Elektrobit

UDACITY

Safety Plan Lane Assistance

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Document history

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11/06/2017	1	JP	Starting
11/07/2017	1.1	JP	First Version

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Introduction

Purpose of the Safety Plan

The purpose of this safety plan is to provide an overall framework for the Lane Assistance item, and to assign roles and responsibilities for functional safety and gives measures to achieve the targets of ASIL (Automotive Safety Integrity Levels) as a risk-based approach for determining risk classes. This safety plan ensures compliancy with ISO 26262.

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 Lane Assistance item alerts the driver that the vehicle has accidentally departed its lane and attempts to steer the vehicle back toward the center of the lane.

The Lane Assistance system will have two main functions:

1. Lane departure warning: it shall apply an oscillating steering torque to provide the driver a haptic feedback.

2. Lane keeping assistance: it shall apply the steering torque when active in order to stay in ego lane

The following subsystems are responsible for both functions:

- Camera system
- Car Display system
- Electronic Power Steering system

As shown in figure 1 all three subsystems are included in the item boundary.

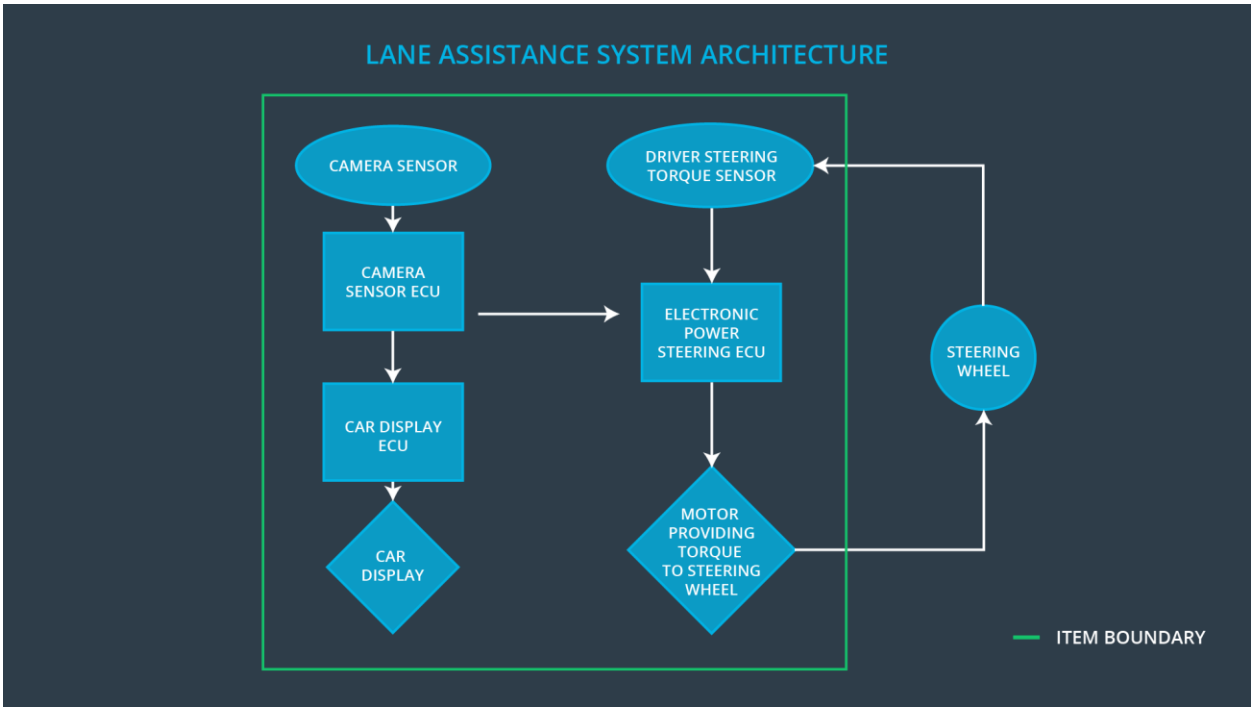

Figure 1: Lane Assistance System Architecture

Goals and Measures

Goals

The major goal is to ensure safe operations and functional safety of the lane assistance system.

Measures

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

- **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

The requirements engineering decisions has always to be tracked with physical papers and to track who is responsible for decisions. In this project the following life cycle phases are in scope:

- Concept phase
- Product development (system level)
- Product development (software level)

The following phases are out of scope:

- Product Development at 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

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.
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.

In this project the responsibilities for the OEM (original equipment manufacturer) are the following:

- supply a functioning lane assistance system
- arrange safety audits
- arrange final safety assessment

The responsibilities for the Tier-1 (our company) will be the following:

- analyze and modify the subsystems in order to fulfill functional safety issues
- develop and provide the source code for Lane Assistance Functionality
- conduct a first safety analysis

Confirmation Measures

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 Measure Definitions:

- **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**: Is the process that checks that the actual implementation of the project conforms to the safety plan.
- **Functional safety assessment**: Confirms 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.