



Safety Plan Lane Assistance

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Document history

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For example, if this were your first draft or first submission, you might say version 1.0. If this is a second submission attempt, then you'd add a second line with a new date and version 2.0]

Date	Version	Editor	Description
24/12/2018	1.0	Manjunath Gasthi	Initial safety plan

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Introduction

Purpose of the Safety Plan

Safety Plan provides an overall framework for a functional safety "Lane Assistance System". This includes project schedule plan, deliverables, confirmation measures, assign roles and responsibilities.

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

This safety plan covers the Lane Assistance System (item) which is an Advanced Driver Assistance System (ADAS). The Lane Assistance System alerts the driver to potentially dangerous situations and takes control over the vehicle to prevent accidents from occurring.

To do this the item has two main functions:

- Lane departure warning
- Lane keeping assistance

The two main function of this item are:

• **Lane departure warning function:** The lane departure warning function shall apply an oscillating steering torque to provide the driver a haptic feedback if the car drifts towards the edge of the ego lane.

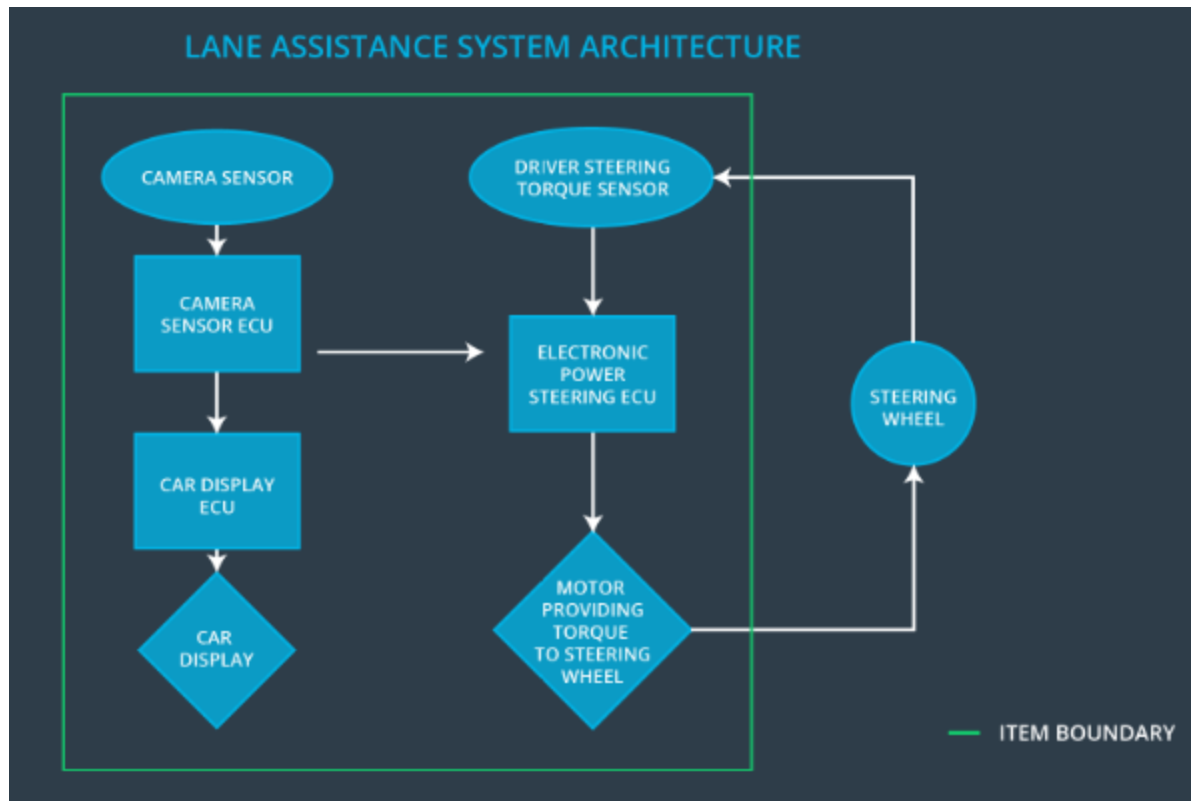
• **Lane keeping assistance function:** When the driver drift out toward the edge of the lane, this functionality will move the steering wheel so that the wheels turn toward the center of the lane. It should apply steering torque in order to stay in the ego lane.

Both functions will act automatically and additionally to the vibrating steering wheel a warning light shall be displayed on in the car display dashboard.

The item functionalities are implemented by the following subsystem:

- **Camera subsystem** : This subsystem is composed by two components:
 - Camera sensor
 - Camera sensor ECU (Electronic Control Unit)
- **Electronic Power Steering subsystem:** This subsystem is composed by three components:
 - Driver Steering Torque Sensor.
 - Electronic Power Steering ECU.
 - Motor Providing Torque to Steering Wheel.
- **Car Display subsystem** : This subsystem is composed by two components:
 - Car Display ECU
 - Car Display

Boundaries include the 3 subsystems which were mentioned previously (Camera system, Electronic Power Steering system, Car Display system) and the Steering Wheel system. Only the Steering Wheel system is outside the Lane Assistance item as per the system architecture attached below.



Goals and Measures

Goals

The project goals are:

- Identify risk and hazardous situations in the Lane Assistance System components malfunction causing injuries to a person.
- Evaluate the risk of hazardous situations.
- Low the risk of the malfunctions to reasonable levels acceptable by current society.

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

To increase functional safety our organization provides a safety culture. This includes the following characteristics:

- High priority: Safety is highest priority
- Well defined processes: Clearly defined management processes and company design
- Accountability: Decisions are documented and traceable
- Diversity: People with different skills and backgrounds work together
- Resources: projects have necessary resources including people with appropriate skills.
- Rewards: the organization motivates and supports the achievement of functional safety.
- Communication: Potential safety problems have to be reported immediately to the developers for further investigations

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

The Development Interface Agreement (DIA) helps to avoid disputes during planning and development of the lane assistance system as it defines the above roles and responsibilities between the involved parties.

Describe the work products that each company will provide & Help avoid disputes between companies. Clarifies who will be responsible for any safety issues in post-production.

The Tier-1 Supplier is accountable for the lane assistance component and not the other parts of the vehicle. Therefore the Tier-1 Supplier will analyze and modify various sub-systems of the lane assistance component from a functional safety viewpoint.

The Tier-1 company will act and fix all bugs which apply to the lane assistance system. All other issues have to be investigated by the OEM.

Confirmation Measures

The confirmation measures ensures that the processes comply with the functional safety standard, project execution is following the safety plan and that the design improves functional safety. Therefore a confirmation review, functional safety audit and functional safety assessment will be executed.

The confirmation review ensures that the project complies to ISO 26262 and will be performed by a person which is independent from the design team.

The functional safety audit checks that the actual implementation of the projects conforms to the safety plan.

The functional safety assessment confirms that project plans, designs and development actually to achieve functional safety.

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.