



Elektrobit



UDACITY

Safety Plan Lane Assistance

Document Version: 1.0

Template Version 1.0, Released on 2018-06-21



Document history

Date	Version	Editor	Description
21-Jun-2018	1.0	Prathmesh Dali	Final Submission

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Introduction

Purpose of the Safety Plan

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

In this, we have a Lane Assistance System which is used to keep the vehicle in the middle of the lane. It alerts the driver (generally by vibration in steering wheel) whenever car deviates

from its lane i.e. moves to the edge of the lane. This helps in preventing accident due to vehicle going to the edge of the lane.

This is done with the help of following two tasks:

1) Lane Departure Warning:

This will warn the driver whenever the car changes its lane without any proper signal. It will be done by vibration of steering wheel. Detection of change of lane is done by camera which then sends the signal to steering system and then applies torque to vibrate the steering wheel.

2) Lane Keeping Assistance:

This is used to keep the vehicle in its lane where the vehicle is driving, Whenever the vehicle changes its lane without any signal, first, lane departure system will send warning to the driver. If any action is not taken by driver for “Lane Keeping Assistance” then this will itself move the steering wheel so that vehicle comes back to its lane by applying steering torque.

There are 3 subsystems for Lane Assistance System:

- Camera Subsystem
- Electronic Power Steering Subsystem
- Car display subsystem

Camera Subsystem further consists of Camera Sensor and Camera ECU. **Electronic Power Steering Subsystem** consists of “Steering torque sensor”, “Electronic power steering ECU” and motor which provides torque to the steering wheel. And **Car display subsystem** consists of Car display and Car display ECU.

Goals and Measures

Goals

The main goal of Safety plan is to identify all the possible risks of Lane Assistance System. By doing this it we want to achieve safe and reliable Lane Assistance System with ISO 26262. After the risk analysis is done, we classify the levels of safety and formulate plans to minimize risk and avoid any hazard.

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

Safety is the first and foremost priority in every company. Some of the characteristics of Safety Culture are:

- **High Priority:**
Safety has the highest priority among constraints like cost and productivity in an organization.
- **Accountability:**

There is documentation for all developmental activities so that they are traceable to the people and teams who made these decisions.

- **Rewards:**
the organization motivates and supports the achievement of functional safety.
- **Penalties:**
The organization penalizes shortcuts that threatens quality or safety of it.
- **Independence:**
Product design and development team shall be independent from the auditing team.
- **Well defined processes:**
There shall be a well-defined company design and management processes.
- **Resources:**
Projects have necessary resources including people with appropriate skills.
- **Diversity:**
Intellectual diversity is sought, valued and integrated into processes.
- **Communication:**
Communication channels encourage disclosure of problems.

Safety Lifecycle Tailoring

Below are the safety lifecycles which are in scope for lane assistance project:

- Concept phase
- Product Development at System level
- Product Development at Software level

The phases which are out of scope are:

- Product development at hardware level.
- Product 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

Development Interface Agreement defines the roles and responsibilities all the companies which are involved in product development (OEM and Tier-1). All the parties who are involved in this needs to mutually agree on the contents of DIA before the project starts. The DIA also specifies what evidence and work products each party have to provide in order to prove that work was as per the agreement.

Responsibilities of OEM include defining the lane assistance system functionality and conducting activities which are in scope of Safety Manager, Project Manager and Safety Engineer.

Confirmation Measures

Main purpose of confirmation Measures are:

- Project makes the vehicle safer.
- Functional safety conforms to ISO 26262.

Confirmation review:

It is a process which ensures complies with ISO 26262. There shall be an independent person who performs review to make sure that the mentioned ISO is being followed.

Functional safety audit:

This audit ensures that implementation of the project conforms to the safety plan.

Functional safety assessment:

It ensures that the plans, designs and products which are developed actually achieve functional safety