

# Simulation Of Radar With Ultrasonic Sensors

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## 1. Abstract:

*Now a day's .RADAR systems are widely used to detect obstacles. They are used to enemy aircrafts, missiles, ships etc. and also they are used to determine the altitude of the planes and clouds from the ground, controlling of planes at airports, to record speed of the cars, which exceed a specified limit, weather forecasts etc*

*1. RADAR (Radio Detection And Ranging) is a way to detect and study far off targets by transmitting a radio pulse in the direction of the target and observing the reflection of the wave.*

*2. The idea is now to have this transmitted signal propagate to a*

*Target and receive the scattered signal, about the angle of target.*

*3. It's basically radio echo*

## 1.1 Main aim of the project:

In this system we are simulating the RADAR function with ultrasonic sensor. We are providing an ultrasonic transmitter and receiver in place of RF transmitter and receiver. If any object, reflecting the ultrasonic sound rays back to receiver can be detected. This transmitter and receiver are placed on rotating antenna to detect angle of the object.

## **2. INTRODUCTION**

### **2.1 PROJECT SCOPE:**

This project is used to detect the object and also find the range and distance of the object using ultrasonic sensors.

### **2.2 SYSTEM ANALYSIS:**

In this project we are interfacing the each component with micro controller and ultrasonic sensor.

Here crystal oscillator connected to 9<sup>th</sup> and 10<sup>th</sup> pins of micro controller, regulated power supply is also connected to micro controller and LED's also connected to micro controller through resistors.

The module of our project contains a development board with a microcontroller base which can accommodate a 28 pin microcontroller (here the PIC16F72 microcontroller is used), a 7805 regulator, switches(toggle and momentary), jack for power supply, a serial communication port to communicate with external world etc., and externally ultrasonic sensor to detect an obstruction or an object and measure its distance and a buzzer which functions as an alarm. All these are connected to the dev board.

We connect the 12v dc adaptor to the dev board jack pin and it is connected to the ON/OFF toggle switch and that is connected to 7805 regulator and the regulator has three pins input, ground, and output. The regulator converts the 12v dc power supply into 5 v dc. We give the 12 v dc power to the regulator input and the output is connected to the microcontroller. The microcontroller we use here is PIC16F72 it has 28 pins RA0-RA5, RB0-RB7, RC0-RC7, ground, VCC, Reset etc., we don't use all the pins but few. RC6 and RC7 are connected to the serial port and 7805 regulator to VCC and ground pin to ground. And other pins serial port are connected to another toggle switch, ground etc., and the switch is acted as pin 1-2 for dumping/ downloading the program into the microcontroller and 2-3 pin for communicating through UART. Ultrasonic sensor is connected to pin RA0 and another to ground and other to 5V pin. And the buzzer is connected to any pin which is declared as output and other to ground. As these pins are connected as per programmed in the microcontroller.

### **2.3 Existing system:**

This system is a manual system. In that we use optical sensors, which is used to detect the object in very small range.

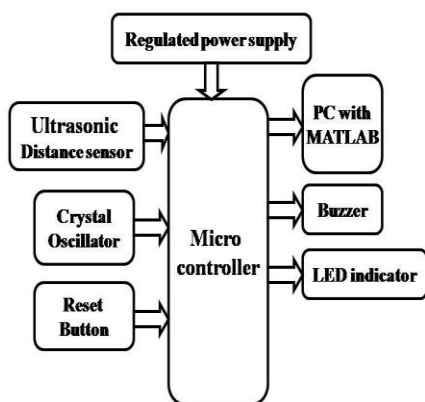
## 2.4 Proposing system:

To overcome the drawback of existing system, we are using ultrasonic sensors for better implementation. This ultrasonic sensor detects the object upto 3mts.

## 2.5 WORKING OF THE SYSTEM:

The block diagram and flow chart of the project as follows

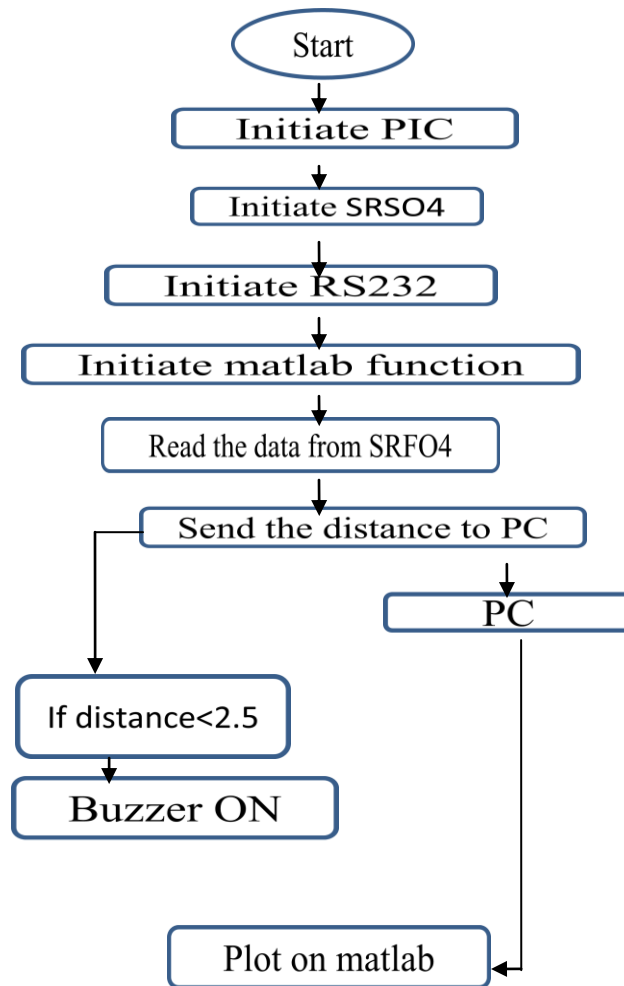
RADAR SIMULATION WITH ULTRASONIC SENSOR



1. After the kit is turned on the transmitter in the ultrasonic sensor propagates the sound waves in the forward direction.
2. When there is an obstruction in the path of the ultrasonic rays it gets reflected back and this signal is received by the receiver in the sensor.
3. The received data is passed to the microcontroller.
4. The received analog signal is converted to digital signal by the Analog to Digital converter (ADC) present internally in the PIC16F72 microcontroller.

5. Then the microcontroller passes this data to the pc/laptop using serial communication or (UART) protocol present in it to MATLAB software present in a pc.
6. Preferably a RS-232 cable is used to communicate data between the development board and the pc/laptop.
7. After receiving the data MATLAB software will display the data.

Flowchart of the project, which describe the whole process of the project.



### **3. Software implementation:**

This project is implemented using following software's:

1. Express PCB – for designing circuit
2. PIC C compiler - for compilation part
3. Proteus 7 (Embedded C) – for simulation part
4. MATLAB- for output

### **4. Advantages:**

1. Obstacle detection using ultrasonic distance finder sensor
2. audible alerts using buzzer
3. Efficient low cost design.
4. Low power consumption.

### **5. Disadvantages:**

1. Interfacing ultrasonic module is sensitive.
2. It detects obstacle only from 2 feet.
3. The o/p doesn't give any information regarding the direction, velocity of a moving obstacle.

### **6. Applications:**

1. This system can be practically in real time, which helps the blind to know the obstacles in their way.
2. This can be used in vehicles as parking sensor, in security systems, in monitoring systems etc.,

### **7. Result:**

The project was designed such that it is used to provide the obstacle detection using ultrasonic sensor and plotted on MATLAB.

### **8. Conclusion:**

Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested.

### **9. Future Scope:**

Our project is mainly intended to design distance sensed by sensor to plot on MATLAB

1. This project can be extended by using ranger finders which can detect the obstacle presence from a longer distance and also helps in increasing the efficiency of the system. We can extend the project by adding GSM modem through which the SMS alerts can be sent in case of emergencies.
2. We can interface a stepper motor to the microcontroller and mount the sensor onto it thus enabling the radar to detect any obstacle around it and also it can effectively

detect direction of any moving obstacle within its range.

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