

ABSTRACT

Ultrasonic technology has been on the market for years and is still considered a trusted technology throughout the industry. The design of the Ultrasonic Radar is very useful for many applications like homes, shops, military and object detection. The aim of this work is to build an ultrasonic transceiver which is basically one kind of a radar system to get exact distance and angle for fixed objects placed around the device based on the speed of ultrasonic waves in open air. An Arduino microcontroller was used to transmit and receive the ultrasonic waves through 40 KHz in order to provide the flexibility of usage requirements. A delay occurred between the transmitted and the received waves govern the reflection of sound. Some tests were done using two kinds of alarms first: the visual alarm which done by a personal computer screen designed to be a radar screen. Second the audible beep alarm which done by an LCD digital screen.

Objectives

- Securing data by implementing authentication and authorization techniques.
- Gives idea about product demand which is increasing or decreasing.
- RADAR is an object detection system which uses radio waves to determine the range, altitude, direction, or speed of objects.
- Reduce time spend on retrieving details.
- Reduce error that can occur in manual system.

Purpose

- As a security purpose
- Object detection
- For military application

Scope

1. It is not affected by color or transparency. Basically, the Ultrasonic Sensors transmit the sound off of the object, hence the color and transparency have no effect on the radar reading.
2. Any dark environments have no effect on this Arduino radar sensor's detection procedure. So, it can also use at night.
3. Easy to design and low price. The ultrasonic sensors are available at the market with very cheap price.
4. It has high frequency, high sensitivity, therefore, it can easily detect the external or deep objects.
5. This radar sensor is not affected by dust, rain, snow, and many more.
6. It has a self-cleaning system to continue running and less downtime.
7. The Arduino Radar Sensor is easy to use. Also, it is completely safe during the operation to nearby objects, human or equipment.
8. The Ultrasonic sensor can easily interface with any types of the microcontroller.

Technical:

AVR ATmega328

The ATmega328 is a single [chip micro-controller](#) created by [Atmel](#) and belongs to the [mega AVR](#) series.

Crystal Oscillator

A crystal oscillator is an [electronic oscillator](#) circuit that uses the mechanical [resonance](#) of a vibrating [crystal](#) of [piezoelectric material](#) to create an electrical signal with a very precise [frequency](#).

Servo Motor

A servomotor is a [rotary actuator](#) that allows for precise control of angular position, velocity and acceleration.

Voltage Regulator

A voltage regulator is an electrical regulator designed to automatically maintain a constant voltage level.

Ultrasonic Sensor

Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor.

Operational:

Army, Navy and the Air Force make use of this technology. The use of such technology has been seen recently in the self parking car systems launched by AUDI, FORD etc. And even the upcoming driverless cars by Google like Prius and Lexus.

The project made by us can be used in any systems the customer may want to use like in a car, a bicycle or anything else. The use of Arduino [1] in the project provides even more flexibility of usage of the above-said module according to the requirements.

The idea of making an Ultrasonic RADAR came as a part of a study carried out on the working and mechanism of “Automobiles of Future”. Also, being students of ECE, we have always been curious about the latest ongoing technology in the world like Arduino, Raspberry Pi, Beagle-Bone boards etc. An hence this time we were able to get a hold of one of the Arduino boards, Arduino UNO R3.

Implementation:

Making own Arduino Uno Board/Boot Loading the ATmega328

- Boot loading an Atmega328 using the Arduino board by uploading the boot loader program to the Microcontroller.
- Making the connections on a general purpose PCB, connecting the crystal oscillator, capacitors, connectors for the connections to Arduino board etc.
- Providing the power supply, usually 5 volts.
- Arduino is ready for use.

Connecting the Ultrasonic Sensor

An Ultrasonic Sensor consists of three wires. One for Vcc, second for Gnd and the third for pulse signal. The ultrasonic sensor is mounted on the servo motor and both of them further connected to the Arduino board. The ultrasonic sensor uses the reflection principle for its working. When connected to the Arduino, the arduino provides the pulse signal to the ultrasonic sensor which then sends the ultrasonic wave in forward direction. Hence, whenever there is any obstacle detected or present in front, it reflects the waves which are received by the ultrasonic sensor. If detected, the signal is sent to the arduino and hence to the PC/laptop to the processing software that shows the presence of the obstacle on the rotating RADAR screen with distance and the angle at which it has been detected.

