iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 9 **Issue:** VI **Month of publication:** June 2021

DOI: https://doi.org/10.22214/ijraset.2021.36133

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue VI June 2021- Available at www.ijraset.com

A Short Range Obstacle Detection Systemusing 8051 Microcontroller

Sanket S. Mallawat[1], Nikhil S. Sonje[2], Asst. Prof. Vaishali M. Sardeshmukh[3]
[1, 2, 3]*TE - Electronics and Telecommunication Department, Sinhgad Academy of Engineering, Savitribai Phule Pune University, India*

Abstract: ***Unidentified flying objects (UFOs) and other threats have recently approached and then vanished from our environment, posing a major threat to human safety. we designed a short-range obstacle detection system based on 8051 microcontroller to assist us in detecting this type of impediment and alerting us before we are wondered. To do this, we use a buzzer and an LED in our system, and we're aiming to develop a small system (SROD) to detect the object for detecting the object we used ultrasonic sensoras a radar so when the obstacle is detected by radar the distance is displayed on the LCD.***
Keywords: Radar, Ultrasonic Sensor, Keil, SROD, Threat

I. INTRODUCTION

In the past, we used antiquated methods such as cotton tape, scales, and other instruments to measure the distance to an obstacle, but with the introduction of ultrasonic sensors, we were able to improve our technique and obtain faster results, though the obstacle detection system was very useful at the time.[1]

Sir Heinrich Hertz discovered that electromagnetic waves reflect off of many surfaces in 1886. In 1935, a British scientist named Sir Watson Watt invented a module called Radio Detection And Ranging based on such premise (RADAR).[2] Radar is an electromagnetic technology that uses atransmitter to send radio waves to identify objects in its path. Once the object is detected, the radio waves are received.

Nowadays, various types of obstacles are detected; for example, the US Navy recently detected 12-13 unidentified objects with the helpof a radar system and used it to protectthemselves from the obstacles; also, Israel uses the iron dome system for defense, which is based on a radar system[3] and all of these systems are based on the ultrasonic sensor detection technique so we built an obstacles detection system that detected objects up to 2metres away and displayed the range on anLCD. We used LEDS and a buzzer for indication so that we could correctly identifythem and take appropriate action.

The core principle behind this system is based on the rotation of servo motor for covering the whole range and ultrasonic sensor works andprovides us with the necessary information.[4] This system will be used to identify and track aircraft, ground targets and ships at sea, as well as insects and birds in the sky, also monitor vehicle speed and measure atmospheric and oceanic properties.

II. BLOCK DIAGRAM

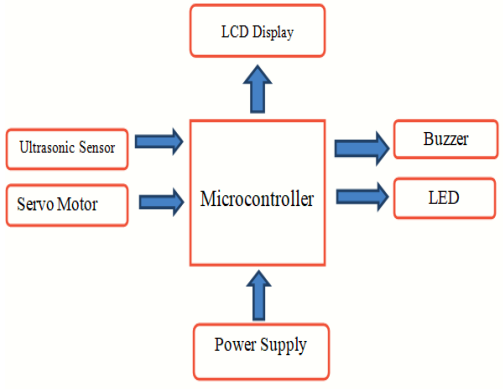


Fig.1 Block Diagram of SROD System

The 8051 microcontroller, servo motor, ultrasonic sensor, led, LCD, and buzzer are all part of this system.

1) A microcontroller is utilized to operate the entire system and control the commands for transmitting and receiving signals.
2) An ultrasonic sensor detects the obstacle and sends the information to the microcontroller.
3) We used a servo motor to monitor the 180- degree area.
4) If an impediment is detected, a led and abuzzer are used to notify the user.
5) The obstacle's exact location was displayed on an LCD.

III. IMPLEMENTION DETAILS

Very first we create Short Range Obstacle Detection system (SROD) on proteus software by connecting the ultrasonic sensors (HC-SR04),servo motor , buzzer , led to the microcontroller.

The system was then operated via software, which is known as simulation. We connect all ofthe essential connections in simulation to see if our system is running properly or not, and we get the outcome. After that, we add the HEX file of programming code generated by Keil software.

Then system was activated, and the ultrasonic sensor was prepared to detect the obstacle by emitting a transmission pulse and receiving aresponse when the object was detected.

If an obstacle is identified at that point, the ultrasonic sensor's answer is sent to the microcontroller, and the obstacle range is displayed on the screen.[5] If the obstacle is between 100 cm and 500 cm, the green led will illuminate and we will receive information aboutthe obstruction. If the obstruction is less than 100 cm. Then the red led will illuminate and the buzzer will sound and the result will be displayed on the LCD.

A. To Measure Distance

1) Object Distance (in cm) = (Sound Velocity* Time) / 2, Where, Sound Velocity = 34300 (in cm per second)
2) Here, oscillator frequency of AT89C51 (8051)is 11.0592 MHz, then timer frequency of 8051 will be 921.6 kHz.
3) So, Time required to execute 1 instruction is 1.085 us.
4) So, timer gets incremented after 1.085 us timeelapse.
5) Hence, Distance
= [34300 * Timer Count* 1. 085 * 10^-6] / 2
= (Timer Count) / 54

IV. SIMULATION DIAGRAM

Here is The Simulation Diagram Of Our Project.Where all the components are connected with the At89c51 microcontroller and the distance will displayed at the Lcd.

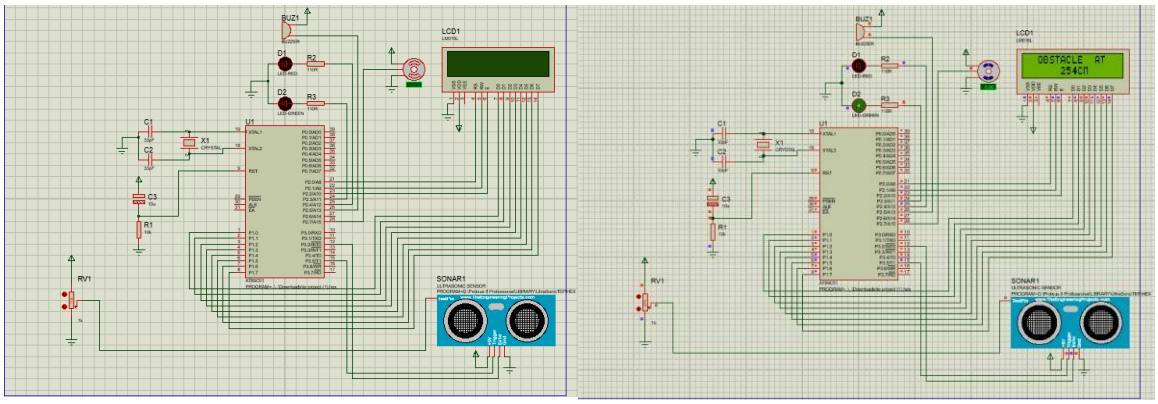


Fig.2 simulation diagram

V. SIMULATION RESULT

On the Lcd Display, we notice the range of obstacles when we start our System. When an obstacle is detected within a 100cm range, the red led illuminates and the buzzer beeps, alertingus that the obstacle is approaching us. The outcome is depicted in the diagram below

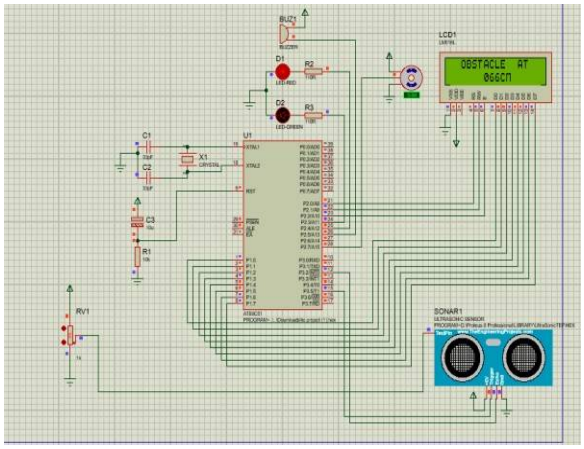


Fig.3 simulation result A

If the obstacle's range is greater than 100 cm, theGreen Led will illuminate, and the distance will be displayed on the LCD screen, giving us the precise location of the obstruction.

Fig.4 simulation result B

VI. ADVANTAGES

A. It has the ability to detect all types of materials.
B. This sensor is unaffected by dust, rain, orsnow in the atmosphere.
C. When it comes to measuring thickness and distance to a parallel surface, they are more accurate than many other approaches.
D. Ultrasonic sensors are simple to operate and pose no hazard to neighboring items, persons, orequipment while in use.
E. The ultrasonic sensor can easily detectexterior or deep objects due to its high frequency, sensitivity, and penetrating strength.
F. Because it uses an ultrasonic sensor, this range finder is more accurate than earlierapproaches.

VII. APPLICATIONS

A. Radar is a critical military technology since it is used to detect aeroplanes, vehicles, and missiles.
B. With a high-power ultrasonic transmitter, it can be utilized as a parking aid system in vehicles.
C. With the appropriate supplementary software,it may be used as a burglar alarm for both housesand offices.
D. Police officers utilize RADAR speed meters to enforce speed limits.

VIII. CONCLUSION

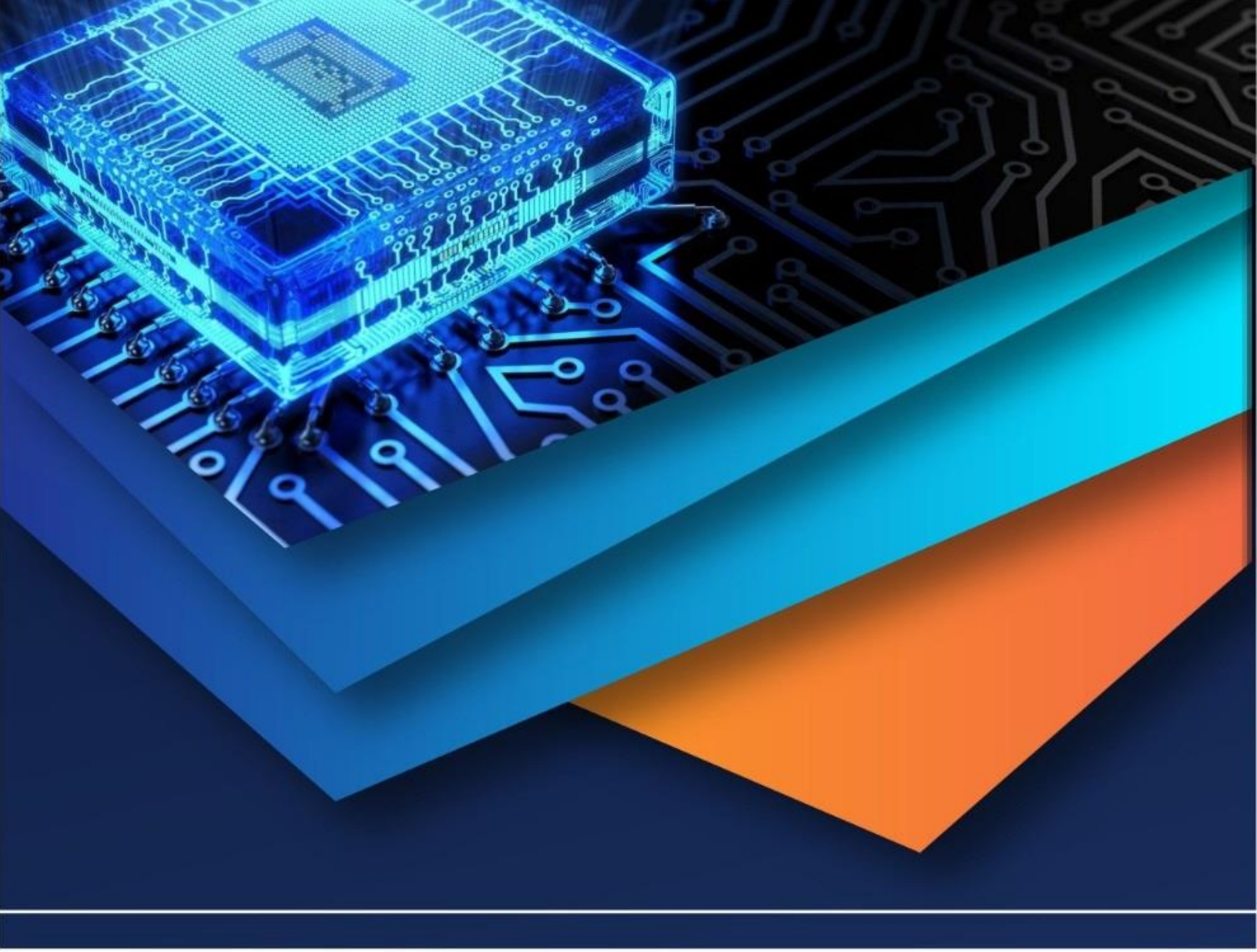
In this project, Keil software was used to successfully interface an Ultrasonic module HC-SR04 with an 8051 Microcontroller, and the object distance was measured up to 4 metres using the ultrasonic sensor's mechanism; however, this system (HC SR04 ultrasonic sensor) was not capable of measuring longer distances. As a result, we can replace the sensor module to increase the range. This technology will be used to identify objects up to 4 meters away with a 1cm tolerance, as mentioned in this study. Other devices can readily use the technology as well. The distance of an object or a barrier must be measured froma stationary or moving observation point in either system.

IX. FUTURE SCOPE

A. A GSM module can be added to send SMS to the person who needs to know about the detectedobstacle range for precocious and how to proceed.
B. A camera can also be used in the system so that we can see a live update on the screen to seewhat kind of obstacles are present.
C. Instead of providing a separate voltage sourcefor ultrasonic operation, We used power from the microcontroller to power the sensor and servo motor. The cost of voltage supplies was reduced as a result of this.

REFERENCES

[1] Design and implementation of ultrasonic radar system for distance measurements using Arduino Abdalla, Ali I. Haraa Raheem Hatem,Vol7, No 4 (2018)
[2] Ultrasonic Range Finder using 8051 by Charu Pramod Kumar, Rajinder Kaur Ghumman2 in volume 6 january2018
[3] S.G.N. M urthy, B.Sangoju, H.Wiggenhauser, N.R.Iyer , “Application of Radar and Ultrasonic Pulse Echo for Testing Concrete Structures, paper, July 2009.
[4] Md. Shamsul Arefin, Tajrian Mollick , “Design of an UltrasonicDistance Meter” , paper ,published in March 2013.
[5] Cai Yanping, Cheng Shu, etc. Ultrasonic Distance Measuring System Based on Embeded SPT-K Controller.Measurement and controlTechnique. 2005,vol. 24, NO,3.
[6] Detection and Localization of High Speed Moving Targets Using a Short-Range UWB Impulse Radar by Guohua Wei, Yuxiang Zhou, Siliang Wu in Radar Research Laboratory, Beijing Institute ofTechnology 100081, Beijing, P.R. China
[7] C. Villien, V. Fleck, E. Ostertag and P. Raymond. 3-D Short-Range Localization Device By Low-Cost CW-Doppler Radar. In Proceedings of 2005 IEEE Radar Coliference/Virginia USA, May 9-12, 2005, pp. 557-561.
[8] L. Sambuelli, L. Valentina Socco, A. Godio ,” Ultrasonic Electric and radar measurements for livening trees assessment” paper , published in Desember 2006.
[9] Distance Measurement of an Object or Obstacle by Ultrasound Sensors using P89C51RD2 by A. K. Shrivastava, A. Verma, and S. P. Singh International Journal of Computer Theory and Engineering, Vol. 2, No. 1 February, 2010 1793-8201



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY