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 sy
When finished, export your spreadsheet as a pdf file so that a reviewer can ea

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 Roads	EN01 - Normal Conditions
HA-003	OM03 - Normal driving	OS03 - Country Roads	EN03 - Fog (degraded view)
HA-004	OM03 - Normal driving	OS02- City Roads	EN01 - Normal Conditions

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ssistance system. Fill in the HA-003 and HA-004 rows.
wer can easily see your work.

Situational Analysis		
Situation Details	Other Details (optional)	Item Usage (function)
SD02 - High speed	N / A	IU01 - Correctly used
SD02 - High speed	N / A	IU02 - Incorrectly used
SD01 - Low speed	N / A	IU01 - Correctly used
SD01 - Low speed	N / A	IU01 - Correctly used

Situation Description	Function	Deviation
Normal driving on **a highway** during **rain (slippery road)** with **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
Normal driving on **country roads** during **normal conditions** with **high speed** and i**ncorrectly used** system.	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane.	DV03 - Function always activated
Normal driving on a **country roads** during **fog (degraded view)** with **low speed** and **correctly** used system.	Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver with haptic feedback.	DV19 - Sensor Detection is Wrong
Normal driving on **city roads** during **normal conditions** with **low speed** and **correctly used** system.	Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver with haptic feedback.	DV02 - Function unexpectedly activated

Hazard Identification		
Deviation Details	**Hazardous Event (resulting effect)**	**Event Details**
The lane departure warning function applies an oscillating torque with very high torque (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.
The lane keeping assistance is not time limited, so the driver can misuse it as an autonomous driving function.	EV00 - Collision with other vehicle	The driver is misusing the function by taking both hands off the wheel, overstimating the car´s self-driving capabilities. The vehicle could collide with other vehicles or get off the road.
The camera subsystem detection of lane lines can be wrong due to low visibility conditions, leading to non activation of the LD warning.	EV00 - Collision with other vehicle	The misfunction of the LDW warning due to fog or similar low-visibility conditions, together with a driver's mistake, also due to bad visibility, and over-trust on the LDW system, could lead to a collission with other traffic.
The lane departure warning function is activated independently. The steering wheel begins to oscillate during normal driving in urban areas at low speed. In such conditions the system is expected to be deactivated automatically.	EV00 - Collision with other vehicle	Unexpected 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.

Hazardous Event Description	Exposure (of situation)	Rationale (for exposure)
Loss of of control (steering) with possible collision.	E3 - Medium probability	The driver is driving on a highway with slippery road. This will happen quite often (several times per month during winter season, for example), so we will label the exposure with E3.
Loss of vehicle control (steering) with possible collision.	E2 - Low probability	The driver is on a country road and misusing the system. We consider this a low probability, so we will label the exposure E2
Side collision with other traffic circulating in adjacent lanes / Front collision in case of double direction traffic.	E2 - Low probability	A normal driver would take extra care driving on fog or very low visibility conditions, and usually will not trust the system in such conditions
Loss of of control (steering) with possible collision.	E4 - High probability	The driver is driving on city roads under normal conditions at low speed and uses the system correctly. This situation will occur during almost every drive.

Hazardous Event Classification		
Severity (of potential harm)	**Rationale** (for severity)	**Controllability** (of hazardous event)
S3 - Life-threatening or fatal injuries	The driver is traveling at high speed and could loose control.	C3 - Difficult to control or uncontrollable
S3 - Life-threatening or fatal injuries	The driver is traveling at high speed and could loose control.	C3 - Difficult to control or uncontrollable
S3 - Life-threatening or fatal injuries	Even at moderate speed the injuries can be fatal in case of a frontal collision, with short braking due to low visibility.	C2 - Normally Controlable
S1 - Light and moderate injuries	The severity would normally be low because of slow speeds in urban traffic.	C2 - Normally controllable

	Determin
Rationale **(for controllability)**	**ASIL** **Determination**
With the malfunction causing the steering wheel to vibrate or swing excessively, a normal driver would have difficulty controlling the vehicle.	ASIL C
The malfunction was that the lane keeping assistance was always on and had no time limit, so drivers could take both hands off the wheel. Because hands aren't on the wheel at high speeds, a vehicle accident would not be controllable.	ASIL B
Most drivers (>90%) would be able to take back the ego car to its lane when detecting other traffic, even if the distance is short due to visibility conditions.	ASIL A
The lane departure warning function causes the steering wheel to vibrate unexpectally, while the system should be off. The steering wheel will be oscillating with the normal torque. Most drivers would be able to control this situation.	ASIL A

Safety Goal
The oscillating steering torque from the lane departure warning function shall be limited.
The lane keeping assistance function shall be time limited. Also, 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 shall detect conditions where it cannot operate as expected (such as very low visibility due to fog or heavy rain) and warn the vehicle operator with a audio and visible warning about this fact ("function unavailable").
The lane departure warning function shall not be activated independently if this is not intended by the driver.