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
When finished, export your spreadsheet as a pdf file so that a reviewer can easily see your

Hazard ID	Situational Ana			
	Operational Mode	**Operational Scenario**	**Environmental Details**	**Situation Details**
HA-001	OM03-Normal Drive	OS04-Highway	EN01-Rain (slippery road)	SD02-High Speed
HA-002	OM03-Normal Drive	OS03-Country Road	EN01-Normal Condition	SD02-High Speed
HA-003	OM03-Normal Drive	OS01-Country Road	EN03 -Fog (degraded view)	SD01-Low Speed
HA-004	OM03-Normal Drive	OS02-City Road	EN01-Normal Condition	SD01-Low Speed

the HA-003 and HA-004 rows.
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Other Details (optional)	Item Usage (function)	Situation Description
	IU01-Correctly used	Normal drving on highway during rain with 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 a fully autonomous function)
	IU01-Correctly used	Normal driving on country roads during fog conditions with low speed
	IU01-Correctly used	Normal drving on city road during normal condition

Hazard Identi		
Function	**Deviation**	**Deviation Details**
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).
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 function is not limited in time duration which leads to misuse as an autonomous driving function.
Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver with haptic feedback	DV02-Function unexpectedly activated	The LDW function is not able to detect the lane correctly.
Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	DV01-Function not activated	The LKA function is active but fails to apply steering torque to keep vehicle in ego lane.

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Hazardous Event (resulting effect)	Event Details	Hazardous Event Description	Exposure (of situation)
EV-05-Front collision with ahead traffic	Vehicle collides with another vehicle ahead and cause injury to driver	Loss of steering	E3 - Medium probability
EV-05-Front collision with ahead traffic	Vehicle collides with another vehicle ahead and cause injury to driver	Driving on a country road with high speed and misusing the system	E2-Low probability
EV-05-Front collision with ahead traffic	Vehicle collides with another vehicle ahead and cause injury to driver.	Driving on a country road with low speed and partial loss of steering.	E2-Low probability
EV-06-Front collision with oncoming traffic	Vehicle collides with ongoing vehicle in the traffic and cause injury to driver.	Driving on a city road during normal condition and fails to keep in ego lane due to LKA function failure.	E4 - High probability

Hazardous Event Classification			
Rationale (for exposure)	**Severity (of potential harm)**	**Rationale (for severity)**	**Controllability (of hazardous event)**
Driving on highway when it is raining occurs once a month or more ofter for an average driver	S3 - Life-threatening or fatal injuries	On highway speed of vehicle is expected to be high	C3-Difficult to control or uncontrollable
Drving on a country road with high speed, and misusing the system. That combination probably does not happen often, so we will label the exposure E2.	S3 - Life-threatening or fatal injuries	The driver is traveling at high speed,	C3-Difficult to control or uncontrollable
Driving on a country road with low speed under fog condition is not a high probability event for most driver.	S2-Severe and life-threatening injuries	The driver is traveling at low speed,	C3-Difficult to control or uncontrollable
Driving on a city road during normal condition is part of regular driving.	S2-Severe and life-threatening injuries	The driver is traveling during normal condition,	C1-Simply controllable

	Determination of ASIL and Safety Goals	
Rationale (for controllability)	**ASIL Determination**	**Safety Goal**
The malfunction was that the lane keeping warning applied too much torque in a too high frequency, the drivers lose control of steering. Because steering is lost on the wheel at high speeds, a vehicle accident would not be controllable. We will label this hazardous situation as C3	C	The oscillating steering torque from the lane departure warning function shall be limited
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. We will label this hazardous situation as C3.	B	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 malfunction was that the LKW unexpectedly activated and vibrated the steering wheel. The drivers may lose control of steering. We will label this hazardous situation as C3.	A	The LDW function shall deactivate when the camera sensor is unable to detect road markings, and shall warn the driver of its deactivation.
The LKA failed to function, but most driver can still able to handle the situation under normal condition. We will label this hazardous situation as C1.	QAM	The LKA system should check if the Electronic Power Steering ECU is functioning and give warning to driver if it stops working.