

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 r

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

Hazard ID	Situational Analysis				
	Operational Mode	Operational Scenario	Environmental Details	Situation Details	Other Details (optional)
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	OM04 - Backward driving	OS03 - Country Road	EN06 - Rain (slippery road)	SD01 - Low speed	
HA-004	OM03 - Normal Driving	OS02 - City Road	EN03 - Fog (degraded view)	SD04 - High acceleration	

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		Hazard Identification			
Item Usage (function)	Situation Description	Function	Deviation	Deviation Details	Hazardous Event (resulting effect)
IU01 - Correctly used	Driving normally on a highway while rain or slippery road having 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 high	The LDW function applies an oscillating torque with very high torque which is above limit.	EV00 - Collision with other vehicle
IU02 - Incorrectly used	Driving normally on a country road under normal conditions with high speed.	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane	DV03 - Function always activated	LKA function always actively scan the track and keeps the car in lane.	EV00 - Collision with other vehicle
IU02 - Incorrectly used	Driving backwards on a country road under rainy weather/slippery road with low speed	Lane Keeping Assistance (LKA) function shall apply the steering torque when active	DV03 - Function always activated	LKA function always actively scan the track and keeps the car in lane.	EV03 - Rear collision with trailing traffic
IU02 - Incorrectly used	Driving normally on a city road with fog in the weather with high acceleration	Lane Keeping Assistance (LKA) function	DV01 - Function not activated	LKA function is not activate	EV05 - Front collision with ahead traffic

		Hazard		
Event Details	Hazardous Event Description	Exposure (of situation)	Rationale (for exposure)	Severity (of potential harm)
High haptic feedback can affect driver's ability to steer as intended. The driver could lose control of the vehicle and collide with other vehicle or may be road infrastructure.	The LDW functions applies too high an oscillating torque to the steering wheel which is above limit.	E3 - Medium probability	Driving in rain on a highway can happen more often and it can also depend on the driver's location.	S3 - Life-threatening or fatal injuries
Driver misuse the autonomous driving function and it collides with other vehicle as can't react in those situations.	The LKA function is always active so the driver does not focus on driving the car.	E2 - Low probability	Normal driving on the country road and also the conditions are normal could happen often.	S3 - Life-threatening or fatal injuries
Driver couldn't react in this situation, before controlling the vehicle, the vehicle collided	The LKA function is always activated so driver does not focus on driving the car.	E2 - Low probability	Backward driving in country road while rainy weather happens often.	S1 - Light and moderate injuries
Driver could lose control of the vehicle and collide with other traffic ahead due to high acceleration and fog weather	The LKA function is not activated, so it takes time for driver to control the vehicle.	E2 - Low probability	High acceleration in city road while fog weather happens often.	S2 - Severe and life-threatening injuries

Hazardous Event Classification			Determination of ASIL and Safety Goals	
Rationale (for severity)	Controllability (of hazardous event)	Rationale (for controllability)	ASIL Determination	Safety Goal
Vehicle going at high speed can cause injuries.	C3 - Difficult to control or uncontrollable	It is difficult for the drivers to control the vehicle which is going at high speed.	ASIL C	The oscillating steering torque from the lane departure warning function shall be limited.
The impact of crash is more while travelling with high speed on the country road.	C3 - Difficult to control or uncontrollable	Driver cannot react directly or instantly as both the hands will not be on the steering wheel.	ASIL B	The LKA function shall be time limited and the additional steering torque shall end after mentioned time interval so the driver cannot misuse the autonomous system for driving.
The impact of crash is light as the speed is low on the country road.	C1 - Simply controllable	As the speed is low, driver can stop the vehicle instantly and control it	QM	Acceleration should be start reducing and ultimately the vehicle should stop.
The impact of crash can be high due to high acceleration and fog weather on the city road.	C2 - Normally controllable	As the acceleration is high and fog in the weather, driver has to reduce the speed and control it which may take some time in the city road.	QM	Acceleration should be limited once the speed limit is reached or if there is any obstacle or traffic coming or ahead.