INSTRUCTIONS: **Situation Details**

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

David Simon	**version 1.0**	**3/21/201/**	**First Attempt**	
David Simon	**version 2.0**	**3/23/2018**	**HA-004**	**Time Reasoning**

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)	SD03-High Speed	
HA-002	OM03-Normal Driving	OS03-Country Road	EN01-Normal conditions	SD03-High Speed	
HA-003	OM03-Normal Driving	OS02-City Road	EN07-Snow(slippery road)	SD01-Low Speed	
HA-004	OM03-Normal Driving	OS04-Highway	EN03-Fog(degraded view)	SD03-High Speed	

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Item Usage (function)	Situation Description	Function
IU01-Correctly used	Normal Driving at High Speed during Rain on a Slippery Highway	Lane Departure
IU02-Incorrectly Used	Normal Driving at High Speed during Normal Conditions on a Country Road	Lane Keeping
IU02-Incorrectly Used	Normal Driving at Low Speed on a Snow-covered City Road	Lane Keeping
IU01-Correctly used	Normal Driving at High Speed in Fog on a Highway.	Lane Departure

Deviation	Deviation Details
DV04-Actor effect is too much	The LDW function applies an oscillating torque with very high torque (above limit).
DV03-Function always activated	The LKA always applies an extra torque instead of being time limited in duration,
DV03-Function always activated	The LKA always applies an extra torque instead of being time limited in duration,
DV07-Actor effect is too late	The LDW function applies an oscillating torque too late after crossing lane lines

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

Identification

Event Details
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
The driver is misusing the function by taking both hands off the wheel and incorrectly treating the car as a fully autonomous vehicle.
The driver is misusing the function by taking both hands off the wheel and incorrectly treating the car as a fully autonomous vehicle.
Haptic feedback must occur immediately upon crossing lane line to alert driver. If not immediate (too late) , a collision could occur with car in adjacent lane.

Hazardous Event Description	Exposure (of situation)	Rationale (for exposure)
Loss of steering control	E3-Medium Probability	Highway Driving in the Rain somewhat common
Loss of steering control	E2-Low Probability	Country Road and Misusing System doesn't usually occur.
Loss of steering control	E2-Low Probability	City Road, Snow, and Misusing System doesn't usually occur.
Enter adjacent lane	E2-Low Probability	Fog unusual driving condition

Hazardous Event Classification		
Severity (of potential harm)	**Rationale (for severity)**	**Controllability (of hazardous event)**
S3-Life-threatening or fatal injuries	High speed and poor braking from rain	C3-Difficult to control or uncontrollable
S3-Life-threatening or fatal injuries	High speed	C3-Difficult to control or uncontrollable
S1-Light and moderate injuries	Low speed	C3-Difficult to control or uncontrollable
S3-Life-threatening or fatal injuries	High speed and low visibility from fog	C3-Difficult to control or uncontrollable

Rationale (for controllability)	ASIL Determination
High speed, slippery, jerking steering wheel	C
High speed, Driver does not have hands on steering wheel	B
Low speed, but poor braking from snow	QM
High speed and poor visibility so delayed driver response	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 assistant function shall be time-limited and the additional steering torque shall end after a given time interval so that the driver cannot
The lane keeping assistant function shall be time-limited and the additional steering torque shall end after a given time interval so that the driver cannot
The oscillating steering torque from the lane departure warning function shall be initiated within 0.01 second of lane line crossing.

Reasoning for HA-004 Safety goal. Assume 20 mph, almost 30 feet per second so even 0.1 second is 3 feet and potential collision hazard.