Requirements on Ultrasonic sensor Driver

Team X

Contents:

Introduction:

The Ultrasonic Sensor Driver is designed to interface ultrasonic sensors with an embedded system, providing accurate distance measurement capabilities. This document outlines the software and hardware requirements, functionalities, and interfaces of the Ultrasonic Sensor Driver.

Scope of document:

This document specifies requirements on the module SPI communication protocol Driver.

Functional overview:

The Ultrasonic Sensor Driver enables the initiation and reception of ultrasonic waves to calculate the distance between the sensor and a target object. It employs the time-of-flight principle, where the time taken for the ultrasonic wave to travel back and forth determines the distance.

Comparison with Other Technologies:

The Ultrasonic Sensor Driver offers several advantages over alternative distance measurement technologies:

- Ultrasonic sensors are cost-effective and readily available.

- They provide accurate distance measurements in various applications, including object detection and obstacle avoidance.

- Compared to infrared-based sensors, ultrasonic sensors have a longer detection range.

- Ultrasonic sensors are not affected by color or light intensity variations in the target object.

In conclusion:

The Ultrasonic Sensor Driver is a valuable tool for interfacing ultrasonic sensors with embedded systems. Its ability to provide accurate and reliable distance measurements, along with compatibility with AUTOSAR, makes it a suitable solution for applications where precise ranging is.

Requirement specifications:

Functional Requirements:

Configuration and initialization:

1- **[SRS_ULTRASONIC_111] The driver should provide an initialization function to configure the ultrasonic sensor module**

Type:	**Valid**
Description:	▪ The function should set the appropriate GPIO p for transmitting and receiving ultrasonic waves. ▪ It should configure any necessary timers or capt modules for accurate time measurement.
Rationale:	The driver should interface with the ultrasonic sensor module's GPIO pins for transmitting and receiving ultrasonic waves
Use cases	--
Dependencies	Timers_interface.h , DIO_interface.h
Supporting material	--

2- [SRS_ULTRASONIC_112] It should measure the time taken for the ultrasonic waves.

Type:	**Valid**
Description:	It should measure the time taken for the ultrasonic waves to tr to the target object and back.
Rationale:	Basic functionality
Use cases	The measured time should be converted into a distance value u the speed of sound.
Dependencies	[SRS_ULTRASONIC_111]
Supporting material	--