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.	The 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 torque is higher than the limit.	EV00 - traffic collision.	High haptic feedback can affect driver's ability to steer as intented.The driver loses control and could collide with another vehicle or side of the road.	The Lane Departure Warning function applies an oscillating torgue with very high torque (above limit.)	E3 - Medium probability	Driving on a highway in rain should happen between 1% and 10% of the time when operating the vehicle.	S3 - Difficult to control or uncontrollable	Collisions at high speed could cause fatal injuries.	C3 - Difficult to control or uncontrollable	It is difficult to stay calm and react properly when the steering well is moving significantly.	C	The torque of oscillating steering from the Lane Departure Warning function shall be limited.
HA-002	OM03 - Normal Driving	OS03 - Country Road	EN01 - Normal Condition	SD02 - High Speed		IU02 - Incorrectly used	Normal driving on a country road during normal conditions with high speed and incorrectly used systam.	The Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane.	DV03 - Function is always activated.	The Lane Keeping function is always activated.	EV00 - traffic collision.	The driver uses the function as if the car was a self-driving car, being distracted easily.	The driver does not use the function properly.	E2 - Low probability	Driving at a country road with misusing system should not happen frequently, less than 1% of the time when operating the vehicle.	S3 - Difficult to control or uncontrollable	Collisions at high speed could cause fatal injuries.	C3 - Difficult to control or uncontrollable	When the driver is distracted from driving, it is difficult to re-focus in the case of imminent collision.	B	The Lane Keeping Assistance function shall be time-limited, and additional steering torque shall end after a given time interval so the driver cannot misuse the system for autonomous driving.
HA-003	OM03 - Normal Driving	OS04 - Highway	EN01 - Fog (Degraded View)	SD02 - High Speed		IU01 - Correctly used	Normal Driving on a highway during fog with high speed and correctly used system.	Due to reduced visibility, lane lines may not be clearly visible. Hence, even though the driver is driving along the lane, the lane departure warning system may get activated	DV02 - Function unexpectedly activated.	The camera sensor stops working and the Lane Departure Warning function continues to be activated.	EV00 - Car Comes off road.	As visibility is low, the car may drive off the road if the lane departure warning system activates incorrectly	Lane departure warning function activates when the driver is moving correctly along the lane. The driver may assume that he is driving incorrectly and steer off the road to comply with the lane departure warning system.	E3 - Medium probability	Highway Driving on foggy roads	S3 - Difficult to control or uncontrollable	Collisions at high speed could cause fatal injuries.	C3 - Difficult to control or uncontrollable	A wrong steering action made by the driver at high speeds is difficult to control.	C	The lane departure warning function shall be disabled in low visibility environments
HA-004	OM03 - Normal Driving	OS03 - Highway	EN01 - Cross-wind (Lateral Force)	SD02 - High Speed		IU01 - Correctly used	Normal Driving on a highway during strong winds with high speed and correctly used system.	If the direction of strong wind is opposite to the direction of torque applied to keep the vehicle in lane, the amount of torque applied maybe too small to keep the vehicle in lane	DV02 - Actor effect is too less.	The camera sensor stops working and the Lane Keeping Assistance function continues to be activated.	EV00 - traffic collision.	If the amount of torque applied is not sufficient to keep the vehicle in lane, the vehicle might be in the lane boundary and could collide with other vehicles.	Amount of torque applied is smaller than what is required to keep the vehicle in lane.	E3 - Medium probability	Highway Driving on rainy roads	S3 - Difficult to control or uncontrollable	Collisions at high speed could cause fatal injuries.	C2 - Somewhat difficult to control or uncontrollable	Driver can control the vehicle and steer it into the right lane	B	The lane keeping assistance function shall apply a higher torque when the prevailing winds is in the direction opposite to the direction of application of torque.