



RADAR AS A TOOL FOR HOUSEHOLD LOCKER SECURITY

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ABSTRACT - This paper is based on the working principle of a simplest radar. This radar is basically made in such a way that all the complicity of modern radar is not taken into the account. This paper gives the complete knowledge of the very minimum and essential elements to build radar. This paper also focuses on the application of basic level radar. As the radar is in very basic level so the application are also bounded to a base level. Later, it provides some glimpse of future applications which can be implemented. The main advantages of this type of radar are cost efficient, not complicated, gives the high security, highly reliable, easy to maintain and many more. This paper gives the complete road map to create your 1st radar and use it in home, office etc where security is needed.

This paper is basically focused on **RADAR BASED LOCKER SYSTEM** and on the procedure of making it. Which is nothing but an application of the base level radar.

KEY COMPONENTS

Arduino uno development board, Ultrasonic sensor, Servo motor.

INTRODUCTION

Radar is made to alert people before the harm happens. The radars are basically used in border areas, in navy ships to detect any movement of enemies which will be a great threat for any continent. Radars are also used in spaceships to detect the meteoroids before it harms the ship. But this type of high tech radars are very costly, they have no use in, where less security is needed like to secure any locker in home or any place where important files and documents are kept. So here in this paper we followed the simple manner to make a radar and to use it in home or in any other small places.

To make a base level radar our key component is Arduino Uno board. So let us give a brief

description of it. Arduino is an open source microcontroller which can be easily programmed, erased and reprogrammed at any instant of time. Introduced in 2005 the Arduino platform was designed to provide an inexpensive and easy way for hobbyists, students and professionals to create devices that interact with their environment using sensors and actuators. Based on simple microcontroller boards, it is an open source computing platform that is used for constructing and programming electronic devices. It is also capable of acting as a mini computer just like other microcontrollers by taking inputs and controlling the outputs for a variety of electronics devices.

Arduino uses a software for developing the code known as the Arduino IDE (Integrated Development Environment). This development board can also be used to upload a new code to the board by simply using a USB cable to upload. The Arduino IDE provides a simplified integrated platform which can run on regular personal computers and allows users to write programs for Arduino using embedded C or C++.

This Arduino board is the brain of our project. Which controls the other sensor and components like ultrasonic sensor, servo motor and buzzer. By only using this much of components we can be able to make a radar. This can be an Efficient, Affordable, User-friendly tool to secure any place where important things are kept.[4]

TYPES OF RADAR

1. **Doppler Radar :-** A Doppler radar is a special form of radar that employs the use of the Doppler Effect to produce velocity data about an object at a given distance. This is achieved by sending electromagnetic signals towards a target and then analysing how the object's motion has affected the frequency of the returned signal.[1]

2. Bistatic Radar :- Bistatic radar is a radar system that comprises of a transmitter and a receiver that are separated by a distance that is equal to the distance of the expected target. A radar in which the transmitter and the receiver are located at the same place is known as a monostatic radar. Most long-range surface-to-air and air-to-air missiles employ the use of bistatic radar.[1]

3. Instrumentation Radar Instrumentation radars are radars that are designed to test rockets, missiles, aircraft, and ammunitions on government and private test ranges. They provide a variety of information including space, position, and time both in real-time and in the post-processing analysis.[3]

4. Mapping Radar :- Mapping radars are used to scan a large geographical region for geography and remote sensing applications. Because of their use of synthetic aperture radar, they are limited to relatively static objects. There are some specific radar systems that can sense humans behind walls thanks to the reflective characteristics of humans that are more diverse than the ones found in construction materials.[2]

5. Navigational Radar :- Navigational radars are generally the same as search radars. However, they come with much shorter wavelengths that are capable of reflecting from the earth and from stones. They are most common on commercial ships and other long-distance commercial aircraft. There are various navigational radars that include marine radars commonly mounted on ships for collision avoidance and navigational purposes.[1]

NEED FOR RADAR

The reason behind using Radar as a tool for household.[3]

1. Keep your home off burglars :- When we think about home security, most people consider burglary detection. This ultrasonic Radar sense the environment periodically, so at normal condition we will get constant echo signal from closed room environment, that echo signal read by micro controller and analysed. When there is any abnormal echo signal apart from normal signal that will be treated as abnormal action happening in the environment, that may be thief or other moving object. By this method when thief enter in room, that instant we can get alert signal by blinking light.

2. Safe your home from bad guys :- while protection from potential break-ins and suspicious activity is a big part of securing our home and loved ones, there are more layers of security that complete home security measures other than

guarding against theft, intrusion, and bad guys. So, we can use Radar to get rid of this problem.

ELEMENTS OF RADAR

Elements of Radar can be done into two categories:

- Hardware
- Software

HARDWARE

The Radar consists of many components that together makes it work. Here are some of those main component blocks that help in its functioning:

- **Arduino Uno development board:** This is the heart of the Radar, which works as a logic controller and can receive as well as send information or command to the peripheral devices (Servo motor, Ultrasonic sensor) connected to it. The Arduino used differs; it also has its own various specifications.[5]
- **Ultrasonic Sensor:** This sensor is main part of our Radar. The main principal of this sensor is to measure the distance of any object from this sensor. It has two parts one is called transmitter part and another is called receiver part.[5]
- **Servo Motor:** This sensor is mainly used for 180° rotation of our Radar. That's why our Radar can able to detect any object from 0° to 180°.[5]
- **Jumper wires:** Jumper wires is mainly used for internal connection.[5]
- **Screen:** Screen is needed for graphically showing the object is in which direction, and the distance measurement.
- **Buzzer:** This buzzer is mainly for alarming purpose. When the object enters in between the threshold distance this buzzer indicates that.

SOFTWARE

- Arduino IDE
 - Processing Development Environment (PDE)
- Arduino IDE :-** The program code written for Arduino is known as a sketch. The software used for developing such sketches for an Arduino is commonly known as the Arduino IDE. This IDE contains the following parts in it:

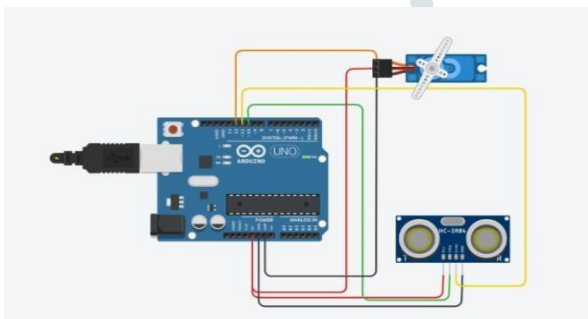
- **Text editor:** This is where the simplified code can be written using a simplified version of C++ programming language.

- Text: The console displays text output by the Arduino environment including complete error messages and other information.[3]
- Console Toolbar: This toolbar contains various buttons like Verify, Upload, New, Open, Save and Serial Monitor. On the bottom right-hand corner of the window there displays the Development Board and the Serial Port in use.[3]

Processing Development Environment (PDE) :-

And to show the graphical representation of our Radar we use Processing Development Environment (PDE) software.

The Processing Development Environment (PDE) makes it easy to write Processing programs. Programs are written in the Text Editor and started by pressing the Run button. In Processing, a computer program is called a sketch. Sketches are stored in the Sketchbook, which is a folder on your computer.



(FIGURE 1) CIRCUIT MODEL USING TINKERCAD

OBSERVATION

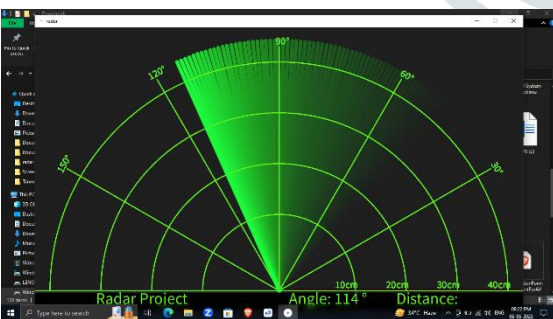


Fig II

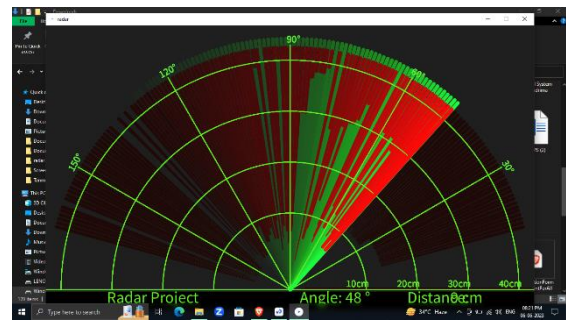


Fig III

Fig IV

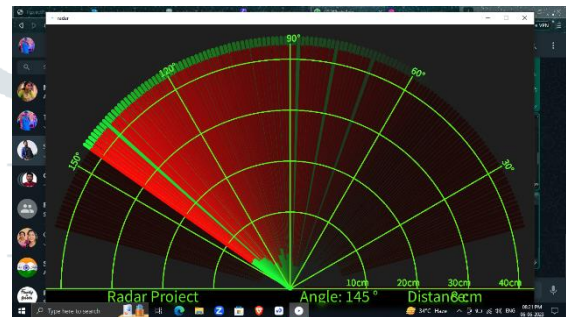
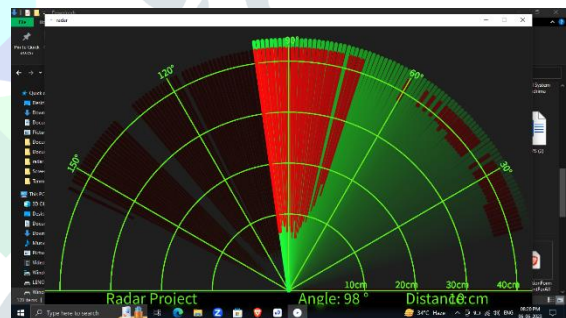
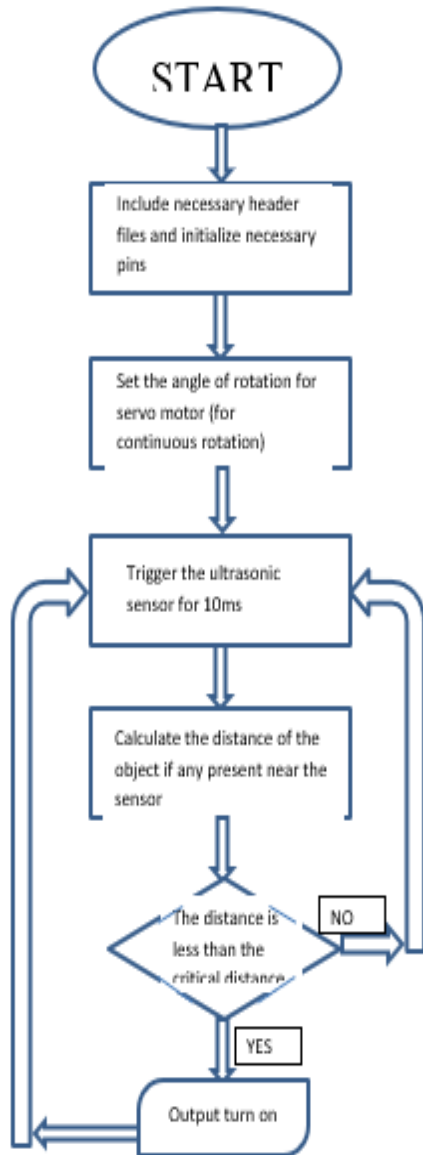


Fig V

PROGRAMME FLOWCHART



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CONCLUSION

At the end, we can say that our project can be used in many areas where low level protection is needed in a very bare minimum cost. It can become a very efficient and user friendly device for a user. As the quote says "prevention is better than cure", in the same way our low cost radar alert the user before any misdeed happens so that user can take the necessary steps for protection.

It has a huge future scope as we work on it to add more features in it. Upto this our project can only alert the user but we are trying to add some more features which can also provide the protection. By which our project can become a full proof security device.