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				
	Operational Mode	**Operational Scenario**	**Environmental Details**	**Situation Details**	**Other Details (optional)**
HA-001	OM03 - Normal driving	OS04 - Highway	EN06 - Rain (slippery road)	SD02 - High speed	
HA-002	OM03 - Normal driving	OS03 - Country Road	EN01 - Normal conditions	SD02 - High speed	
HA-003	OM03 - Normal driving	OS05 - Mountain Pass	EN03 - Fog (degraded view)	SD02 - High speed	
HA-004	OM03 - Normal driving	OS05 - Mountain Pass	EN08 - Glace (slippery road)	SD02 - High speed	

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		Hazard Identification			
Item Usage (function)	**Situation Description**	**Function**	**Deviation**	**Deviation Details**	**Hazardous Event (resulting effect)**
IU01 - Correctly used	Normal driving on highway during rain	Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver with haptic feedback	DV04 - Actor effect is too much	Lane Departure warning function applied too much oscillating steering torque above limit	EV00 - Collision with other vehicle
IU02 - Incorrectly used	Driver is on country road and misusing the system	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	DV03 - Function always activated	Lane Keeping function is always activated	EV00 - Collision with other vehicle
IU01 - Correctly used	Normal Driving on Mountain Pass during Fog (degraded view) with High speed	Warning (LDW) function shall apply an oscillating steering torque to provide the driver with haptic feedback	DV19 - Sensor detection is wrong	Lane lines are not detected accurately since camera vision is affected due to fog	EV00 - Collision with other vehicle
IU01 - Correctly used	Normal Driving on Mountain Pass during Glace (slippery road) with High speed	Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver with haptic	DV04 - Actor effect is too much	The LDW function applies an oscillating torque with very high torque (above limit).	EV03 - Car spins out of control

				Hazard
Event Details	**Hazardous Event Description**	**Exposure (of situation)**	**Rationale (for exposure)**	**Severity (of potential harm)**
High haptic feedback could affect drivers steering ability and could cause the vehicle to collide with other vehicles.	LDW applied very high oscillating steering torque above limit	E3 - Medium probability	Driving on rainy situation may happen less than 10%.	S3 - Life-threatening or fatal injuries
The driver is misusing the lane keeping assistance function as a fully autonomous function	Driver do not use the system properly	E2 - Low probability	Driver misusing the LKA functionwhen driving in country road may happen less likely.	S3 - Life-threatening or fatal injuries
The Lane Departure warning system doesn't work as intended due to camera ECU not able to detect lane lines.	The LDW function didn't work as intended, i.e. it didn't warn the driver when he is steering off the lane.	E2 - Low probability	Very less probability of fog days in a year	S3 - Life-threatening or fatal injuries
High haptic feedback can affect driver's ability to steer as intended. The driver could lose control of the vehicle and car could spin out of control	The LDW function applies too high an oscillating torque to the steering wheel (above limit).	E2 - Low probability	Very less probability of Glace in a year	S3 - Life-threatening or fatal injuries

dous Event Classification			Determin
Rationale (for severity)	**Controllability (of hazardous event)**	**Rationale (for controllability)**	**ASIL Determination**
Collision at high speeds could cause fatal injuries	C3 - Difficult to control or uncontrollable	Difficult to control steering wheel at high speeds when it is oscillating too much.	C
Collision at high speeds could cause fatal injuries	C3 - Difficult to control or uncontrollable	Difficult to react to sudden siutations and take control steering wheel at high speeds when hands are off the steering wheel	B
Collision at high speeds could cause fatal injuries	C3 - Difficult to control or uncontrollable	The Driver believes that the system is working as intended and also his vision is affected due to fog hence may react late as well	B
Collision at high speeds could cause fatal injuries	C3 - Difficult to control or uncontrollable	Its difficult to control car with excessive vibratons at high speed and slippery road	B

ation of ASIL and Safety Goals
Safety Goal
Lane Departure warning function shall apply oscillating steering torque within max torque amplitude limits
The LKA function shall be time limited and the additional steering torque shall end after a given time interval so that the driver cannot misuse the system for autonomous driving
The Lane Departure Warning System shall warn the driver when one of its sensor isn't giving proper values.
Oscillating torque shall be limited