



# Safety Plan Lane Assistance

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# Document history

Date	Version	Editor	Description
5/14/2018	1.0	Gireek Bansal	First attempt

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# Introduction

## Purpose of the Safety Plan

This record characterizes a general structure for the Lane Assistance item. It likewise incorporates the task of parts and duties regarding the functional security.

## 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:

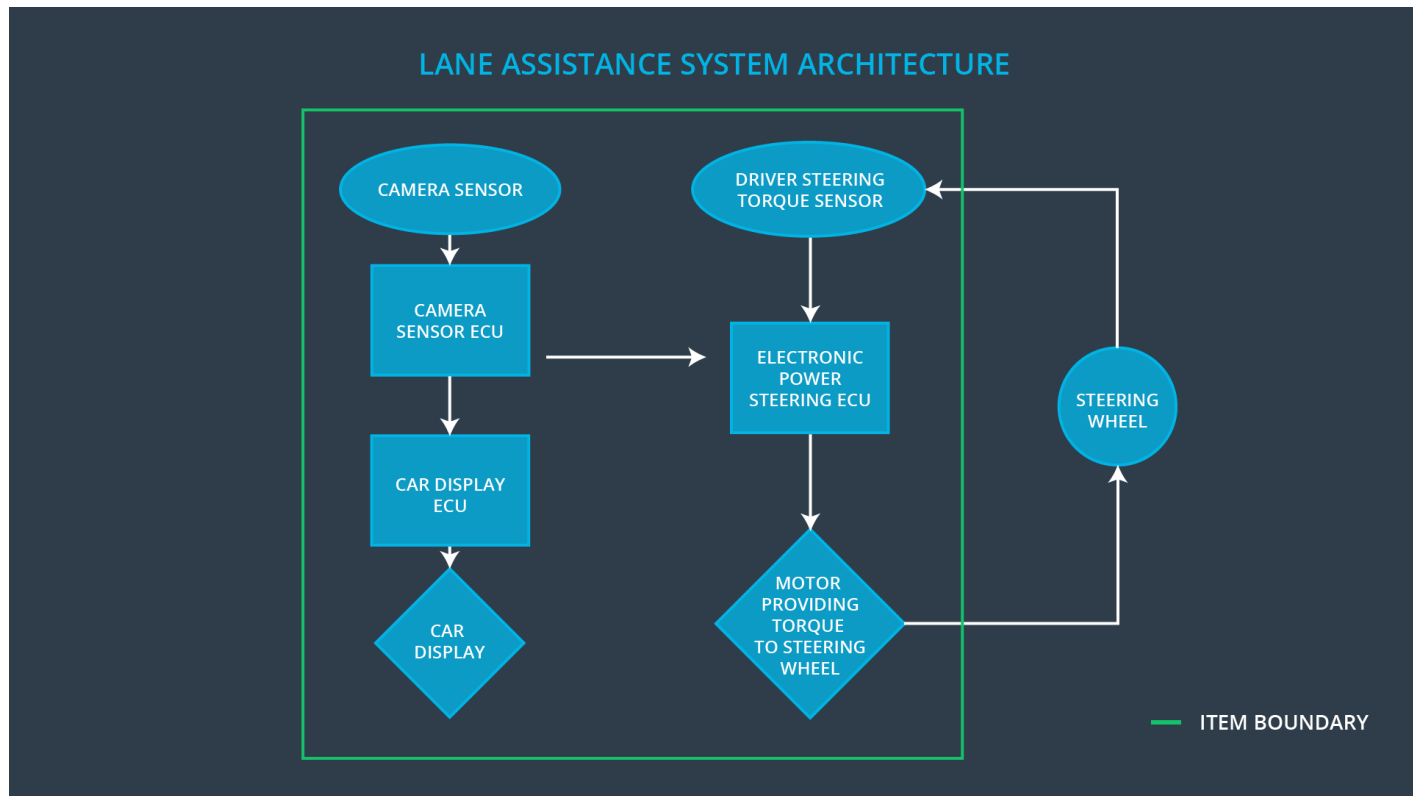
- Product Development at the Hardware Level
- Production and Operation

## 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 item considered in this plan is a simplified version of a Lane Assistance System.

The two main function of this item are:

- **Lane departure warning function:** At the point when the driver float out toward the edge of the path, the steering wheel vibrates to caution the driver. The vehicle will moves the steering wheel back and forward to make vibration.
- **Lane keeping assistance function:** When the driver drift out toward the edge of the lane, this functionality will automatically **assist** the driver; the steering wheel turns towards the center of the lane. It should apply steering torque in order to stay in the ego lane (this is the lane where the car is.)

The item functionalities are implemented by the following subsystems:

- **Camera subsystem:**
  - Camera sensor
  - Camera sensor ECU (Electronic Control Unit)
- **Electronic Power Steering subsystem:**
  - Driver Steering Torque Sensor.
  - Electronic Power Steering ECU.
  - Motor Proving Torque to Steering Wheel.
- **Car Display subsystem:**

- Car Display ECU
- Car Display

The only subsystem outside the item boundary is the steering wheel itself. The rest of 3 subsystems mentioned above are all inside.

The camera system detects lane departures and tells the steering wheel how hard to turn. The driver receives a warning on the vehicle display and also receives a warning via a steering wheel vibrating. Simultaneously, the wheel adds extra steering torque to help the driver move back towards the center of the lane.

## Goals and Measures

### Goals

This project goals are:

- Distinguish hazardous and risky circumstances in the electronic Lane Assistance system making injuries to a person.
- Evaluate the risks related to the hazardous situations.
- Lower the risk of the malfunctions to levels acceptable by society.

### Measures

Measures and Activities	Responsibility	Timeline
Follow safety processes	Entire team	Constantly
Create and sustain a safety culture	Entire team	Constantly
Coordinate and document the planned safety activities	Entire team	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

Some features of the safety culture in our company:

- **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

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

# 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 is required to clearly state the roles and responsibilities between companies involved in developing a product. All sides will have to agree on the terms and conditions of DIA before commencement of the project.

The DIA also specifies what evidence and work products each party will provide to prove that work was done according to the agreement.

The ultimate goal is to ensure that all parties are developing safe vehicles in compliance with ISO 26262.

- **Functional Safety Manager - Item Level:** Pre-audits, plans the development phase for the project.
- **Functional Safety Engineer - Item Level:** Develop prototypes, integrate subsystems combining them into the larger complete Lane Assistance item.
- **Project Manager - Item Level:** Allocates the resources needed for the project.
- **Functional Safety Manager - Component Level:** Pre-audits, plan the development phase for the inner components used in the project.
- **Functional Safety Engineer - Component Level:** Develop prototypes and integrate components conforming the Lane Assistance item.
- **Functional Safety Auditor:** Make sure the project conforms to the safety plan.
- **Functional Safety Assessor:** Judges whether the final solution has increased levels of safety from the previous state.

# Confirmation Measures

Confirmation measures serve two purposes which are that a functional safety project conforms to ISO 26262, and that the project really has an impact in making the vehicle safer.

The 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. A functional safety audit makes sure the actual implementation of the project conforms to the safety plan. A functional safety assessment confirms that the plan, design and developed product actually achieve functional safety we strive for.

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A safety plan could have other sections that we are not including here. For example, a safety plan would probably contain a complete project schedule.

There might also be a "Supporting Process Management" section that would cover "Part 8: Supporting Processes" of the ISO 26262 functional safety standard. This would include descriptions of how the company handles requirements management, change management, configuration management, documentation management, and software tool usage and confidence.

Similarly, a confirmation measures section would go into more detail about how each confirmation will be carried out.