Elektrobit

UDACITY

Safety Plan Lane Assistance

Document Version: [V1.1]

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
23-01-2019	V1.1	Liping S	Draft the safety plan

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]

Confirmation Measures

Introduction

Purpose of the Safety Plan

[Instructions: Answer what is the purpose of a safety plan?]
Safety plan provides an framework to manage the safety the of the system. It gives an overview of the project and documentation; define the target system for analysis; discuss the goals and measures of the project; define the required resources and supported management methods; gives the project schedule and reports what will be done to prove that functional safety has been achieve.

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 item in question is a simplified version of a Lane Assistance System. The item provides lane departure warning and lane keeping assistance.

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

The Lane Assistance System will have two functions:

Lane departure warning
Lane keeping assistance

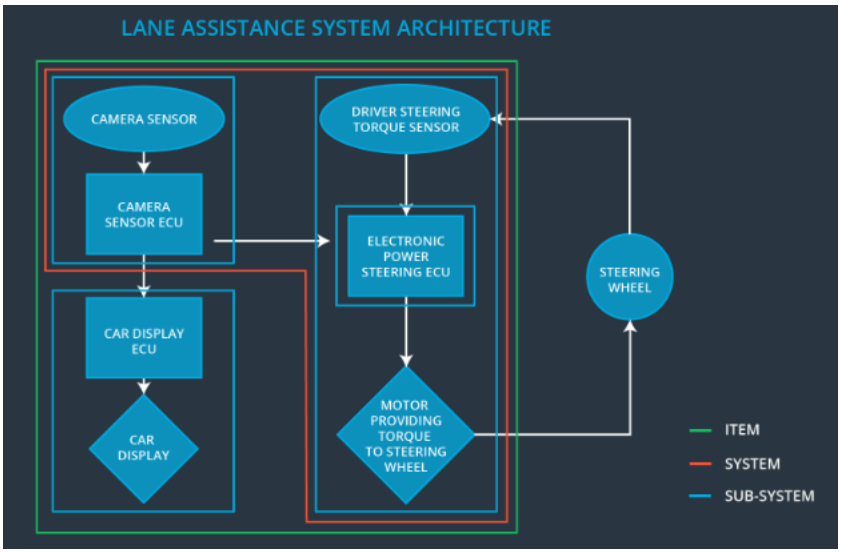
When the driver drifts towards the edge of the lane, two things will happen:

the **lane departure warning function** will vibrate the steering wheel
the **lane keeping assistance function** will move the steering wheel so that the wheels turn towards the center of the lane

Which subsystems are responsible for each function?

There are three subsystems: Camera system, Electronic Power Steering system and Car Display system. The architecture and interaction between subsystems are shown on the attached diagram.

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.



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

As shown on the above diagram, the green line defines the boundaries of the item. Inside the item, there are three subsystems: Camera system, Electronic Power Steering system and Car Display system. Elements like steering wheel and turn signal buttons are outside the item. Other subsystems in ADAS system like Adaptive Cruise Control, Automatic Parking, Blind Spot Monitoring, Tire Pressure Monitoring, Pedestrian Protection are also at outside.

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 assure functional safety of the proposed system. By analyzing the lane assistance functions with ISO26262, the team can guide to identify hazards, evaluate the risk, and prevent accidents from occurring by lowering risk to reasonable levels via systems engineering.

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	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

[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
]
Ccharacteristics of 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 defines the roles and responsibilities between companies involved in developing a product. It 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.

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.**

]

OEM:

Appoint safety manager
Supply hardware for prototyping and production
Define hardware safety lifecycle
Provide developing interfaces and hardware specifications and user guide.
Provide test data

The company:

Appoint safety manager
Supply system specifications
Define the system and subsystems, their functionalities and interfaces
Define system safety lifecycle
Provide functional safety analysis on the systems level and software level
Provide system verification and design documentation

Confirmation Measures

[Instructions:
Please answer the following questions:

1. **What is the main purpose of confirmation measures?**

Confirmation measures serve two purpose:

. that a functional safety project conformas to ISO26262, and
. that the project really does make the vehicle safer

2. **What is a 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.

3. **What is a 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.

4. **What is a 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.