

ARDUINO BASED RADAR SYSTEM FOR OBJECT DETECTION

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CONTENTS

- ❖ Introduction to Radar System
- ❖ Rationale
- ❖ Components and their description
- ❖ Block Diagram
- ❖ Circuit Diagram
- ❖ Working Principle
- ❖ Graphical Representation of Detecting Objects
- ❖ Final project
- ❖ Future work
- ❖ Applications
- ❖ References

INTRODUCTION TO RADAR SYSTEM

- Radar is a long-range object detection system that uses radio waves to establish certain parameters of an object like its range, speed and position
- The project is based on Sonar technology as I will be using an Ultrasonic Sensor to determine the presence of any object in a particular range.
- Rader is an object detection system. It uses Microwaves to determine the range, altitude, direction, or speed of objects. The radar can transmit radio waves or microwaves which bounce off any object in their path. So, we can easily determine any object in the radar range.



Radar system

RATIONALE

- ❖ To develop an ultrasonic RADAR.
- ❖ To detect the fixed or moving object.
- ❖ To measure the distance of the object from the system.
- ❖ To measure the angle of the moving object.
- ❖ Reducing human time and effort

COMPONENTS

Hardware

- Arduino UNO
- HC-SR04 Ultrasonic Sensor
- Tower Pro SG90 Servo Motor
- Ultrasonic Sensor
- Jumper Cables + USB Cable (for Arduino)
- Breadboard

Software

- Arduino IDE
- Processing Application

ULTRASONIC SENSOR

- Ultrasonic sensor is mainly used to determine the distance of the target object.
- Transmitter and receiver are two main parts of the sensor where former converts an electrical signal to ultrasonic waves while later converts that ultrasonic signals back to electrical signals.
- Its operating frequency is 4 MHz and its detection range is from 2cm to 400 cm



RATING

- Measures the distance within a wide range of 2 cm to 400cm
- Stable performance
- Accurate distance measurement
- High-density
- Small blind distance

SERVO MOTOR

Servo motor is a motor which requires +5V to operate and having a torque of 2.5kg/cm. It must be kept in mind that it can only rotate from 0°-180°



RATING

- Operating Voltage is +5V typically
- Torque: 2.5kg/cm
- Operating speed is 0.1s/60°
- Gear Type: Plastic
- Rotation : 0°-180°
- Weight of motor : 9gm
- Package includes gear horns and screws

BLOCK DIAGRAM

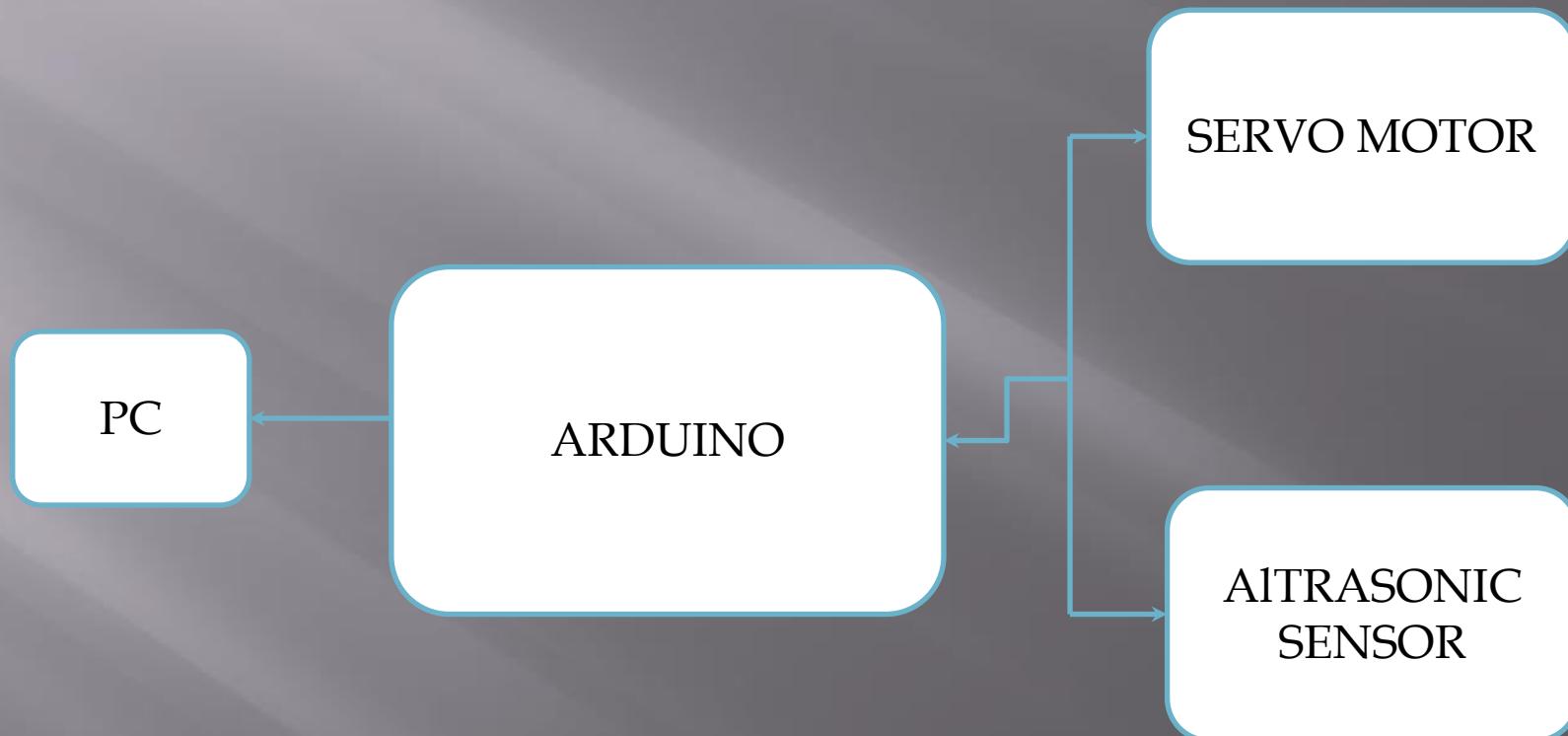


Fig: Block Diagram

CIRCUIT DIAGRAM

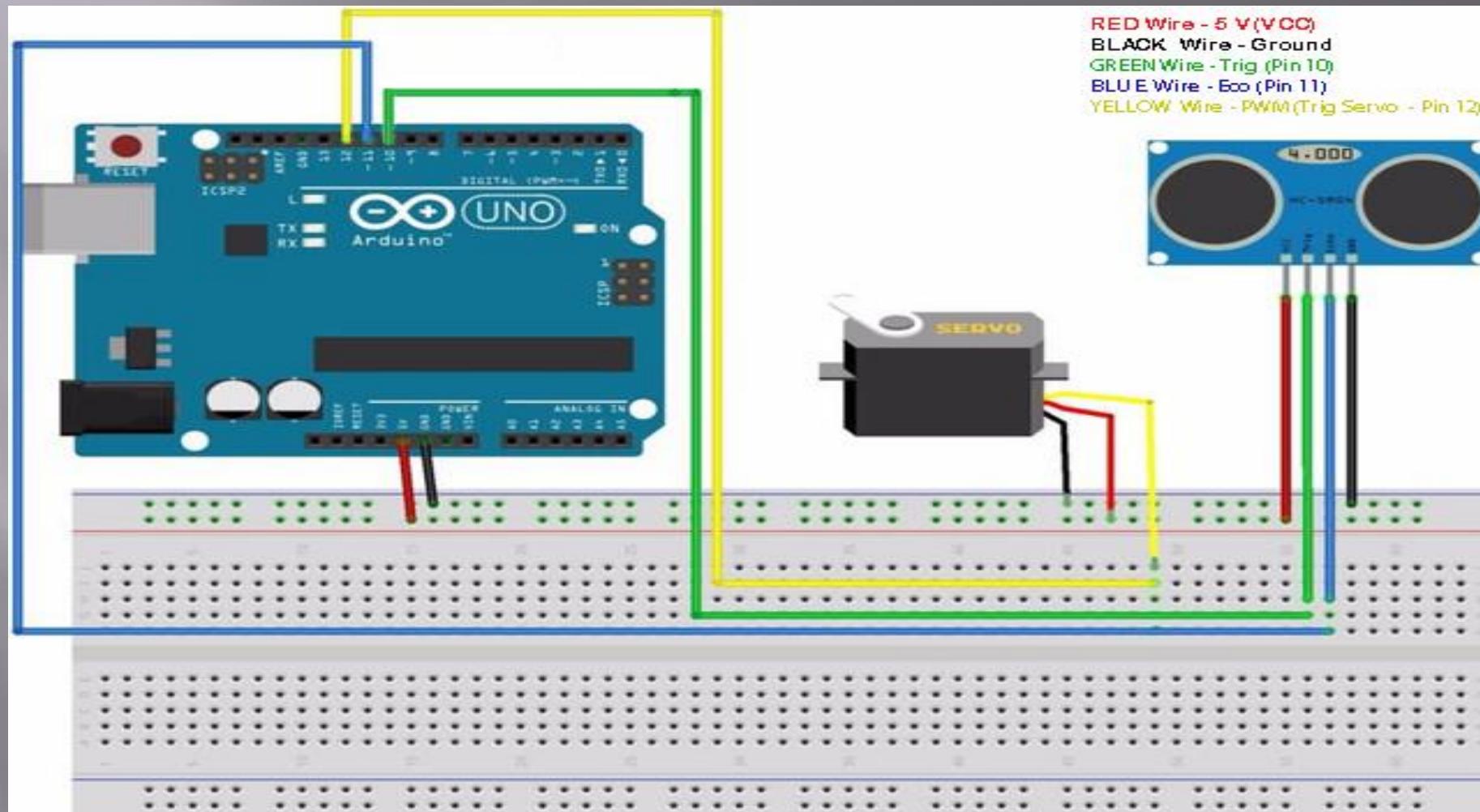
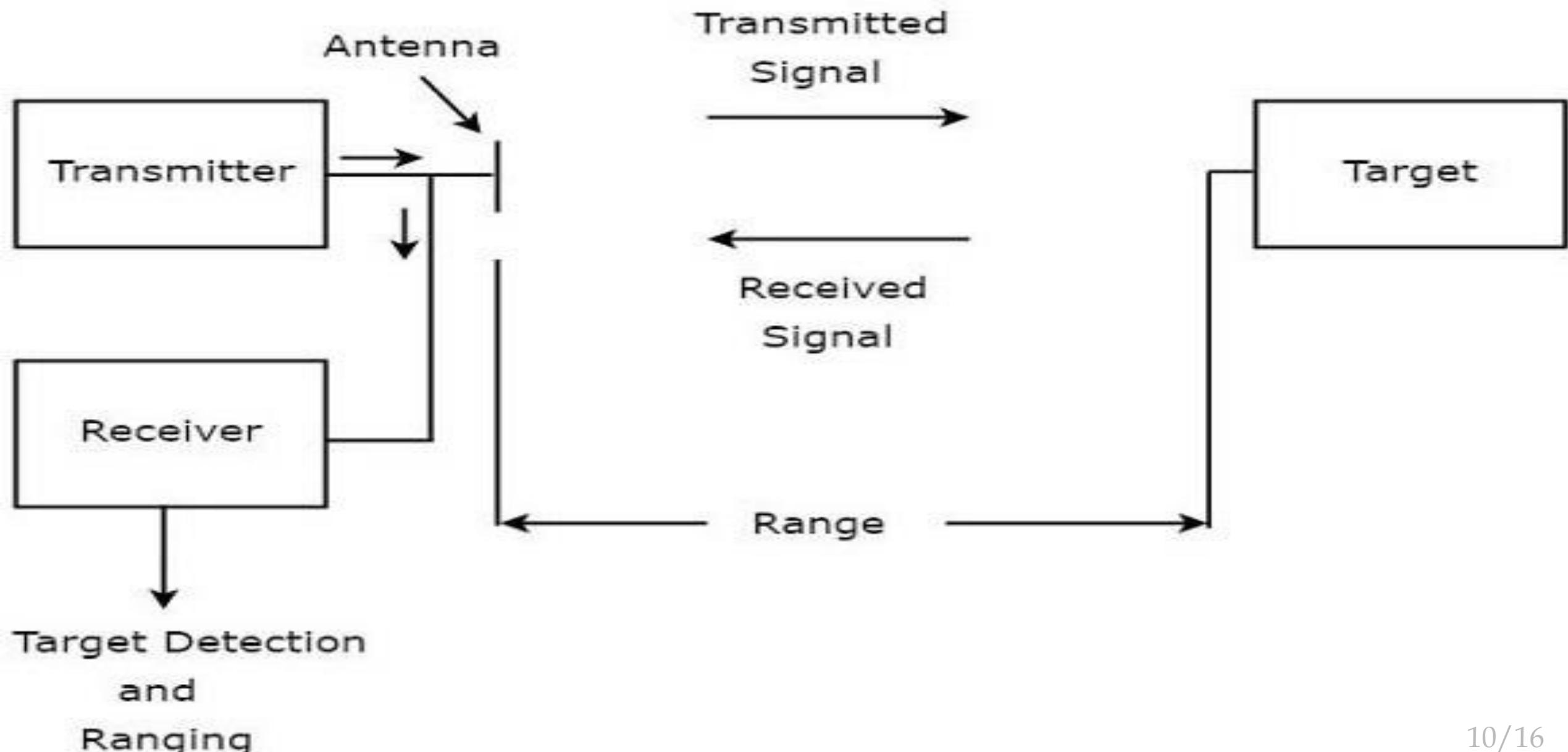
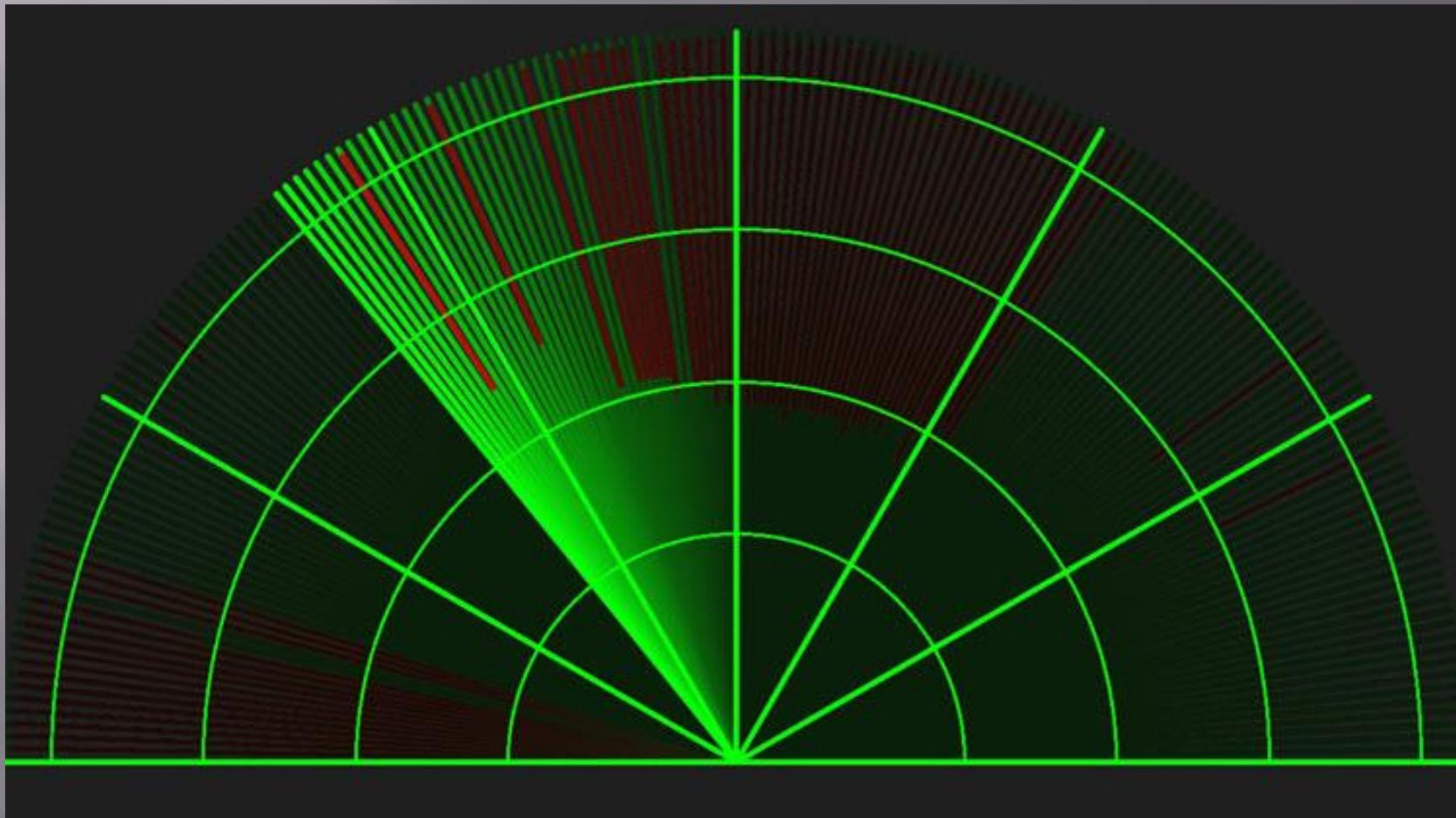


Fig: Circuit Diagram

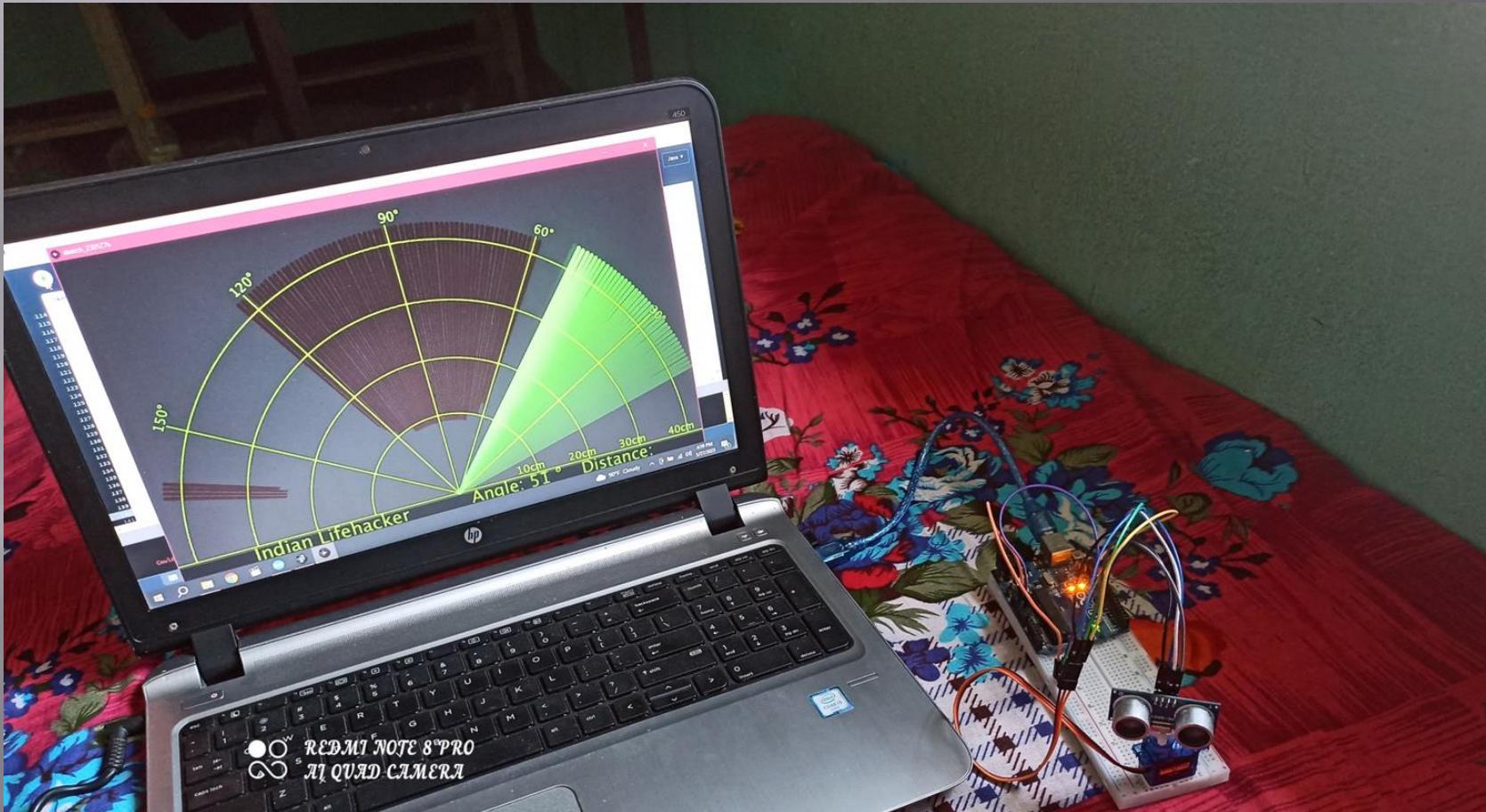
WORKING PRINCIPLE



GRAPHICAL REPRESENTATION OF DETECTING OBJECTS

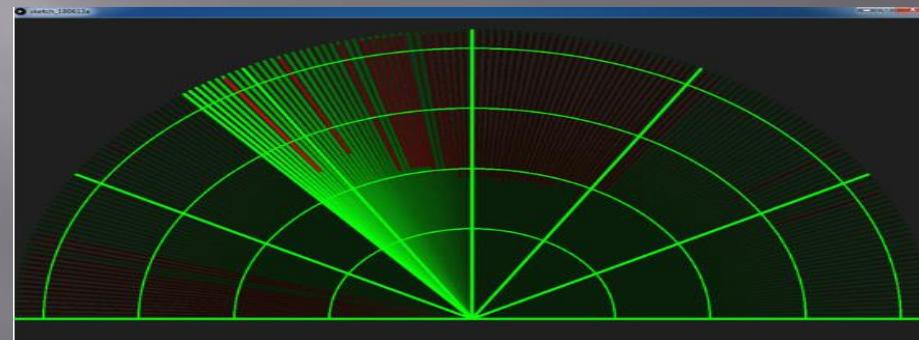


FINAL PROJECT

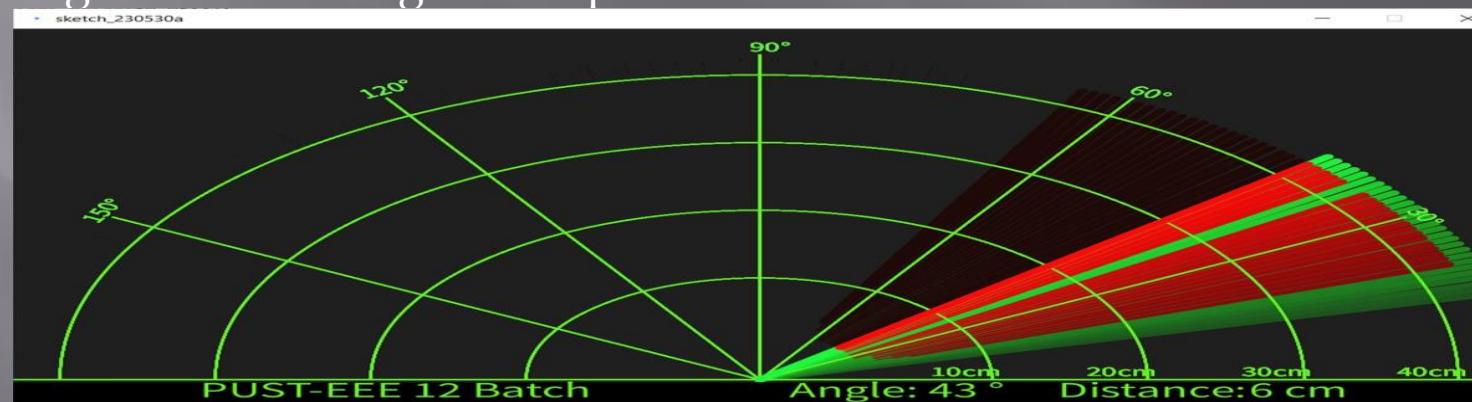


FUTURE WORK

- Instead of providing a different voltage source for operating ultrasonic sensor and servo motor, we have used supply from the micro-controller. By this way we reduced the cost of voltage supplies.
- Earlier the output screen was like this:



- After making some changes in the coding the output screen looks like this:



Now, it will show us the accurate distance as well as angle of the object which is much more accurate as compared to the previous output. This output screen is based on the polar coordinates system.

APPLICATIONS

- Radar is an electromagnetic system for the detection and location of target objects such as aircraft, ships, spacecraft, vehicles, people, and the natural environment which can reflect a signal back.
- It uses electromagnetic radio waves to determine the angle, range, or velocity of objects.
- The modern radar system is more advanced and the uses of radar are highly diverse. Such as Air traffic control, Air-defence system, Radar Astronomy, Antimissile system, Ocean Surveillance system, outer space surveillance and many more.

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THANKS