Elektrobit

UDACITY

Safety Plan Lane Assistance

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Document history

Date	Version	Editor	Description
8/9/2018	1.0	Ajinkya Bhave	Safety Plan for Lane Assistance Item

Table of Contents

Introduction

Purpose of the Safety Plan

A safety plan provides an overall framework for a functional safety project. It also defines the responsibilities of the various actors involved in the project. The output of the design, implementation, and production phases are checked against the safety plan to ensure compliance.

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 to be analysed is the Lane Assistance (LA) system. This system alerts the driver when the vehicle is accidentally leaving the lane and attempts to steer the vehicle back to the centre of the lane.

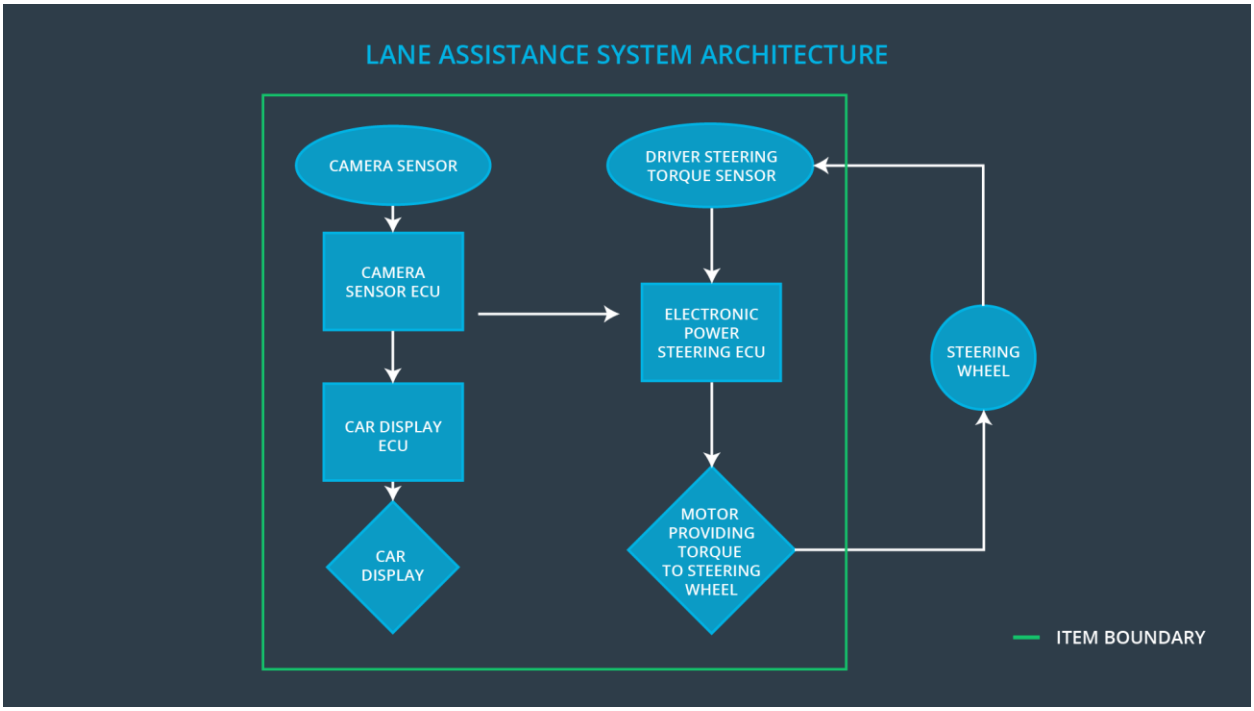
This item has two functions:

1. Lane Departure Warning (LDW)
2. Lane Keeping Assistance (LKA)

The LDW function shall apply an oscillating steering torque to provide the driver a haptic feedback. The LKA function shall apply the steering torque when active in order to stay in ego lane.

The camera subsystem, the electronic power steering (EPS) subsystem, and the steering subsystem are responsible for the functions of the LA system.

The architecture and boundary of the item is shown in the figure below. The steering wheel is not included in the item.



Goals and Measures

Goals

The major goal is to follow the ISO 26262 framework to analyse the lane assistance system to: identify hazards, evaluate the risk in each hazardous situation, and prevent accidents from occurring by lowering the risk to reasonable levels methodically.

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

In my company, the following characteristics describe the safety culture followed and how it is maintained:

1. Safety has the highest priority among competing constraints like cost and productivity.
2. Processes are in place that ensure accountability such that design decisions are documented and traceable back to the people and teams who made the decisions.
3. The company motivates and supports the achievement of functional safety.
4. The company penalizes shortcuts that jeopardize safety or quality.
5. Teams who design and develop a product are independent from the teams who audit the work.
6. Company design and management processes are clearly defined and accessible.
7. Each project has the necessary resources including people with appropriate skills.
8. Intellectual diversity is sought after, valued and integrated into processes.
9. Communication channels encourage disclosure of problems without fear of being called out.

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

Please answer the following questions:

1. What is the purpose of a development interface agreement?
   A Development Interface Agreement (DIA) 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 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.

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.
   The OEM is responsible for defining the functional and safety requirements, and system architecture at the item level. My company will be responsible for the technical safety requirements at the component level, including detailed software requirements, and the component-level refined software architecture. In summary, the OEM will be responsible for the product development at the Item level while my company will be responsible for the software product development at the component level. I am assuming hardware is out of scope for this document.

Confirmation Measures

1. What is the main purpose of confirmation measures?
   Confirmation measures serve two purposes:
   - that a functional safety project conforms to ISO 26262
   - that the project really does make the vehicle safer.

2. What is a confirmation review?
   A review that 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?
   An audit that checks to make sure that the actual implementation of the project conforms to the safety plan.

4. What is a functional safety assessment?
   An assessment confirming that plans, designs and developed products actually 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.