

Object Detection Using Ultrasonic Sensor

Arun Francis G, Arulselvan M, Elangkumaran P, Keerthivarman S, Vijaya Kumar J

Abstract: *Radio Detection and Ranging (RADAR), a device that can be used to monitor a distinct area continuously. It is a detection system which utilizes radio waves to decide the range, angle or velocity of objects. The presence of aircrafts, ships, spacecraft and weather formations. The main intent of this project is to help our fishermen who are caught by the neighbouring country's Navy. They are getting caught while fishing near the neighbouring country's border. This project helps the fishermen to escape from them by raising an alert message. The alert message will be exhibited on the shade. While seeing the alert note, they can get alerted and move away from the place immediately. The location and the distance of the object is also measured and indicated to the people. This system has an Arduino which is connected to an Ultrasonic Sensor which is attached on a DC Motor.*

Keywords: *Arduino, Ultrasonic Sensor, DC Motor.*

I. INTRODUCTION

The system spreads a spurt out ultrasonic sound waves and receives the echo. The time that is taken for the ultrasonic waves to spread out and to the distance that is travelled from system to target and back to the system precisely is measured by this structure. This is generally based upon the sound waves that are reflected. From this project we could also get the adequate information about Arduino, MATLAB Simulink for Arduino. While in many products like playing helicopter, cars, and even in robots, the powerful DC motors are used. The Ultrasonic Sensor is used in this project which continuously spreads out ultrasound waves rapidly without any delay. The deliberate target is hit by the ultrasonic waves and these waves travel again to the ultrasonic sensor with known velocity. The temperature, improving consistency and accuracy do not much disturb the Ultrasonic sensor. During the World War-II, the idea of RADAR evolved.

In the air traffic control, air craft navigation and marine navigation, the radar systems are essentially used. Eight major nations developed their own radar systems independently during the period 1934-1939.

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Arun Francis G, Assistant Professor, Department of Electronics and Communication Engineering, Karpagam College of Engineering, Coimbatore

Arulselvan M, Student, Department of Electronics and Communication Engineering, Karpagam College of Engineering, Coimbatore

Elangkumaran P, Student, Department of Electronics and Communication Engineering, Karpagam College of Engineering, Coimbatore

Keerthivarman S, Student, Department of Electronics and Communication Engineering, Karpagam College of Engineering, Coimbatore

Vijaya Kumar J, Student, Department of Electronics and Communication Engineering, Karpagam College of Engineering, Coimbatore

They are United Kingdom, Germany, the United States, the USSR, Japan, the Netherlands, France and Italy.

II. IMPLEMENTATION

Components

- Ultrasonic Sensor
- Arduino UNO
- DC Motor
- Motor Driver
- UART

III. HARDWARE DESCRIPTION

Ultrasonic Sensor: From 2cm to 40cm, the Ultrasonic ranging module HC-SR04 varies and the ranging accuracy is of 3mm. The transmitter in the Ultrasonic Sensor spreads ultrasonic waves in a particular direction and the timing will be started when the waves are emitted. In the air, the ultrasonic waves are spread and the waves gets returned immediately once it encounters any object in its path. When the reflected wave is received, the receiver in the ultrasonic sensor stops the timing that is started by the transmitter. The distance between the intended target and the transmitter is calculated by using the formula, $s=340t/2$, as the velocity of ultrasonic waves is 340m/s. This is called as the time difference distance measurement principle. The known air spreading velocity, i.e. by measuring the time for the waves from the time of transmitting to the receiving of the waves after the contact with the target and the distance is calculated by using time and velocity of the waves is the principle of ultrasonic distance measurement.

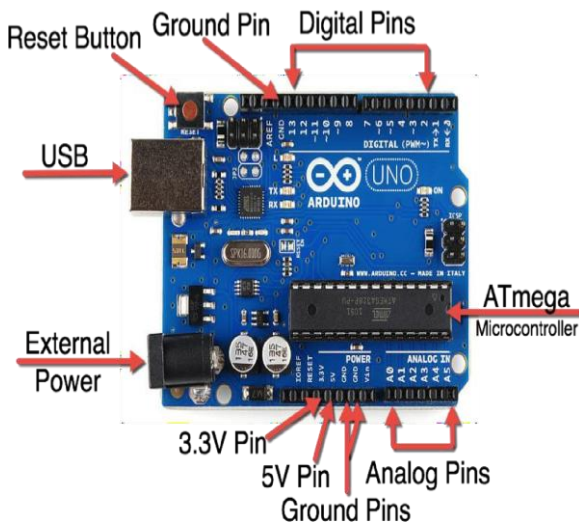


Ultrasonic Distance Sensor

Features:

- Supply Voltage:- 5VDC
- Supply Current :- 30mA
- Range:- 2cm - 3m (0.8in to 3.3 yds)
- Burst Frequency:- 40KHz for μ s.
- Size:- 22mm H 46mm W x 16mm D(0.84 in x 1.8 in x 0.6 in).

Arduino UNO: ARDUINO UNO is a microcontroller board that is based on the ATmega328P. Arduino has 14 digital input/output pins (PWM output pins are of 6), 6 analog inputs, 16 MHz quartz crystal, a USB connection port, power jack, an ICSP header and a reset button in it. To obtain the support to the microcontroller from Arduino board, everything is contained it and an USB cable can be used to connect the computer to it. The Arduino can be powered either by AC to DC adapter or by a battery. In Italian language, “Uno” has the meaning of one and to represent the release of the first version of Arduino Software(Integrated Development Environment). The earlier versions of the Arduino software are now evolving as the new releases in the present time. It also includes the Uno board.

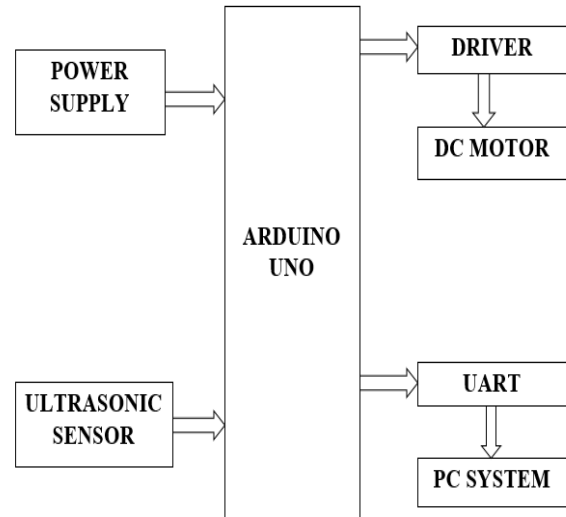


DC Motor: The rotary machines convert direct electrical power into mechanical power and DC motor is one among them. The most common kind of the motor is dependent on the forces produced by the magnetic fields. The advantage of using DC motor is that it has the rotation of about 360 degrees. DC motors have internal mechanism and it would be one of the following two modes. They are electronic and electromechanical mechanism. In both the cases, the current flow direction of the DC motor is changed every so often.

Motor Driver: A l298n h-bridge type dc motor driver is being used in this setup. Two DC motors and a bipolar stepper motor’s speed and the direction can be easily controlled by the user. The motors that has the voltage range of about 5 to 35V DC use the L298N H-bridge module.

UART: A Universal Asynchronous Receiver Transmitter (UART) is a hardware device that is used for transferring data between the two devices. It also acts as an intermediate between parallel and serial interfaces. It is a block of circuitry which is responsible for implementing the serial communication as it is the key component.

IV. BLOCK DIAGRAM



V. WORKING PROCEDURE

The block diagram consists of Ultrasonic Sensor, Arduino Uno, UART, DC Motor, Motor Driver and a PC system. An Ultrasonic Sensor is connected to the Arduino so that when the sensor senses any object, the signal from the sensor is sent to the Arduino. The Ultrasonic sensor emits a high frequency sound waves at regular time intervals as the velocity of sound in air. The waves fall on the object and get reflected back to the receiver. The sensor emits the waves of frequency about 40KHz and it can cover up to a range of 2m. The transmitter that is present in the sensor converts the electrical signal into ultrasounds whereas the receiver converts the ultrasounds into electrical signal.

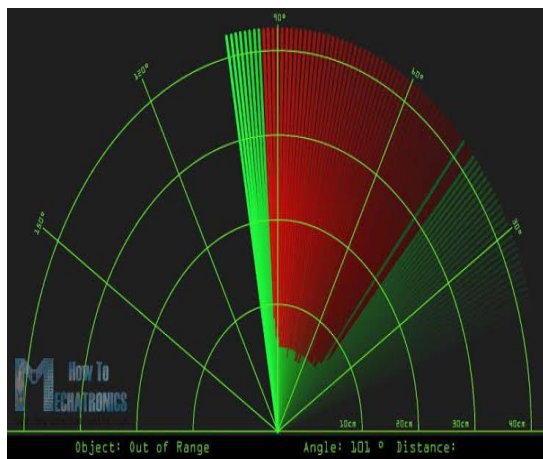
And, the Ultrasonic sensor which is attached to the DC motor which is useful in rotating 360 degrees. If we use Servo motor, it can turn up to 180 degrees only. So that, DC motor is used. Then the DC motor which rotates continuously so that the sensor emits the waves in all directions. The pulse signal is provided by Arduino to the ultrasonic sensor which receives the pulse signal and then reflects back the ultrasonic wave in the forward direction. The DC motor is connected to the driver motor which controls the speed and angle of the sensor.

Then, the Arduino integrated development environment (IDE) which is written in Java is a cross platform application. The Processing programming language and the wiring projects can also be used that are derived from the Integrated Development Environment. It is planned in such a way that it introduces the basic ideas of programming and knowledge to new users and beginners who have no knowledge on the software development. It embraces a code editor which has salient features which has highlighting of the syntax, matching of braces, and indentation process that is automatic, and it has the capability to compile and upload programs to the board that is connected using only a click in it. Either in C or C++ language, the Arduino programs are being written.

The Arduino Integrated Development Environment has an inbuilt library called "Wiring" which is obtained from earliest wiring project. It creates many mutual input or output functions to perform in a sophisticated manner. To run an abled cyclic executive program, the users ought to define only two functions.

The UART is connected to the Arduino which is used to transfer the data between the Arduino and the PC system. When the object is detected, it replicates the waves that are received by the receiver which is present in the sensor. Then, the reflected signal is guided back to the Arduino and to the computer system and the presence of the object will be displayed in the rotating RADAR screen.

VI. RESULT



When the object is detected, the screen will display the presence of the object and the angle and distance of the object will also be displayed.

VII. CONCLUSION

This project can be used for security purpose for the safety of human by detecting object interference in a given range of distance. Finally, the project has been effectively instigated and the desire of the project is accomplished without any discrepancy. Since this project has many security values, the future scope for this project is high. For many applications, this can be used as the base material. It can also be technologically advanced or reformed affording to the increasing necessities and future demands.

VIII. REFERENCES

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