INSTRUCTIONS:
Fill out the hazard analysis and risk assessment below.
HA-001 should be for the lane departure warning function as discuss
HA-002 should be for the lane keeping assistance function as discus
Then come up with your own situations and hazards for the lane assi
When finished, export your spreadsheet as a pdf file so that a reviewe

Hazard ID			
	Operational Mode	**Operational Scenario**	**Environmental Details**
HA-001	OM03 - Normal Driving	OS04 - Highway	EN06 - Rain (slippery r
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	OS01 - Any Road	EN07 - Snow (slippery road)

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

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 a correctly used system
SD02 - High speed		IU02 - Incorrectly used	Normal driving on country roads during normal conditions with high speed (the driver is misusing the lane keeping assistance function as an autonomous function)
SD02 - High speed	Lane lines are poorly marked	IU01 - Correctly used	Normal driving on a highway during normal conditions with high speed and a correctly used system. Lane lines are poorly marked.
SD02 - High speed		IU01 - Correctly used	Normal driving on any road at high speed in adverse weather conditions such as snow, obstructing visibility of the lane markings.

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 LDW 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	The LKA function continues to operate while the driver does not intput into the controls	EV00 - Collision with other vehicle
Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver with haptic feedback	DV19 - Sensor detection is wrong	The LDW applies haptic feedback when there is no deviation from an actual lane	EV00 - Collision with other vehicle
Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	DV13 - Sensor sensitivity is too low	The LKA camera sensor is not capable of measuring lane markings in adverse weather conditions	EV-07 - None

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 LDW function applies too high an oscillating torque to the steering wheel (above limit).	E3 - Medium probability
The LKA is not designed and tested to work as an autonomous system. The system could collide the car with another vehicle or obstacle.	The LKA continues to operate without the presence of driver input. It is not designed for the purpose of autonomous driving	E2 - Low probability
Haptic feedback can distract driver, who will wonder why the wheel is vibrating, causing him to lose focus and hit other vehicles.	The LDW function continues to operate while lane detection confidence is low.	E3 - Medium probability
The LKA shuts off unexpectedly and does not provide steering assistance.	The LKA cannot measure lane markings in adverse weather. The system shuts down and does not provide lane assistance.	E3 - Medium probability

Hazardous Event Classification			
Rationale (for exposure)	**Severity (of potential harm)**	**Rationale (for severity)**	**Controllability (of hazardous event)**
Occurs once a month or more often for an average driver. This is determined from the functional safety standard	S3 - Life-threatening or fatal injuries	Vehicle to vehicle head on crashes at high speed caused by the LDW failure can result in fatal injury. More than 10 % probability of AIS 3-6 (and not S3)	C3 - Difficult to control or uncontrollable
Misuse of the LKA on country roads probably does not happen often. Occurs a few times a year for the great majority of drivers	S3 - Life-threatening or fatal injuries	Vehicle to vehicle head on crashes at high speed caused by the LDW failure can result in fatal injury. More than 10 % probability of AIS 3-6 (and not S3)	C3 - Difficult to control or uncontrollable
Occurs once a month or more often for an average driver. This is determined from the functional safety standard	S3 - Life-threatening or fatal injuries	Vehicle to vehicle head on crashes at high speed caused by the LDW failure can result in fatal injury. More than 10 % probability of AIS 3-6 (and not S3)	C2 - normally controllable
Occurs once a month or more often for an average driver. It is assumed that the driver operates the vehicle in rain, snow or fog on average once a month or more	S0 - No injuries	The driver is capable of piloting the vehicle without the Lane Keep Assistance	C0 - Controllable in general

	Determination of ASIL and Safety Goals	
Rationale (for controllability)	**ASIL Determination**	**Safety Goal**
Less than 90 % of all drivers or other traffic participants are usually able, or barely able, to avoid harm. Let us assume that testing has indicated most drivers are not capable of responding to high torque output from the steering wheel LDW system.	ASIL C	The oscillating steering torque from the lane departure warning function shall be limited.
Both hands aren't on the wheel at high speeds. The accident would not be controllable	ASIL B	The lane kepping 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.
Only drivers that easily lose focus would not be able to control the car.	ASIL B	The lane deviation system shall deactivate when confidence in its lane detections is low.
The LKA is not required for normal vehicle driving. A driver should be capable of operating the vehicle without it.	QM	The lane keep assistance shall deactivate if lane markings are not detected (due to adverse weather or other sensor obstruction).