



# Safety Plan Lane Assistance

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# Document history

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# Introduction

## Purpose of the Safety Plan

Provide the document for the audit purpose for different stack holders. In multivendor development, safety plan provides overall framework for functional safety of the lane assistance pertaining to the potential malfunctions of the electric and electronic system based on ISO26262 standard or tailored one.

## Scope of the Project

For the lane assistance project, the following safety lifecycle phases are in scope:

- Concept phase
- Product Development at the System Level
- Product Development at the Software Level

The following phases are out of scope:

- Product Development at the Hardware Level
- Production and Operation

## Deliverables of the Project

The deliverables of the project are:

- Safety Plan
- Hazard Analysis and Risk Assessment
- Functional Safety Concept
- Technical Safety Concept
- Software Safety Requirements and Architecture

# Item Definition

The Lane Assistance Item is a simplified version of an Advanced Driver Assistance System As known as ADAS that warns the driver of unintended steering drifts and assists the driver in steering back to the center of the current lane. The item will have two functions

1. Lane departure warning
2. Lane keeping assistance

Use case: when driver drifts towards the edge of the lane system will perform two things

1. The lane departure warning function shall apply an oscillating steering torque to provide the driver a haptic feedback (vibration).
2. The lane keeping assistance function shall apply the steering torque when active in order to stay in ego (current active) lane.

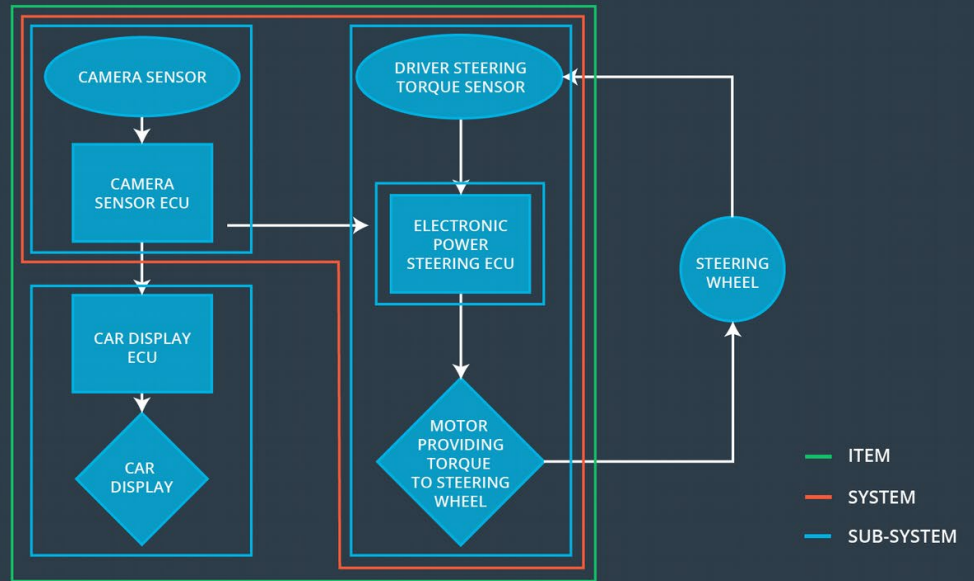
The item boundary includes three sub-systems as shown in Figure:

- 1.Camera system
- 2.Electronic Power Steering system
- 3.Car Display system

When the camera senses that the vehicle is leaving the lane, the camera sends a signal to the electronic power steering system asking to turn and vibrate the steering wheel. The camera sensor will also request that a warning light turn on in the car display dashboard. That way the driver knows that the lane assistance system is active. When the driver uses a turn signal, then the lane assistance system deactivates so that the vehicle can leave the lane. The driver can also turn off the system completely with a button on the dashboard. The driver is still expected to have both hands on the steering wheel at all times. The electronic power steering subsystem has a sensor to detect how much the driver is already turning. The lane keeping assistance function will merely add the extra torque required to get the car back towards center. The extra torque is applied directly to the steering wheel via a motor. As shown in below figure, the Lane Assistance Item does not include the following systems normally found in a fully implemented ADAS system:

- 1.Adaptive Cruise Control
- 2Automatic Parking
- 3.Blind Spot Monitoring
- 4.Tire Pressure Monitoring
- 5.Pedestrian Protection

## LANE ASSISTANCE SYSTEM ARCHITECTURE



# Goals and Measures

## Goals

The goals of the Lane Assistance Functional Safety Plan for the project are:

1. Identify risk hazardous situations in a lane assistance electronic or electric system malfunction that may cause physical injury or damage to a person's health.
2. Evaluate the risk level of the hazardous situation
3. Via systems engineering, lowering high risk level situations to reasonable levels to prevent accidents from occurring.

## Measures

Measures and Activities	Responsibility	Timeline
Follow safety processes	All Team Members	Constantly
Create and sustain a safety culture	All Team Members	Constantly
Coordinate and document the planned safety activities	Safety Manager	Constantly
Allocate resources with adequate functional safety competency	Project Manager	Within 2 weeks of start of project
Tailor the safety lifecycle	Safety Manger	Within 4 weeks of start of project
Plan the safety activities of the safety lifecycle	Safety Manager	Within 4 weeks of start of project
Perform regular functional safety audits	Safety Auditor	Once every 2 months
Perform functional safety pre-assessment prior to audit by external functional safety assessor	Safety Manager	3 months prior to main assessment
Perform functional safety	Safety	Conclusion of functional safety

assessment	Assessor	activities
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## Safety Culture

We believe and will behave in the following manner to achieve the highest safety record in the industry:

1. High priority: safety has the highest priority among competing constraints like cost and Productivity.
- 2.Accountability: processes ensure accountability such that design decisions are traceable back to the people and teams who made the decisions.
3. Rewards: the organization motivates and supports the achievement of functional safety.
4. Penalties: the organization penalizes shortcuts that jeopardize safety or quality.
5. Independence: teams who design and develop a product should be independent from the teams who audit the work.
6. Well defined processes: company design and management processes should be clearly defined.
7. Resources: projects have necessary resources including people with appropriate skills.
- 8.Diversity: intellectual diversity is sought after, valued and integrated into processes.
- 9.Communication: communication channels encourage disclosure of problems.

## Safety Lifecycle Tailoring

For the lane assistance project functional safety initial plan, the ISO 26262 standard have been tailored to include the following safety lifecycle phases in scope:

1. Concept phase
2. Product Development at the System Level
- 3 Product Development at the Software Level

The following phases are out of scope:

- 1 Product Development at the Hardware Level
- 2 Production and Operation [Start of production]

We welcome our selected Tier-1 supplier to help us tailor the ISO 26262 standard further to

# Roles

Role	Org
Functional Safety Manager- Item Level	OEM
Functional Safety Engineer- Item Level	OEM
Project Manager - Item Level	OEM
Functional Safety Manager- Component Level	Tier-1
Functional Safety Engineer- Component Level	Tier-1
Functional Safety Auditor	OEM or external
Functional Safety Assessor	OEM or external

## Development Interface Agreement

All the stakeholders involved in the Lane Assistance project agree to and in the following operating

principals to ensure that we are developing safe vehicles in compliance with ISO 26262 standard, tailored:

1. OEM Project Manager: Item Level resources allocation with adequate functional safety competency, and appointment of external Functional Safety Auditor and Assessor. Lane assistance system functional safety plan, and confirmation measures acceptance.
2. Tier-1 Project Manager: Component Level resources allocation with adequate functional safety competency.
3. Appointed OEM Functional Safety Manager/Engineer (John Chen): Coordinate and document the item level planned safety activities including: concept phase, and product development at the system and software level. Perform functional safety preassessment prior to audit by external functional safety assessor three months prior to main assessment.
4. Tier-1 Safety Manager: Joint tailoring of the safety lifecycle.
5. All OEM, Tier-1 and their selected suppliers team members: Follow safety processes and Create and sustain a safety culture as identified in section 4 of this plan.
6. Appointed Tier-1 Safety Manager/Engineer: Coordinate and document the component level planned safety activities including: concept phase, and product development at the component and sub-system software level in compliance with the item level planned and safety activities as developed by OEM Functional Safety Manager/Engineer.



7. Appointed Safety Auditor: Plan the safety activities of the safety lifecycle once every two months.
8. Appointed Safety Assessor: Perform functional safety assessment at conclusion of functional safety activities.

## Confirmation Measures

It serves two main things

1. The Lane Assistance safety project can align with ISO26262 or tailored version.
2. The lane Assistance safety project makes the vehicle safer/reduce risk.

The confirmation review would ensure that the safety project is ISO26262 compliance/tailored version by an independent appointed safety auditor. The functional safety Audit would ensure that the actual implementation of the project meet the safety plan by an independent appointed auditor. The functional safety assessment will ensure that plans, design and developed products actually meet functional safety independent appointed achieve functional safety by an independent appointed safety accessor.