



Elektrobit



UDACITY

# Safety Plan Lane Assistance

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# Document history

[Instructions: Fill in the date, version and description fields. You can fill out the Editor field with your name if you want to do so. Keep track of your editing as if this were a real world project.

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
9/16/2017	1.0	H. Kim	First attempt
9/17/2017	1.1	H. Kim	Improve contents
9/24/2017	1.2	H. Kim	Update based on 1st review

# Table of Contents

[Instructions: We have provided a table of contents. If the table of contents is not showing up correctly in your word processor of choice, please update it. The table of contents should show each section of the document and page numbers or links. Most word processors can do this for you. In [Google Docs](#), you can use headings for each section and then go to Insert > Table of Contents. [Microsoft Word](#) has similar capabilities]

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# Introduction

## Purpose of the Safety Plan

[Instructions: Answer what is the purpose of a safety plan?]

The purpose of the safety plan is to provide an overall framework for the functional safety project of the Lane Assistance system. It includes Lane Assistance items and the assignment of roles and responsibilities for functional safety for items.

[Reference](#)

## Scope of the Project

[Instructions: Nothing to do here. This is for your information.]

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

[Instructions: Nothing to do here. This is for your information.]

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

[Instructions:

## REQUIRED

Discuss these key points about the system:

What is the item in question, and what does the item do?

The lane assistance item alerts the driver that the vehicle has accidentally departed its lane, and attempts to steer the vehicle back toward the center of the lane.

What are its two main functions? How do they work?

The lane assistance item will have two functions:

1. Lane departure warning
2. Lane keeping assistance

The lane departure warning functions as the lane departure warning function shall apply an oscillating steering torque to provide the driver a haptic feedback.

The lane keeping assistance functions as the lane keeping assistance function shall apply the steering torque when active in order to stay in ego lane.

## [Reference](#)

Which subsystems are responsible for each function?

There are three sub-systems:

- Camera system: Lane departure warning and Lane keeping assistance
- Electronic Power Steering system: Lane keeping assistance
- Car Display system: Lane departure warning

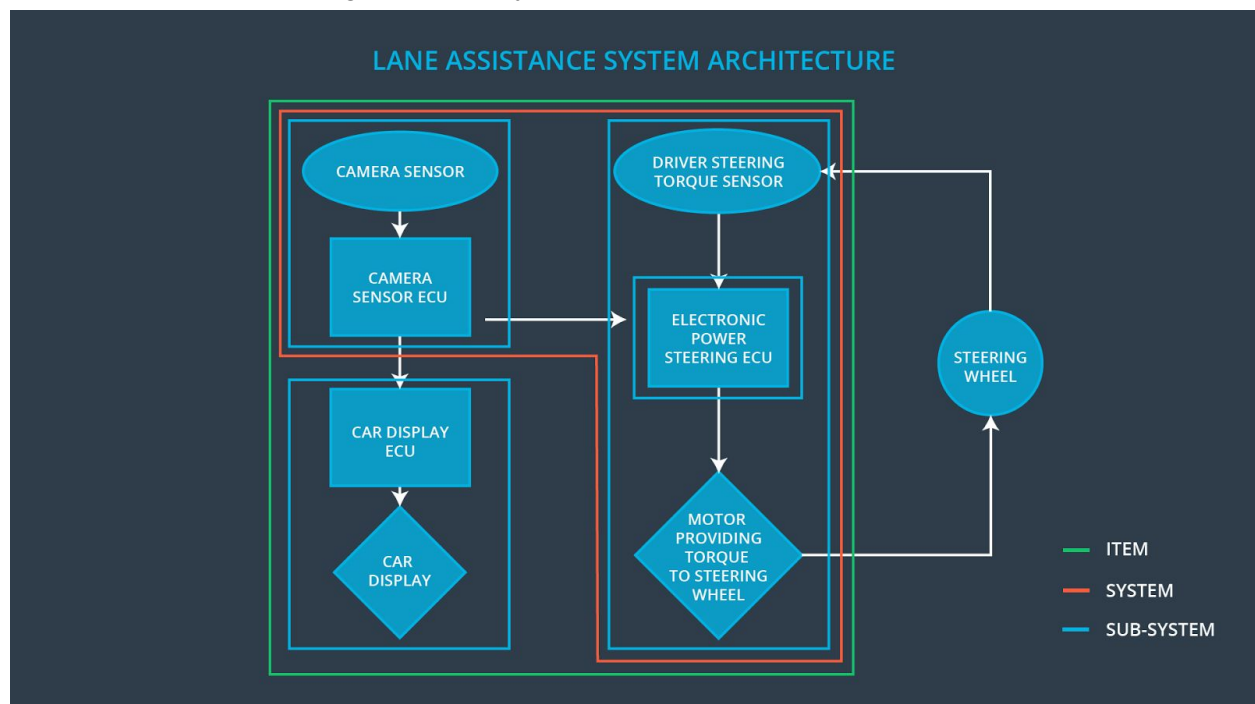
When the camera senses that the vehicle is leaving the lane, the camera sends a signal to the electronic power steering system asking to turn and vibrate the steering wheel.

The 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.

### [Reference](#)

What are the boundaries of the item? What subsystems are inside the item? What elements or subsystems are outside of the item?

The lane assistance system architecture is shown in the figure. As can be seen, the Camera subsystem, the Electronic Power Steering subsystem, and the Car Display subsystem are side the item, while the Steering wheel subsystem is outside the item.



### [Reference](#)

#### OPTIONAL

Optionally, include information about these points as well. These were not included in the lectures, but you might be able to find this information online:

- Operational and Environmental Constraints. This could especially be limited to camera performance; lane lines are difficult to detect in snow, fog, etc
- Legal requirements in your country for lane assistance technology
- National and International Standards Related to the Item
- Records of previously known safety-related incidents or behavioral shortfalls

]

## Goals and Measures

### Goals

[Instructions:

Describe the major goal of this project; what are we trying to accomplish by analyzing the lane assistance functions with ISO 26262?]

The major goal of this project is to ensure the design of a complex vehicle system with sociological and technical requirements is safe.

### Measures

[Instructions:

Fill in who will be responsible for each measure or activity. Hint: The lesson on Safety Management Roles and Responsibilities.

The options are:

All Team Members

Safety Manager

Project Manager

Safety Auditor

Safety Assessor]

Measures and Activities	Responsibility	Timeline
Follow safety processes	All Team Members	Constantly
Create and sustain a safety culture	Safety Manager	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

### [Instructions:

Describe the characteristics of your company's safety culture. How do these characteristics help maintain your safety culture. Hint: See the lesson about 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

[Instructions:

Describe which phases of the safety lifecycle are in scope and which are out of scope for this particular project. Hint: See the [Intro section](#) of this document

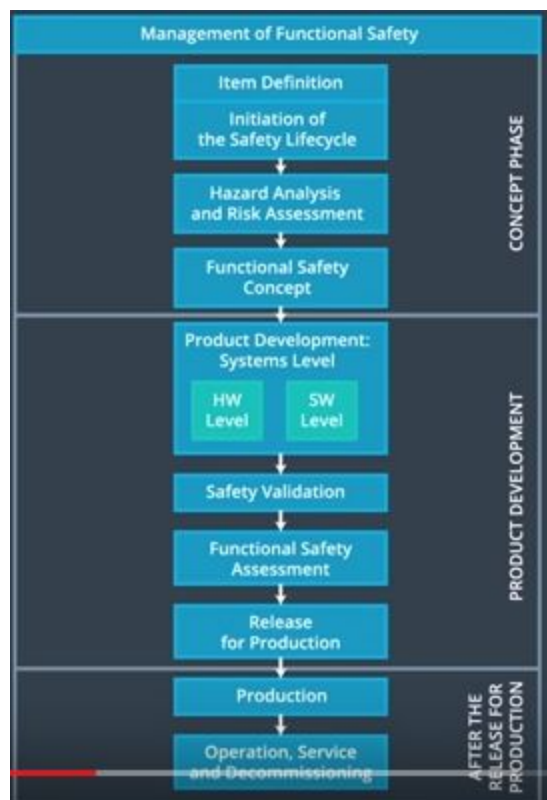
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- Production and Operation



## Roles

[Instructions:

This section is here for your reference. You do not need to do anything here. It is provided to help with filling out the development interface agreement section.

]

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

### [Instructions:

Assume in this project that you work for the tier-1 organization as described in the above roles table. You are taking on the role of both the functional safety manager and functional safety engineer.

Please answer the following questions:

1. What is the purpose of a development interface agreement?
2. What will be the responsibilities of your company versus the responsibilities of the OEM? Hint: In this project, the OEM is supplying a functioning lane assistance system. Your company needs to analyze and modify the various sub-systems from a functional safety viewpoint.

]

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.

The responsibilities of my company include

- Appointment of my company safety manager
- Joint tailoring of the safety lifecycle
- Definition and specification of my company activities and processes

- Exchange of my company information and work products
- Assignment of my company persons responsible for each activity in design and production
- Confirmation of supporting processes and tools to ensure compatibility between OEM and supplier technologies

The responsibilities of OEM include

- Appointment of a customer safety manager
- Joint tailoring of the safety lifecycle
- Definition and specification of OEM activities and processes
- Exchange of OEM information and work products
- Assignment of OEM persons responsible for each activity in design and production
- Confirmation of supporting processes and tools to ensure compatibility between OEM and supplier technologies

## Confirmation Measures

[Instructions:

Please answer the following questions:

1. What is the main purpose of confirmation measures?
2. What is a confirmation review?
3. What is a functional safety audit?
4. What is a functional safety assessment?

]

Confirmation measures serve two purposes:

- that a functional safety project conforms to ISO 26262, and
- that the project really does make the vehicle safer.

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

A functional safety assessment is confirming that plans, designs and developed products actually achieve functional safety is called a functional safety assessment.

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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.