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 the HA-003 and HA-004 rows.

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

Hazard ID	Situational Analysis							Hazard Identification						Hazardous Event Classification						Determination of ASIL and Safety Goals	
	Operational Mode	Operational Scenario	Environmental Details	Situation Details	Other Details (optional)	Item Usage (function)	Situation Description	Function	Deviation	Deviation Details	Hazardous Event (resulting effect)	Event Details	Hazardous Event Description	Exposure (of situation)	Rationale (for exposure)	Severity (of potential harm)	Rationale (for severity)	Controllability (of hazardous event)	Rationale (for controllability)	ASIL Determination	Safety Goal
HA-001	OM03 - Normal driving	OS04 - Highway	EN06 - Rain (slippery road)	SD02 - High speed		IU01 - Correctly used	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	The LDW function applies an oscillating torque with very high torque (above limit)	EV00 - Collision with other vehicle	High haptic feedback can affect the driver's ability to steer as intended. The driver could lose control of the vehicle and collide with another vehicle or with the road infrastructure.	The LDW function applies too high oscillating torque to the steering wheel (above limit).	E3 - Medium probability	According to functional safety standards, driving on wer roads is E3 (quite often)	S3 - Life-threatening or fatal injuries	Crashing while driving at high speed can lead into fatal injuries	C3 - Difficult to control or uncontrollable	Steering wheel vibrates excessively which is difficult to control for most drivers	C	The oscillating steering torque from the LDW function shall be limited.
HA-002	OM03 - Normal driving	OS03 - Country Road	EN01 - Normal conditions	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)	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 is always activated trying to steer towards lane center.	EV06 - Front collision with oncoming traffic	If the user misuse the LKA as if it was an autonomous driving feature, the car could go off the lane and crash with oncoming traffic.	The LKA function applies steeering torque longer than expected	E2 - Low probability	Most users won't misuse the LKA feature	S3 - Life-threatening or fatal injuries	Colliding with front vehicles at high speed is fatal	C3 - Difficult to control or uncontrollable	Driver is not controlling the steering wheel while driving at high speed	B	The LKA function shall be time limited and the additional steering torque shall end after a given time interval so that the driver is not able to misuse the system as an autonomous driving feature.
HA-003	OM03 - Normal driving	OS04 - Highway	EN03 - Fog (degraded view)	SD02 - High speed		IU01 - Correctly used	Normal driving on a highway with fog at high 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	The LDW function is activated, even though the car is driving along the lane, because lane lines are not completely visible because of fog.	EV04 - Car comes off the road	If the LDW is activated unexpectedly, when the visibility is not clear enough, the high haptic feedback can affect the driver's ability to steer as intended. The driver could lose control of the vehicle and it may come off the road.	The LDW functon is activated even when the car is driving along the center of the lane.	E3 - Medium probability	Highway driving is very common, but fog is more rare.	S3 - Life-threatening or fatal injuries	Crashing while driving at high speed can lead into fatal injuries	C3 - Difficult to control or uncontrollable	Steering wheel vibrates excessively which is difficult to control for most drivers	C	The system shall detect low visibility environments and disable the LDW function
HA-004	OM03 - Normal driving	OS04 - Highway	EN05 - Cross-wind (lateral force)	SD02 - High speed		IU01 - Correctly used	Normal driving on a highway with strong winds at high speed and using the system correctly	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	DV05 - Actor effect is too less	The torque applied by the LKA may not be enough since the strenght of the wind is opposite to the control force.	EV00 - Collision with other vehicle	The car may collide with other vehicle if the LKA force is not eough to keep it along the lane.	The LKA torque applied is not enough to keep the vehicle in the center of the lane.	E3 - Medium probability	Highway driving is very common, but strong winds are more rare.	S3 - Life-threatening or fatal injuries	Crashing while driving at high speed can lead into fatal injuries	C2 - Normally controllable	Normally the driver can steer enough so that the vehicle stays in the center of the lane	B	The system shall measure the force and direction of the wind and apply the required additional torque.