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 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	OS04 - Highway	EN03 - Fog (degraded view)	SD02 - High speed
HA-004	OM03 - Normal driving	OS08 - Road with bump	EN05 - Cross-wind (lateral force)	SD02 - High speed

the HA-003 and HA-004 rows.
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Other Details (optional)	Item Usage (function)	Situation Description	Function
	IU01 - Correctly used	normal driving on a highway during rain 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
Driver is not grasping the steering wheel	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)	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane
	IU01 - Correctly used	normal driving on a highw during fog	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane
	IU01 - Correctly used	normal driving on a bumpy road	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane

Hazard Identification		
Deviation	**Deviation Details**	**Hazardous Event (resulting effect)**
DV04 - Actor effect is too much	The function applies an oscillating torque with too high torque.	EV00 - Collision with other vehicle
DV03 - Function always activated	LKA is always active	EV00 - Collision with other vehicle
DV13 - Sensor sensitivity is too low	the camera does not see the lane marking anymore	EV-05 - Front collision with ahead traffic
DV11 - Actor effect is wrong	The car might leave the current lane due to the bumpy road combined with heavy lateral wind	EV-06 - Front collision with oncoming traffic

Event Details	Hazardous Event Description	Exposure (of situation)
Due to the heavily oscillating steering wheel the driver could lose control and crash into another car.	too high oscillating torque	E3 - Medium probability
Continously maintaining a lane without speed and environment considerations could lead to collision to a slower moving vehicle in the same lane.	Continuous operation of the LKA	E2 - Low probability
lanes and traffic in front can't be recognized properly anymore	sensors not working properly due to fog	E3 - Medium probability
collision with opposing traffic	Actors might not react quickly enough on sudden car movement	E1 - Very low probability

Hazardous Event Classification			
Rationale (for exposure)	**Severity (of potential harm)**	**Rationale (for severity)**	**Controllability (of hazardous event)**
high speed while raining happens frequently	S3 - Life-threatening or fatal injuries	car crashes end often fatal	C3 - Difficult to control or uncontrollable
The driver is on country roads and misusing the system	S3 - Life-threatening or fatal injuries	The vehicle is traveling at high speed	C3 - Difficult to control or uncontrollable
does occur frequently	S2 - Severe and life-threatening injuries	severe crashes can occur	C3 - Difficult to control or uncontrollable
does not occur often	S2 - Severe and life-threatening injuries	severe crashes can occur	C3 - Difficult to control or uncontrollable

	Determination of ASIL and Safety Goals	
Rationale (for controllability)	**ASIL Determination**	**Safety Goal**
Especially during rain and high speed the driver will struggle to control the vehicle with too high oscillating torque	C	Limit the magnitude and frequency of the oscillating torque
The driver is not grasping the steering wheel, so there is no possibility to control steering	B	Continous activation of the LKA shall be prevented
System does not react correctly anymore	B	System must inform the driver that the sensors are not working properly anymore, slow down and pass the responsibility to the driver
if the car suddenly deviates from the planned path, it is difficult for the LKA to keep the car in the lane	QM	The controlling unit / execution model needs to publish steering and acceleration values at least values every 30ms