



# Safety Plan Lane Assistance

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# Document history

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# Introduction

## Purpose of the Safety Plan

This safety plan intends to document and show in a detailed way how the Lane Assistance was designed and tested. Besides, it will also assign roles, responsibilities and show how the best practices were followed to achieve a better quality and minimize risks as much as possible.

## 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 is important to alert the driver when its non-intentionally leaving a lane by vibrating the steering wheel and/or with sound and visual alarms. Besides, the Lane Assistance also works with the Adaptive Cruise Control to maintain the car inside a line actuating on the steering wheel.

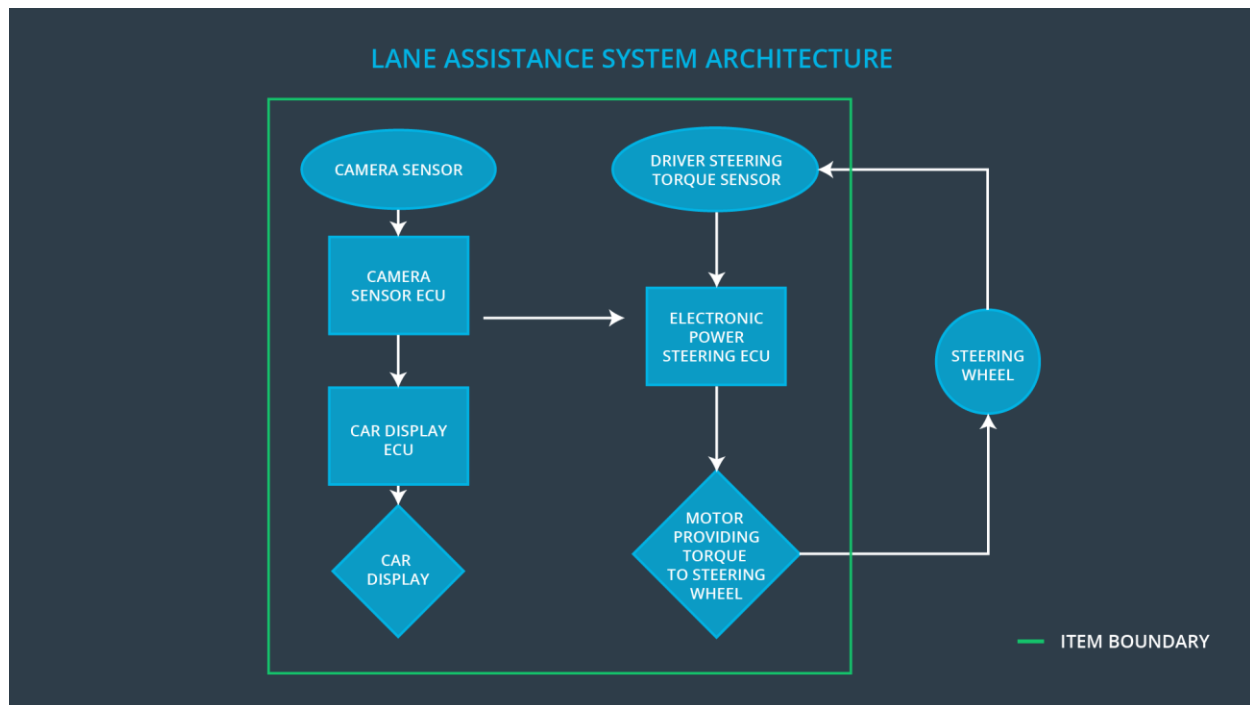


Figure 1 - Lane assistance system architecture

The two main functions of this system are the “lane departure warning” and the “lane keeping assistance”.

The lane departure warning is active when the car starts deviating from the lane without to signal a left or right turn. It alerts the driver by vibrating the steering wheel, a sound effect and a visual effect on the panel.

The lane keeping assistance actively makes the car to stay on the middle of the center lane by applying a counter-steering force on the steering wheel, if the driver doesn't proactively correct the vehicle's course after the alerts from the lane departure warning.

For the lane departure warning, the subsystem used is the camera and the alert displays (panel, sound and steering wheel vibration). For the lane keeping assistance, it uses also the camera and the steering wheel.

The boundaries of the lane assistance include the camera sensor, camera sensor ECU, car display ECU, car display, driver steering torque sensor, electronic power steering ECU and motor providing torque to steering wheel. For the element that are outside of the system is the steering wheel.

# Goals and Measures

## Goals

The goal of this document is to define the lane assistance safety plan in accordance with the ISO 26262.

## 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 Manager	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 assessment	Safety Assessor	Conclusion of functional safety activities

# Safety Culture

Here are some characteristics of a good safety culture:

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



# Safety Lifecycle Tailoring

The safety lifecycle phases that are in scope of this project are concept phase, product development at the system level and product development at the software level.

On the other hand, product development at the hardware level and production and operation are out of scope.

# 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

A DIA (development interface agreement) defines the roles and responsibilities between companies involved in developing a product. All involved parties need to agree on the contents of the DIA before the project begins. It also specifies what evidence and work products each party will provide to prove that work was done according to the agreement. Finally, it ensures that all parties are developing safe vehicles in compliance with ISO 26262.

The responsibility of our company is to analyze and modify the various sub-systems from a functional safety viewpoint that meets the requirements needed by the OEM for the functioning lane assistance system.

# Confirmation Measures

There are two main purpose of confirmation measures, that a functional safety project conforms to ISO 26262, and that the project really does make the vehicle safer.

## **Confirmation review**

Ensures that the project complies with ISO 26262. As the product is designed and developed, an independent person would review the work to make sure ISO 26262 is being followed.

## **Functional safety audit**

Checking to make sure that the actual implementation of the project conforms to the safety plan is called a functional safety audit.

## **Functional safety assessment**

Confirming that plans, designs and developed products achieve functional safety is called a functional safety assessment.