, as drivers can be driving on a normal highway frequently.	S3	Life-threatening injuries (survival uncertain), fatal injuries because of collision with other vehicle at high speed	C1	Failure to activate lane departure warning system does not result in any loss of controllability	ASIL B	It should be ensured that the function does not fail to activate and if it does, the driver should be warned about it.
HA-004	CM03 - Normal driving	OS04 - Highway	EN04 - Snowfall (degraded view)	SD01 - Low speed		LU01 - Correctly used	Normal driving on a highway during a snowfall (degraded view) and correctly used system	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	DV02 - Function unexpectedly activated	The function activates unexpectedly, perhaps by being confused because of snow on the road	EV00 - Collision with other vehicle	If the lane keeping assistance function activates unexpectedly, the vehicle can be steered into another vehicle	Collision with other vehicle because of unexpected activation of lane keeping assistance function	E3	This can be a frequent scenario	S1	Light and moderate injuries, as the driver is driving at low speed	C3	Difficult to control when the lane keeping assistance system applies an unexpected torque to the steering wheel	ASIL A	The function should be disabled in low visibility conditions

Normal driving on country roads during normal conditions with high speed (the driver is misusing the lane keeping assistance function as a fully autonomous function)