



Detecting Long Range Objects under Radar System using Arduino

S Nandhini, J Harry William, M Gokulakrishnan and G S Vijay

EasyChair preprints are intended for rapid dissemination of research results and are integrated with the rest of EasyChair.

March 19, 2020

Detecting Long Range Objects under Radar System using Arduino

S Nandhini ,Assitant Professor

J Harry William, M Gokulakrishnan, G S Vijay

SRM Institute of Science and Technology,Ramapuram,Chennai

Abstract

The increase in demand for security purpose and detection of objects ,the radar system has very much popular in many occasions. A new approach of finding objects under radar using Arduino controller makes it more efficient for Detection and Ranging. The Ultrasonic sensor mounted on the servo Motor transmits pulses of radio waves or microwaves which when bounce off any object in their path it interrupts the radio pulse which produce a signal to the user by displaying on computer , laptops or on any screen . This project aims at making an efficient, cheaper and reflects all the possible techniques that a radar consists of.

Keywords:RADAR,UltrasonicSensor ,

Arduino controller.

1.Introduction

This paper is about finding distance objects under Radar using Arduino with the help of Ultrasonic sensor and Arduino controller which are connected together to produce the output radar in a laptop or computer display. A Radar is nothing but a device capable of finding objects which trespasses it.Using the help of Arduino controller which contains the codes for the function to perform helps in transmit the signal from Ultrasonic sensor to the laptop . Arduino is a single-board microcontroller which used as electronics in multidisciplinary projects which is more accessible. The Ultrasonic sensor is used to transmit sound waves to measure the object distance near it.

This process is also useful in identifying enemies or any unidentified object which comes near the radar zone and display it in the monitor screen. This application can be used mainly in military bases and for other security purposes.This technology can also be used in monitoring flights, ships ,geological observations and for guided missile targets in

wars.This process is known for its wide range of purpose in this modern world.

2. Literature Survey

This system upcomes with an idea of monitoring the air toxicity level while traveling on roads and find out the best to travel.For this to perform an IoT kit with arduino IDE and a Wi-Fi module is placed all over the city to measure the air toxicity level where it provides the best route through android app where the air toxicity is less.

This method is used to harvest energy from rainfall which actually follows the method with the help of piezoelectric transducer with an arduino measuring system. The energy is obtained from a single drop of rain and the Arduino is used to measure the actual energy produced in it .When rain drop falls on the structure creates an impulsive force which generates an impulsive voltage on electrodes.

This method consist of a datalogger built with hardware and software components to experience in multiple sites.The datalogger contains the climatic and electric parameters with accuracy .A 3G technology is included to monitor the environmental conditions with the help of photovoltaic cells to obtain energy from the climatic factors and consume it as electrical energy with help of internet and datacloud where the datalogger is used.

This paper is about improving the urbanization in countries to avoid over filling of garbage wastes in streets.This proposed system will alert by sending SMS or alarm to inform that the garbage is full. When the waste components estimates over the garbagebin it senses it with the help of Arduino controller and send an SMS to the user via the Android application developed for it.

In this modern era automation is one of an important aspect takes place in moving to smart technologies. As of smart technologies there are smart cars which provide better convenience for driving. This technology consist of an

Arduino ,ultrasonic sensor and a Li-Fi circuit .First a transmitter and a reciever is placed on the front and the back of the cars .The ultrasonic sensor measures the distance of between the cars and the data is transmitted and send via transmitter which is placed in the backend of the car. The information is received through the receiver of the front end of the second car which shows the speed of the first car to avoid collision. This method is worked by applying this technology on every cars to prevent accidents.

3. System Working

The proposed system design shows how the model work with the help of required functions. The ultrasonic sensor is mounted on a servomotor to cover the angle range for the Radar. Where the sensor that produce frequent radio waves is interrupted by any object the ultrasonic sensor return back as if finds any object which measures the distance and the location of the object.These informations is then carried via the arduino controller .

An Arduino controller is nothing but a board which is equipped with a set of digital input output pins to carry connection between hardware and software components. When the signals carried from the ultrasonic sensor to the Arduino board it generate the siganls and display it in a monitor screen .The Arduino is uploaded with codes that contains the angle range of the servomotor and the distance for each degree of angle and also contains the codes for the format of Radar.

This process is continuously run until it finds an object ,if it finds any object the above method is processed and displays it on the monitor ,if it dosen't finds any object it runs until it finds something.

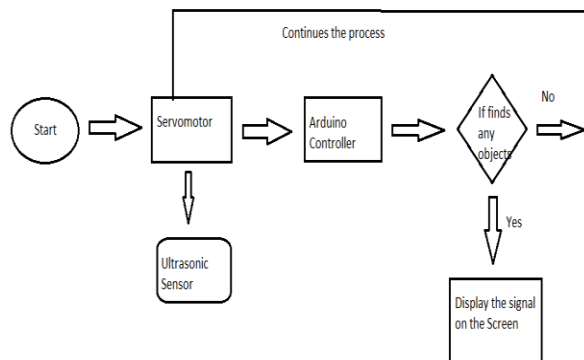


Figure 3 System Architecture

4. Radar Display

The Radar is displayed with the help of function codes that contain each set of codes to display the Radar on the screen. The code are used to create the arc ,lines and the degree of each lines are generated within these codes .

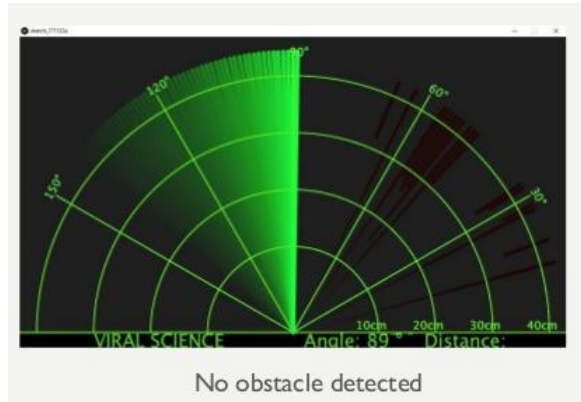


Figure 4.1 Radar with no obstacle

All these functions comes under void drawRadar() function. Under the drawObject() funtion the distance of the object and the pixels of the distance objects is also created, and the drawText() function is used to draw the text on the screen. In the end all the above functions are enclosed in void draw(), where the fill function is used for the stimulation for the moving lines.

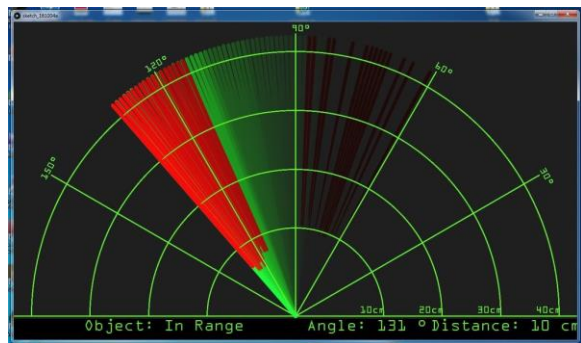


Figure 4.2 Radar with object detected

The above image shows an Ultrasonic sensor detects an object and display it in a Radar the moving lines shows that an object is detected in an appropriate distance and indicates it in the red colour.These performens should require the above function code to work efficiently.

5. Components Required

5.1 Ultrasonic Sensor

The Ultrasonic sensor is a device which is used for both transmitting and receiving the signals of the data. The sensor generate radio active wave which helps us to find the distance objects. When the waves echoes from the distance object it measures the distance with the use of sensor. The sensor calculates the distance between the object and the device.

This technology has been used in wide range of applications in submarines, chemical process, bats uses ultrasonic sound waves to locate objects and preys in their paths. It can also used medical field to see the images of internal organs, tissues for diagnoses.



Figure 5.1 Ultrasonic Sensor

These sound waves contains high frequency than human ears which is not audible, it is also used in anemometer to measure the wind speed and the direction of wind.

5.2 Arduino Controller

The Arduino controller is a board that contains a set of digital and analog input and output pins they may be used for different use with different sets of boards. It contains an USB cable which is used to connect with a computer, a resonator which help to oscillate the signals of the frequency, a power jack and a reset button to restarts from the beginning of the code.

The Arduino is microcontroller board that is efficient to use between the software and the hardware components. In this arduino controller the programs can be easily loaded with less memory of boot loader.

The Arduino controller uses c/c++ function to perform actions and it is also an Object Oriented programming language to gather all variables and functionality into C programmings.



Figure 5.2 Arduino Controller

5.3 Servomotor

A servomotor provides an acceleration control of a linear or angular motion. It is a closed loop mechanism that provides the action. The servomotor is a DC motor that runs on batteries with a low torque.

It can be used to rotate an object in either directions depends upon the supply. It produce low torque to move less weight object or to pull it. It can usually found in toys and in DVD players to move the CD trays.



Figure 5.3 Servomotor

5.4 Bread Board

This board helps you to connect electronic components in a basic circuit. It contains numbers of small holes where any jumper cables or connecting wires is placed on the same line to provide a series of circuit connection. It is a solderless based method of connecting wires and components together and it is easy to connect different components together.

The top and bottom rows of the bread boards are in horizontal which contains the positive and negative power supply, while the vertical holes are connected to a metal strip underneath the bread board which provides the connection between these holes. This board is used to test connection supply without soldering the wires everytime.

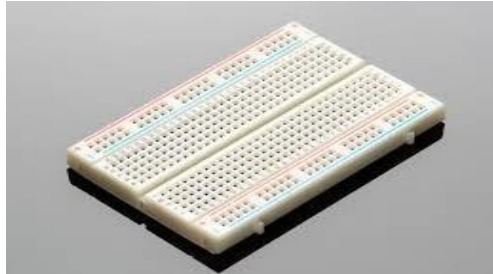


Figure 5.4 Bread Board

6. Conclusion

From this paper, we proposed a improved method for identifying objects in an efficient way .As we discussed about the features using Aduino controller it provides an additional improvement in finding large distance object using C/C++ in a short term and display it in the screen as Radar function . This method can be applicabe for futher future technologies in an improved manner.

7. References

- [1] Mhamed Fannakh ; Mohamed Larbi Elhafyani ; Smail Zouggar : Hardware implementation of the fuzzy logic MPPT in an Arduino card using a Simulink support package for PV application, In IET,2019.
- [2] Haziezol Helmi Mohd Yusof ; Sulaiman Wadi Harun ; Kaharudin Dimiyati ; Tanujjal Bora ; Karel Sterckx ; Waleed S. Mohammed ; Joydeep Dutta : Low-Cost Integrated Zinc Oxide Nanorod-Based Humidity Sensors for Arduino Platform,In IEEE,2019.
- [3] Swati Dhingra ; Rajasekhara Babu Mada ; Amir H. Gandomi ; Rizwan Patan ; Mahmoud Daneshmand : Internet of Things Mobile–Air Pollution Monitoring System (IoT-Mobair),In IEEE,2019.
- [4] Noussaiba Gasmi ; Mohamed Boutayeb ; Assem Thabet ; Mohamed Aoun : Sliding Window Based Nonlinear H_∞ Filtering: Design and Experimental Results,In IEEE,2019.
- [5] Plinio Puello Marrugo ; Emanuel Martínez Franco ; Julio Cesar Rodríguez Ribón : Systematic Review of Platforms Used for Remote Monitoring of Vital Signs in Patients With Hypertension, Asthma and/or Chronic Obstructive Pulmonary Disease,In IEEE,2019.
- [6] Devendra Kumar Yadav ; Guntha Karthik ; Singam Jayanthu ; Santos Kumar Das : Design of Real-Time Slope Monitoring System Using Time-Domain Reflectometry With Wireless Sensor Network,In IEEE,2019.
- [7] Gianluca Acciari ; Massimo Caruso ; Rosario Miceli ; Luca Riggi ; Pietro Romano ; Giuseppe Schettino ; Fabio Viola : Piezoelectric Rainfall Energy Harvester Performance by an Advanced Arduino-Based Measuring System,In IEEE,2019.
- [8] Marciano Santamaria ; Noriel Manrique Correa ; Jose Emilio Moreno ; Yarien Emilio Moreno : Proposal Design of an Open Source Automated System for Photovoltaic Panels Characterization by Electronic Charge Method,In IEEE,2019.
- [9] Xia Geng ; Qinglei Zhang ; Qinggong Wei ; Tong Zhang ; Yu Cai ; Yong Liang ; Xiaoyong Sun : A Mobile Greenhouse Environment Monitoring System Based on the Internet of Things,In IEEE,2019.
- [10] Lun-De Liao ; Yuhling Wang ; Yung-Chung Tsao ; I-Jan Wang ; De-Fu Jhang ; Tsung-Sheng Chu ; Chia-Hui Tsao ; Chih-Ning Tsai ; Sheng-Fu Chen ; Chiung-Cheng Chuang ; Tzong-Rong Ger : Design and Validation of a Multifunctional Android-Based Smart Home Control and Monitoring System,In IEEE,2019.
- [11] Simhadri Vadrevu ; M. Sabarimalai Manikandan : A New Quality-Aware Quality-Control Data Compression Framework for Power Reduction in IoT and Smartphone PPG Monitoring Devices,In IEEE,2019.
- [12] Samuel Oliver ; Asiya Khan : Design and evaluation of an alternative wheelchair control system for dexterity disabilities,In IEEE,2019
- [13] Simhadri Vadrevu ; M. Sabarimalai Manikandan : A New Quality-Aware Quality-Control Data Compression Framework for Power Reduction in IoT and Smartphone PPG Monitoring Devices,In IEEE 2019.
- [14] Zhenyu Yan ; Rui Tan ; Yang Li ; Jun Huang : Wearables Clock Synchronization Using Skin Electric Potentials,In IEEE,2019.