



# Functional Safety Concept 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
3/29/2018	1.0	Hsin-Wen Chang	First attempt

## Table of Contents

[Instructions: We have provided a table of contents. If you change the document structure, please update the table of contents accordingly. 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]

[Document history](#)

[Table of Contents](#)

[Purpose of the Functional Safety Concept](#)

[Inputs to the Functional Safety Analysis](#)

[Safety goals from the Hazard Analysis and Risk Assessment](#)

[Preliminary Architecture](#)

[Description of architecture elements](#)

[Functional Safety Concept](#)

[Functional Safety Analysis](#)

[Functional Safety Requirements](#)

[Refinement of the System Architecture](#)

[Allocation of Functional Safety Requirements to Architecture Elements](#)

[Warning and Degradation Concept](#)

# Purpose of the Functional Safety Concept

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

## Inputs to the Functional Safety Concept

### Safety goals from the Hazard Analysis and Risk Assessment

[Instructions:

**REQUIRED:**

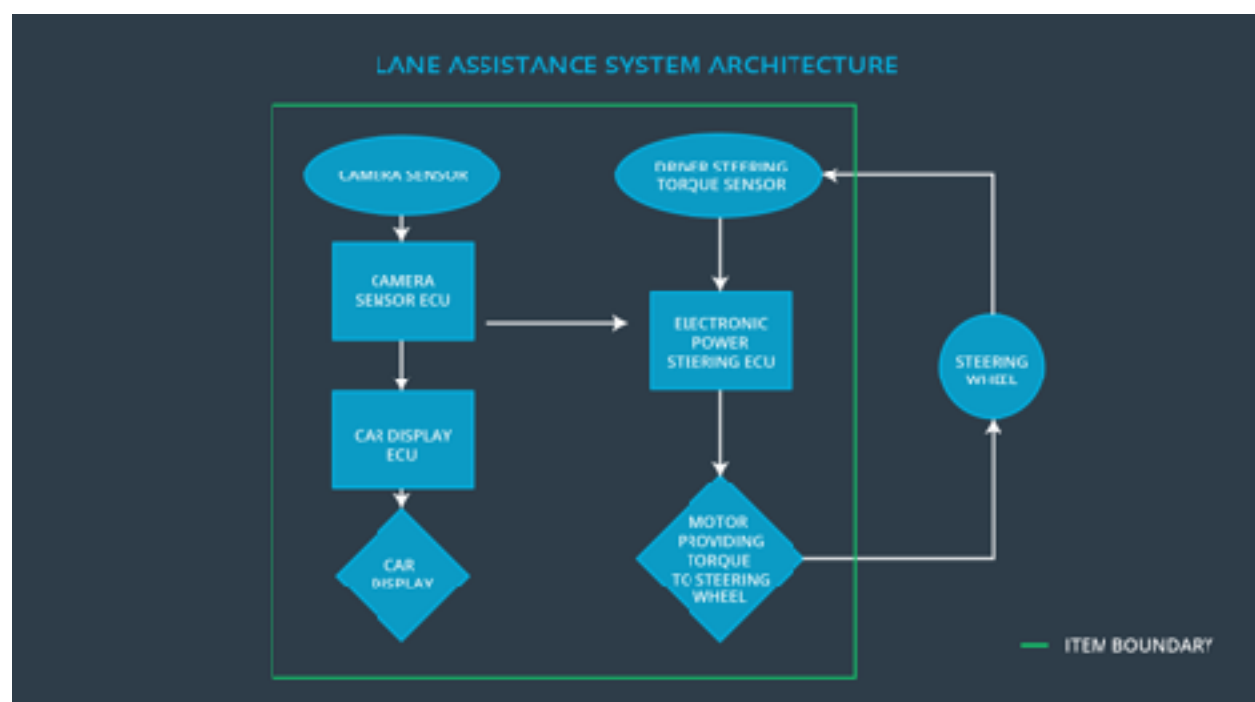
Provide the lane departure warning and lane keeping assistance safety goals as discussed in the lessons and derived in the hazard analysis and risk assessment.

**OPTIONAL:**

If you expanded the hazard analysis and risk assessment to include other safety goals, include them here.

]

ID	Safety Goal
Safety_Goal_01	The oscillating torque to the steering wheel from the lane departure warning function should be limited.
Safety_Goal_02	



## Preliminary Architecture

[Instructions: Provide a preliminary architecture for the lane assistance item. Hint: See Lesson 3: Item Definition]

### Description of architecture elements

[Instructions: Provide a description for each of the item elements; what is each element's purpose in the lane assistance item? ]

Element	Description
Camera Sensor	The camera sensor reads in the images of the world
Camera Sensor ECU	The Camera Sensor ECU identifies when the vehicles have accidentally departed it's lane, and sends appropriate message to the car Display ECU and the Electronic Power Steering ECU.
Car Display	
Car Display ECU	
Driver Steering Torque Sensor	
Electronic Power Steering ECU	
Motor	

## Functional Safety Concept

The functional safety concept consists of:

- Functional safety analysis
- Functional safety requirements
- Functional safety architecture
- Warning and degradation concept

## Functional Safety Analysis

[Instructions: Fill in the functional safety analysis table below.]

Malfunction ID	Main Function of the Item Related to Safety Goal Violations	Guidewords (NO, WRONG, EARLY, LATE, MORE, LESS)	Resulting Malfunction
Malfunction_01	Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver a haptic feedback		
Malfunction_02	Lane Departure Warning (LDW) function shall apply an oscillating steering torque to provide the driver a haptic feedback		
Malfunction_03	Lane Keeping Assistance (LKA) function shall apply the steering torque when active in order to stay in ego lane		

## Functional Safety Requirements

[Instructions: Fill in the functional safety requirements for the lane departure warning ]

Lane Departure Warning (LDW) Requirements:

ID	Functional Safety Requirement	A S IL	Fault Tolerant Time Interval	Safe State
Functional Safety Requirement 01-01				
Functional Safety Requirement 01-02				

Lane Departure Warning (LDW) Verification and Validation Acceptance Criteria:

ID	Validation Acceptance Criteria and Method	Verification Acceptance Criteria and Method
Functional Safety Requirement 01-01		
Functional Safety Requirement 01-02		

[Instructions: Fill in the functional safety requirements for the lane keeping assistance]

Lane Keeping Assistance (LKA) Requirements:

ID	Functional Safety Requirement	A S IL	Fault Tolerant Time Interval	Safe State
Functional Safety Requirement 02-01				

Lane Keeping Assistance (LKA) Verification and Validation Acceptance Criteria:

ID	Validation Acceptance Criteria and Method	Verification Acceptance Criteria and Method
Functional Safety Requirement 02-01		

## Refinement of the System Architecture

[Instructions: Include the refined system architecture. Hint: The refined system architecture should include the system architecture from the end of the functional safety lesson including all of the ASIL labels.]

## Allocation of Functional Safety Requirements to Architecture Elements

[Instructions: Mark which element or elements are responsible for meeting the functional safety requirement. Hint: Only one ECU is responsible for meeting all of the requirements.]

ID	Functional Safety Requirement	Electronic Power Steering ECU	Camera ECU	Car Display ECU
Functional Safety Requirement 01-01				
Functional Safety Requirement 01-02				
Functional Safety Requirement 02-01				

## Warning and Degradation Concept

[Instructions: Fill in the warning and degradation concept.]

ID	Degradation Mode	Trigger for Degradation Mode	Safe State invoked?	Driver Warning
WDC-01				
WDC-02				

