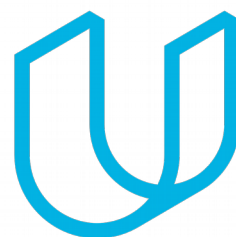




Elektrobit



UDACITY

Safety Plan Lane Assistance

Document Version: [Version]

Template Version 1.0, Released on 2017-06-21



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 |
|------------|---------|-------------------|---|
| 02/10/2018 | 1.0 | Anatolii Volkodav | Initial version |
| 02/12/2018 | 1.1 | Anatolii Volkodav | DIA section improved based on review comments |
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[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]

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Introduction

Purpose of the Safety Plan

[Instructions: Answer what is the purpose of a safety plan?]

Purpose of the plan is to define roles then outline the steps we need to take to achieve functional safety.

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:

Lane Assistance System detect if the driver is unintentionally leaving their lane and react either through warnings or by actively steering the car back into its lane.

What is the item in question, and what does the item do?

Purpose of lane keeping assistance is to provide vibrational steering feedback and torque to the driver as haptic feedback and to limit the oscillating torque. Lane keeping assistance function shall be time limited and the additional steering torque shall end after a given timer interval so that the driver can not misuse the system for autonomous driving.

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

The Lane Assistance System has 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?

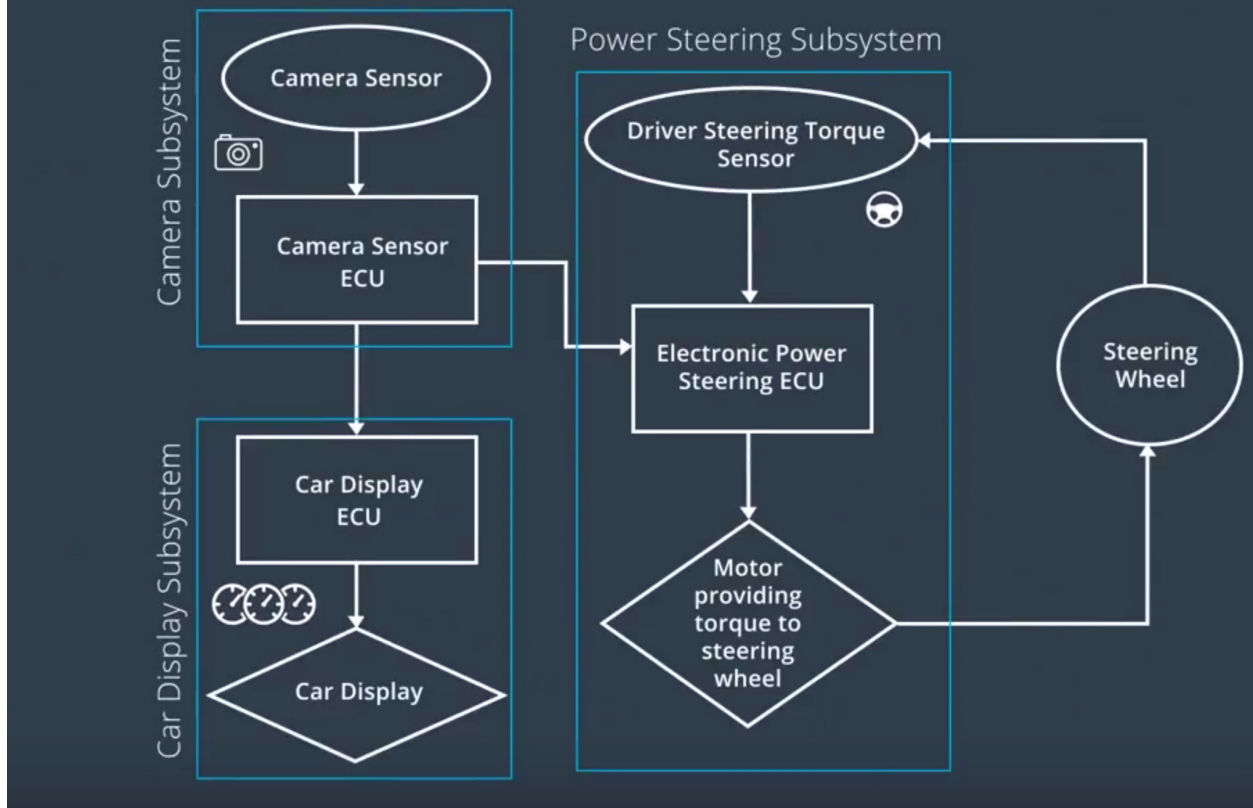
Camera Subsystem

Display Subsystem

Electronic Power Steering Subsystem

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

LANE ASSISTANCE SYSTEM ARCHITECTURE



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?]

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 | 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 | Safety Manager | 3 months prior to main assessment |

| | | |
|--------------------------------------|-----------------|--|
| external functional safety assessor | | |
| 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

]

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:

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?

Define 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.

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.

]

| Role | Org | Responsibilities |
|---|-------------------------------|--|
| Functional Safety Manager- Item Level | OEM | <ul style="list-style-type: none"> • Planning, coordinating and documenting of the development phase of the safety lifecycle • Tailors the safety lifecycle • Maintains the safety plan • Monitors progress against the safety plan • Performs pre-audits before the safety auditor |
| Functional Safety Engineer- Item Level | OEM | <ul style="list-style-type: none"> • Product development • Integration • Testing at the hardware, software and system levels |
| Project Manager - Item Level | OEM | <ul style="list-style-type: none"> • Overall project management • Acquires and allocates resources needed for the functional safety activities • Appoints safety manager or might act as safety manager |
| Functional Safety Manager- Component Level | Tier-1 (Anatolii Volkodav) | <ul style="list-style-type: none"> • Planning, coordinating and documenting of the development phase of the safety lifecycle • Tailors the safety lifecycle • Maintains the safety plan • Monitors progress against the safety plan • Performs pre-audits before the safety auditor |
| Functional Safety Engineer- Component Level | Tier-1 (Anatolii Volkodav) | <ul style="list-style-type: none"> • Product development • Integration • Testing at the hardware, software and system levels |
| Functional Safety Auditor | OEM or external | <ul style="list-style-type: none"> • Ensures that the design and production implementation conform to the safety plan and ISO 26262. • Must be independent from the team developing the project |

| | | |
|----------------------------|-----------------|--|
| Functional Safety Assessor | OEM or external | <ul style="list-style-type: none"> • Independent judgement as to whether functional safety is being achieved via a functional safety assessment • Must be independent from the team developing the project |
|----------------------------|-----------------|--|

Confirmation Measures

[Instructions:

Please answer the following questions:

1. **What is the main purpose of confirmation measures?**
functional safety project conforms to ISO 26262, 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.