Elektrobit

UDACITY

Safety Plan Lane Assistance

Document Version: 1.0

Template Version 1.0, Released on 2017-06-21

Document history

Date	Version	Editor	Description
15.06.2018	1.0	Malgorzata Plonka	Initial version

Table of Contents

Document history

Table of Contents

Introduction
- Purpose of the Safety Plan
- Scope of the Project
- Deliverables of the Project

Item Definition

Goals and Measures
- Goals
- Measures

Safety Culture

Safety Lifecycle Tailoring

Roles

Development Interface Agreement

Confirmation Measures

Introduction

Purpose of the Safety Plan

This document defines an overall framework for the Lane Assistance item.
As part of the Advanced Driver Assistance System (ADAS), the lane assistance item may introduce a new risk in a vehicle. The safety plan is responsible for detection of the risk and reducing it to the acceptance levels.

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 of this safety plan is the lane assistance system. The item has following main functions:

- **Lane departure warning function.** In case the vehicle left a lane without signalizing it, system assumes that it happens by mistake and starts to vibrate a steering wheel to warn a driver.
- **Lane keeping assistance function.** In case the vehicle does not drive near of lane center, the system will move the steering wheel so that the vehicle turns back towards the center of the lane.

Following subsystem cover functionality of the item:

- Camera subsystem
- Electronic Power Steering subsystem
- Car Display subsystem

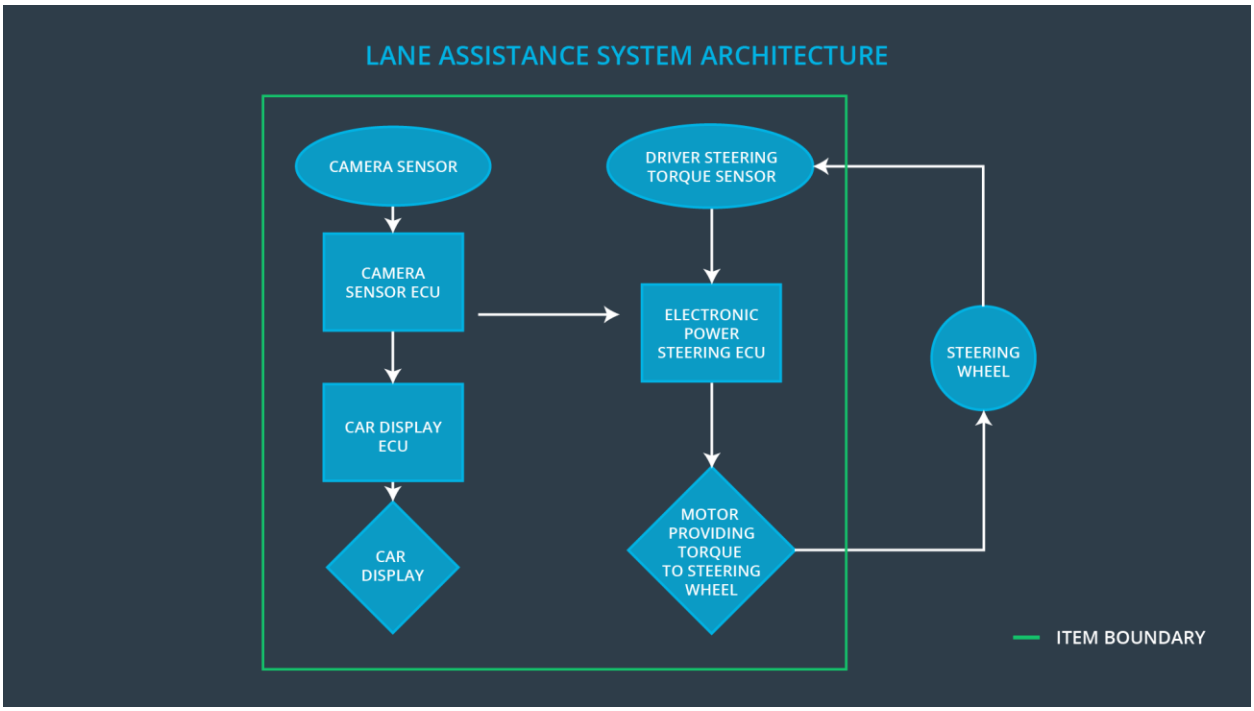
How it works together?

When the camera sensor detects that the vehicle is leaving the lane, the camera sends a signal to the electronic power steering (EPS) system asking to turn and vibrate the steering wheel. The camera sensor will also request that a warning light turn on in the car display dashboard. This is how lane departure warning functions works. This function involves camera, electronic powers steering and car display subsystems.

When the camera sensor detects the driver does not drives towards center of a lane (with some tolerance) the electronic power steering (EPS) system is integrated in the steering wheel that start to move steering wheel to bring a vehicle back to lane center. This how Lane keeping function works. This function involves camera, electronic powers steering subsystems.

Below the composition of subsystems and a diagram showing the interaction between them.

- Camera subsystem containing two components:
  - Camera sensor
  - Camera sensor ECU (Electronic Control Unit)
- Electronic Power Steering subsystem containing three components
  - Electronic Power Steering ECU.
  - Driver Steering Torque Sensor.
  - Motor Proving Torque to Steering Wheel.
- Car Display subsystem containing two components:
  - Car Display ECU
  - Car Display



Goals and Measures

Goals

The goal of the projects is to achieve safety level of Lane Assistance system according to ISO 26262. To do this we are going to:

- Identify risk and hazardous situations
- Evaluate the risks of the hazardous situations
- finally apply systems engineering in order to lower these risk

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

- High priority
  In our company, safety has the highest priority among the competing constraints like productivity and cost. Each new employee in our engineering department is assigned to have a training about ISO 26262 .
- Accountability
  There is a special tem responsible for safety functionality. There is a manager leading working with a team that document all the development activities and decisions in order to ensure the accountability. The documents are managed in the way that all these activities are traceable.
- Rewards
  Our Company motivates and supports the achievement of functional safety.
- Penalties
  We penalize shortcuts that jeopardize safety or quality of our product. After the first attempt, the safety manager will send a warning notice. After the second attempt the employee will be reallocated or dismissed.
- Independence
  We build our development, design, testing, and audit team independently.
  Well defined processes. All processes are clearly defined and the documents are placed in a certain folder in our company network. Only team members with its appropriate role has a write access.
- Resources

We work together with our human resource team to plan, manage and find new talented engineers with the appropriate skills. In case of shortage

- Diversity
  Intellectual diversity is sought after, valued and integrated into processes.
- Communication
  Communication channels encourage disclosure of problems.

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

- 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

The purpose of a development interface agreement (DIA) is to ensure that all parties: OEM and Tier-1 are developing safe vehicles in compliance with ISO 26262.

The responsibilities of the OEM are to define the functionality of the lane assistance system and conduct the activities in scope of project manager, safety manager and safety engineer in item level.
Our company having Tier-1 role is going to analyze and modify various sub-systems according to functional safety requirements.

Confirmation Measures

The main purpose of confirmation measures is to:

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

Confirmation review
ensure the projects comply 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
make sure the actual implementation of the project conforms to the safety plan.

Functional safety assessment
confirms that the plan, design and developed product actually achieve functional safety.