**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 at High Speed with active Lane Departure Warning function | Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver with haptic feedback | DV04 - Actor effect is too much | Oscillating steering torque exceeds limit | EV08 - Collision with other vehicle | Vehicle crashes into traffic or road infrastructure with injury to driver and any others present | Driver loses control of vehicle | E3 - Medium probability | Activation of the lane departure warning system during highway driving at high speed is a medium probability event. | S3 - Life-threatening or fatal injuries | On highway, speed of vehicle is expected to be high | C3 - Difficult to control or uncontrollable | Since the steering wheel rotates uncontrollably, it will be difficult for the average driver to control the vehicle at high speed in the rain | C | The oscillating steering torque from the LDW function s be limited |
| HA-002 | OM03 - Normal driving | OS03 - Country Road | EN01 - Normal conditions | SD02 - High speed | | IU02 - Incorrectly used | Normal Driving on coutry roads during normal conditions with high speed and the system is incorrectly used. | Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane | DV03 - Function always activated | LKA is always active. Driver is taking hands off the wheel. | EV08 - Collision with other vehicle | The lane keeping assistance function is always activated and the driver loses control of the vehicle. | Driver loses control of vehicle | E2 - Low probability | Driver abusing the LKA as Autopilot during highway driving at high speeds is a low probability event | S3 - Life-threatening or fatal injuries | On highway, speed of vehicle is expected to be high | C3 - Difficult to control or uncontrollable | Since driver has his hands off the wheel, he cannot control the vehicle | B | The LKA function shall be time limited and the additional steering torque shall end after a given time interval |
| HA-003 | OM03 - Normal driving | OS03 - Country Road | EN06 - Rain (slippery road) | SD02 - High speed | | IU01 - Correctly used | Normal Driving on a Country Road during Rain at High Speed | Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane | DV02 - Function unexpectedly activated | LKA corrects driver input while driver attempts to evade obstacle | EV11 - Car spins out of control | Vehicle crashes into traffic or road infrastructure with injury to driver and any others present | Driver loses control of vehicle | E2 - Low probability | Evading obstacle on a country road in the rain at high speed is a low probability event | S3 - Life-threatening or fatal injuries | Speed of vehicle is high while attempting to evade obstacle | C3 - Difficult to control or uncontrollable | Driver does not expect extra torque in steering wheel and loses control in already difficult to control situation | B | The LKA function shall be deactivated during heavy steering input by the driver |
| HA-004 | OM03 - Normal driving | OS03 - Country Road | EN06 - Rain (slippery road) | SD03 - Low speed | | IU01 - Correctly used | Normal Driving on a Country Road at Low Speed during Rain with active Lane Keeping Assistance function | Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane | DV02 - Function unexpectedly activated | LKA corrects driver input while driver attempts to evade obstacle | EV11 - Car spins out of control | Vehicle crashes into traffic or road infrastructure with injury to driver and any others present | Driver loses control of vehicle | E1 - Very Low probability | Evading obstacle on a country road in the rain at low speed is a very low probability event | S3 - Life-threatening or fatal injuries | The vehicle hitting onto an obstacle on country road | C3 - Difficult to control or uncontrollable | Driver does not expect additional torque in steering wheel and loses control in already difficult to control situation | A | The LKA function shall be deactivated during heavy steering |