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

Hazard ID				
	Operational Mode	**Operational Scenario**	**Environmental Details**	**Situation Details**
HA-001	OM03 - Normal driving	OS03 - Country Road	EN06 - Rain (slippery road)	SD02 - High speed
HA-002	OM03 - Normal driving	OS04 - Highway	EN01 - Normal conditions	SD02 - High speed
HA-003	OM03 - Normal driving	OS02 - City Road	EN01 - Normal conditions	SD01 - Low speed
HA-004	OM03 - Normal driving	OS09 - Road tunnel	EN01 - Normal conditions	SD02 - High speed

Normal driving on a highway during rain (slippery road) with high speed and correctly used system

The lane departure warning function shall apply an oscillating steering torque to provide the driver a

DV04 - Actor effect is too much

The LDW function applies an oscillating torque with very high torque (above limit)

EV08 - Collision with other vehicle

High haptic feedback can affect driver's ability to steer as intended. The driver could lose control of

Torque to the steering wheel is too high

E3 - Medium probability

Highway driving is part of regular driving however, rain does not occur often

S3 - Life-threatening or fatal injuries

On highway speed of vehicle is expected to be high

C3 - Difficult to control or uncontrollable

Excessive vibration will make it difficult for most drivers to loose control

CThe oscillating steering torque from the lane departure warning function shall be limited

he HA-003 and HA-004 rows.
vork.

Situational Analysis	
Other Details (optional)	**Item Usage(function)**
No Lane Marking	IU01 - Correctly used
NA	IU02 - Incorrectly used
NA	IU01 - Correctly used
No Illumination on road	IU02 - Incorrectly used

ı haptic feedback

the vehicle and collide with another vehicle or with

Situation Description
Normal driving on a highway during rain (slippery road) with high speed and correctly used system
Normal driving on country roads during normal conditions with high speed
Normal driving on a city road during normal conditions with low speed
Normal driving in road tunnel with high speed and no illumination on road

road infrastructure.

Function
Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver with haptic fe
Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane
Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver with haptic fe
Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane

Deviation
DV04 - Actor effect is too much
DV03 - Function always activated
DV01 - Function not activated
DV02 - Function unexpectedly activated

Hazard Identification
Deviation Details
The LDW function applies an oscillating torque with very high torque (above limit)The LDW function applies an oscill
The driver misuses the function by taking both hands off the wheel and incorrectly treating the car as a fully autonom
The driver misuses the function by taking both hands off the wheel and incorrectly treating the car as a fully autonom
The LDW function unexpectedly activated and detect wrong lane marking due to low illumination

Hazardous Event (resulting effect)
EV08 - Collision with other vehicle
EV08 - Collision with other vehicle
EV08 - Collision with other vehicle
EV08 - Collision with other vehicle

Event Details
High haptic feedback can affect driver's ability to steer as intended. The driver could lose control of the vehicle and c
The driver misuses the function by taking both hands off the wheel and incorrectly treating the car as a fully autonom
The driver misuses the function by taking both hands off the wheel and incorrectly treating the car as a fully autonom
High haptic feedback can affect driver's ability to steer as intended. The driver could lose control of the vehicle and c

Hazardous Event Description	Exposure (of situation)
Torque to the steering wheel is too high	E3 - Medium probability
Lane keeping function is activated always	E2 - Low probability
Lane keeping function is not activated and driver consider car as fully autonomous	E4 - High probability
Loss of steering control due to high speed driving in tunnel and low illumination	E2 - Low probability

Rationale (for exposure)
Highway driving is part of regular driving however, rain does not occur often
Driving in the country road may not happen often
City driving is part of regular driving, hence occurs normally
Tunnel driving with high speed is not regular activity for most of the driver

Hazardous Event Classification	
Severity (of potential harm)	**Rationale (for severity)**
S3 - Life-threatening or fatal injuries	High speed collisions could be fatal
S3 - Life-threatening or fatal injuries	High speed collisions could be fatal
S1 - Light and moderate injuries	Low speed collisions is usually cause no injury
S3 - Life-threatening or fatal injuries	High speed collisions could be fatal

Controllability (of hazardous event)
C3 - Difficult to control or uncontrollable
C3 - Difficult to control or uncontrollable
C0 - Controllable in general
C3 - Difficult to control or uncontrollable

Rationale (for controllability)	ASIL Determination
Excessive vibration will make it difficult for most drivers to control steering	C
Vehicle accident would not be controllable as the driver's hands are not on the steering	B
Easy to control at low speed	QM
Excessive vibration will make it difficult for most drivers to control steering	B

Determination of ASIL and Safety Goals
Safety Goal
The oscillating steering torque from the lane departure warning function shall be limited
The lane keeping assistance function shall be time limited and the additional steering torque shall end after a given t
The camera ECU shall send signal to Car Display ECU if LKA is activated or not
The LKA function shall stop when camera will unable to detect road markings and notify to driver