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 eas

Hazard ID			
	Operational Mode	**Operational Scenario**	**Environmental Details**
HA-001	OM3 - Normal Driving	OS04 - Highway	EN6 - Rain (Slippery road)
HA-002	OM3 - Normal Driving	OS03 - Country Road	EN1 - Normal Conditions
HA-003	OM3 - Normal Driving	OS04 - Highway	EN1 - Normal Conditions
HA-004	OM3 - Normal Driving	OS05 - Mountain Pass OS08 - Road with bump	EN1 - Normal Conditions

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sistance 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		IU01 - Correctly used
SD02 - High Speed	the driver is misusing the lane keeping assistance function as an autonomous function	IU02 - Incorrectly used
SD02 - High Speed		IU01 - Correctly used
SD01 - Low Speed		IU01 - Correctly used

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Driver Misuse

Situation Description	Function	Deviation
Normal driving on highway during rain (slippery road conditions) 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 incorrectly 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 highway during normal conditions with high speed and correctly used system.	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	DV04 - Actor effect is too much
Normal driving on mountain pass with bumps under 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	DV04 - Actor effect is too much DV19 - Sensor detection is wrong

Hazard Identification		
Deviation Details	**Hazardous Event (resulting effect)**	**Event Details**
The LDW function applies an oscillating torque with very high torque (above limit).	EV00 - Collision with other vehicle EV04 - Car comes off the road	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 on the different lane or with road infrastructure.
the lane keeping assistance function is always activated.	EV00 - Collision with other vehicle	Vehicle crashes into other vehicles on the same lane with injury to driver
The lane keeping assistance applies a strong torque that is uncorrectable by normal drivers, which causes a sudden great turn of the vehicle.	EV00 - Collision with other vehicle EV04 - Car comes off the road EV03 - Car spins out of control	The driver could lose control of the vehicle and collide with another vehicle on the different lane or with road infrastructure. In addition, the sudden turn could flip the car over
The LDW function applies an oscillating torque with very high torque (above limit). The camera sensor detects bumps as lanes	EV00 - Collision with other vehicle EV04 - Car comes off the road EV03 - Car spins out of control	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 on the different lane or with road infrastructure.

Hazardous Event Description	Exposure (of situation)	Rationale (for exposure)
Death of the driver. Potential death of the driver in the collided vehicles. Total destruction of vehicles. Damage to Road infrasturcture	E3 - Quite Often	Highway driving is part of regular driving, but it constitutes for less than 1/2 of total driving time for most people. Although raining is common, it rains for less than 1/5 of the time for most places.
Death of the driver. Potential death of the driver in the collided vehicles. Total destruction of vehicles	E2 - Low Probability	country driving is part of regular driving, however, misusing the lane keeping system as auto driving system is less likely to happen.
Death of the driver. Potential death of the driver in the collided vehicles. Total destruction of vehicles. Damage to Road infrasturcture	E4 - High Probability	Highway driving is part of regular driving
Injury or death of the driver. Damage to the car. Damage to road infrastructure. Potentially fall off mountain	E2 - Low Probability	Most drivers would not drive on bumpy roads on mountains

Hazardous Event Classification		
Severity (of potential harm)	**Rationale (for severity)**	**Controllability (of hazardous event)**
S3 - Life-threatening or fatal injuries	On highways speed of vehicle is expected to be high	C3 - Difficult to control or uncontrollable
S3 - Life-threatening or fatal injuries	On country roads speed of vehicle is expected to be high	C3 - Difficult to control or uncontrollable
S3 - Life-threatening or fatal injuries	On highways speed of vehicle is expected to be high	C3 - Difficult to control or uncontrollable
S3 - Life-threatening or fatal injuries	The car might fall off mountain	C3 - Difficult to control or uncontrollable

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Rationale (for controllability)	**ASIL Determination**
Because the high occilation reduces the driver's ability to operate the steering wheel. In addition, controlling the car in slippery road is more difficult than doing that in dry road.	C
Because hands aren't on the wheel at high speeds, a vehicle accident would not be controllable	B
Because the LKW applied too much force to the steering wheel for drivers to make corrections	D
Because the high occilation reduces the driver's ability to operate the steering wheel. In addition, controlling the car in mountain passes with high bumps is much more difficult.	B

nation of ASIL and Safety Goals
Safety Goal
The oscillating steering torque from the lane departure waring function shall be limited.
The lane keeping assistance 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 maximum torque applied to the steering wheel shall be limited.
The maximum oscillating steering torque from the lane departure waring function shall be configured based on the bumpiness of the road. If the road condition is not allowed for safe operation, disable LDW.