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 in Rain (slippery road) 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	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 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	Driving on a highway with rain could happen between 1% and 10% of the time operating the vehicle.	S3 - Life-threatening or fatal injuries	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 too much.	C	The oscillating steering torque from the lane departure warning 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 lane keeping assistance function is always activated.	EV00 - Collision with other vehicle	The driver could treat the function as if it were meant for fully autonomous driving if the function is always activated. The driver could misusing the function by taking both hands off the wheel and collide with another vehicle or with road infrastructure.	The lane keeping assistance function is always active.	E2 - Low probability	The combination between driving on a country road and misuing the system is rare. Less than 1% of the time operating the vehicle.	S3 - Life-threatening or fatal injuries	Collisions at high speed could cause fatal injuries.	C3 - Difficult to control or uncontrollable	When the driver loose focus on driving, it is difficult to re-focus in the case of immminent collision.	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.
HA-003	OM03 - Normal driving	OS04 - Highway	EN01 - Normal conditions	SD02 - High speed		IU01 - Correctly used	Normal driving on a Highway during normal conditions 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	DV05 - Actor effect is too less	The LDW function applies an oscillating torque with too less torque (which does not provide the driver with enough haptic feedback).	EV00 - Collision with other vehicle	In case the driver gets distracted and relies on the lande departure warning system, the driver could collide with other vehicles in its side lane.	The LDW function applies too less oscillating torque to the steering wheel (too less haptic feedback).	E3 - Medium probability	Driving on a highway with rain could happen between 1% and 10% of the time operating the vehicle.	S3 - Life-threatening or fatal injuries	Collisions at high speed could cause fatal injuries.	C3 - Difficult to control or uncontrollable	When the driver relies on the system to emit a warning through oscillating the steering wheel, it is difficult to re-focus in the case of immminent collision.	C	The lane departure warning system shall be deactivated in case of too less oscillating torque and the driver informed about the malfunction.
HA-004	OM03 - Normal driving	OS03 - Country Road	EN01 - Normal conditions	SD02 - High speed		IU01 - Correctly used	Normal driving on a Highway during normal conditions with high speed and correctly used system	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	DV19 - Sensor detection is wrong	The camer sensor detecting the lanes could be calibrated incorrectly or supplying wrong measurements due to dirty wind shield.	EV00 - Collision with other vehicle	Wrong sensor detection can lead to a false detection of side lanes. This can lead to a collision wit other vehicles if the ego vehicle drives off the center.	The camera sensor is detecting wrong lane lines.	E3 - Medium probability	Driving on a highway with rain could happen between 1% and 10% of the time operating the vehicle.	S3 - Life-threatening or fatal injuries	Collisions at high speed could cause fatal injuries.	C3 - Difficult to control or uncontrollable	When the driver relies on the system to stay in its lane within its normal operation, it is difficult to re-focus in the case of immminent collision.	C	The lane keeping assistance function shall be deactivated when the camera sensor detection is wrong and the driver informed about the malfunction.