



Safety Plan Lane Assistance

Document Version: 1.0

Template Version 1.0, Released on 2017-06-21



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
24 Oct 2017	1.0	Atif Hussain	Initial draft on Safety
8/Nov/2017	2.0	Atif Hussain	Review Comments applied

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]

Table of Contents

Document history	2
Table of Contents.....	2
Introduction	4
Purpose of the Safety Plan	4
Scope of the Project	4
Deliverables of the Project.....	4
Item Definition	5
Goals and Measures	7

Goals.....	7
Measures	7
Safety Culture	8
Safety Lifecycle Tailoring	8
Roles	9
Development Interface Agreement.....	9
Confirmation Measures	10

Introduction

Purpose of the Safety Plan

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

This Safety plan is being created at the start of the project to build a solid safety case for the final item, to ensure the cars are safe and road-ready to drive.

This safety plan provides an overall framework for Lane Assistance System. It also assigns roles and responsibilities for the functional safety for the Lane Assistance system.

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?

Lane Assistance system warns and guides the human car drivers whenever the car accidentally drifts outside its lane.

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

Lane Assistance system shall have two functions. When the driver drifts towards the edge of the lane, two things will happen:

1. Lane Departure Warning – warns the driver whenever the vehicle drifts out of its lane without setting the giving the turn signal. The lane departure warning function will vibrate the steering wheel.
2. Lane Keeping Assistance – prevents the vehicle from drifting out of its lane when the turn signal is not given. the lane keeping assistance function will move the steering wheel so that the wheels turn towards the center of the lane

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

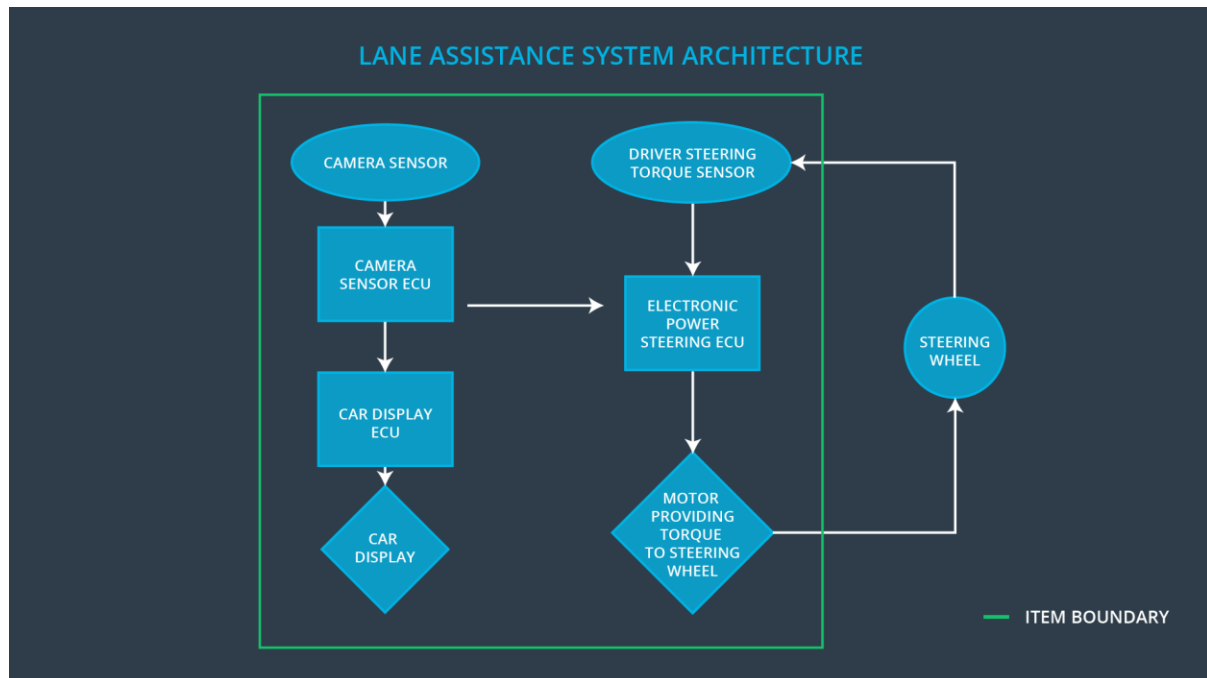
"the lane keeping assistance function shall apply the steering torque when active in order to stay in ego lane"

Which subsystems are responsible for each function?

1. Camera system – detects the lane markings around the itself, and perceives the car position with respect to its lane.
2. Electronic Power Steering system – moves the steering wheel when it detects a lane departure (lane change without a turn signal)
3. Car Display system – alerts the driver whenever there is a lane departure

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

Diagram showing Item boundaries, Component Systems and System boundaries, Component Sub-Systems and their boundaries.



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?]

We are trying to build a Lane Assistance system to improve the car safety.

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

]

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

]

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

[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?

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.

Development Interface Agreement provides the requirements that need to be met by the

Component. Adherence to these requirements will be Audited and Assessed by the OEM before taking delivery of the Tier-1 component.

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.

]

My Tier-1 company is responsible for the functional safety aspects of the various subsystems outsourced to us. OEM is responsible for the overall functional safety of the functioning lane assistance system.

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.

The people who carry out confirmation measures need to be independent from the people who actually developed the project.

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 actually achieve functional safety is called a functional safety assessment.

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.