# Ultrasonic Radar

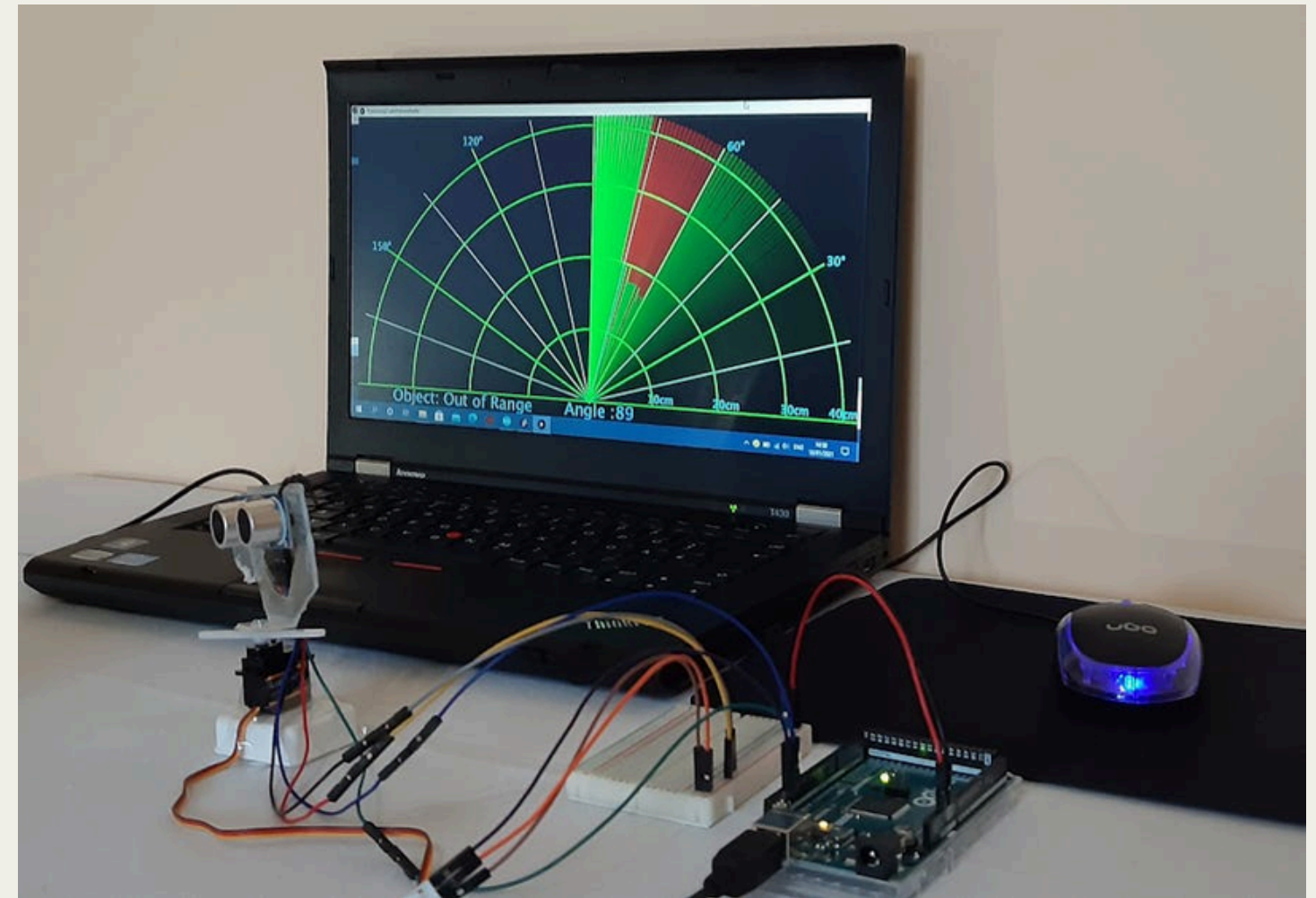## FOR UNAUTORIZED OBJECT DETECTION

Project Based Learning: Digital Electronics

# COMPONENTS USED

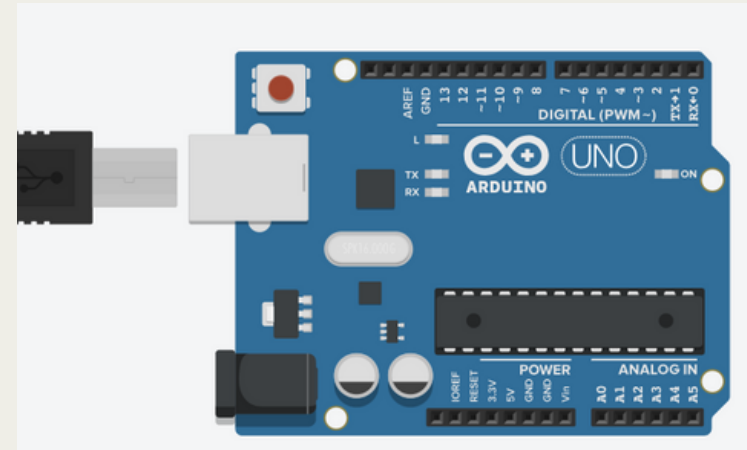- Positional Micro Servo

- Ultrasonic Distance Sensor (4 pin)

- Piezo

- Arduino Uno

- An LED

- 220 Ω Resistor

# COMPONENTS DESCRIPTION

## Arduino Uno

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller. It can be integrated into a variety of electronic projects.

## LED

The major uses of LED (Light Emitting Diodes) are to illuminate objects and even places. Its application is everywhere due to its compact size, low consumption of energy, extended lifetime, and flexibility in terms of use in various applications.
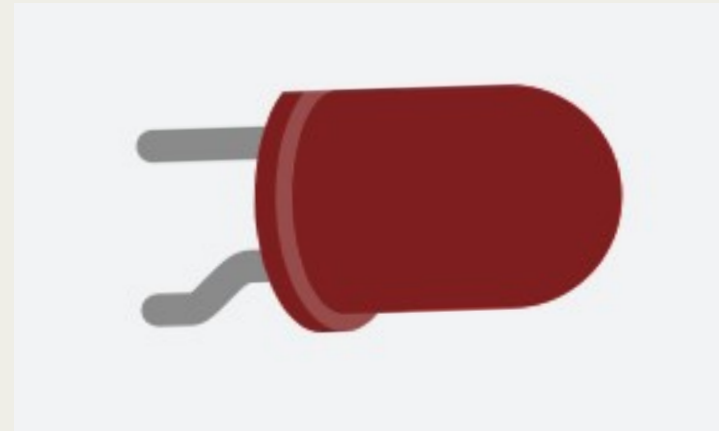
## Piezo Buzzer

An active buzzer is an electronic device that generates sound when a current is passed through it, without needing an external oscillator circuit. It's commonly used in alarms, timers, and other applications where audible alerts are required.
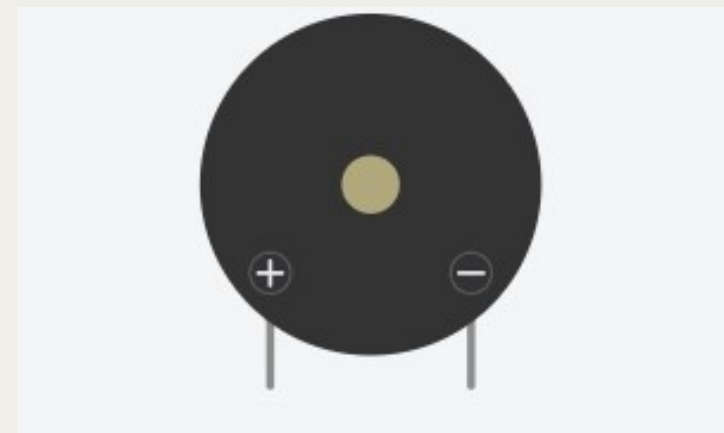
## Resistor(220 ohm)

A resistor is an electrical component that resists the flow of electric current, often used to control voltage or current levels in a circuit. It is characterized by its resistance value, measured in ohms. Here we have used a 220 ohm resistor.
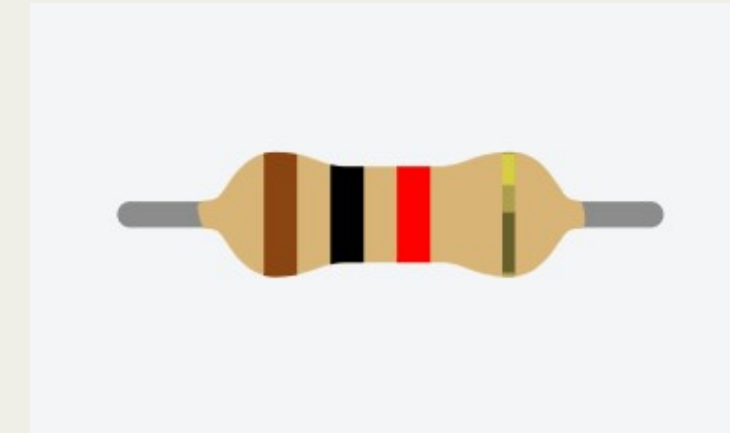
## Ultrasonic Distance Sensor (4 pin)

A 4-pin ultrasonic distance sensor emits ultrasonic waves and measures the time taken for them to bounce back, providing accurate distance measurements. It's commonly used in robotics, security systems, and industrial automation for object detection and proximity sensing.

## Positional Micro Servo

A positional micro servo is a compact motorized device that rotates within a specific range, often used for precise control of mechanical movements in robotics and automation projects.
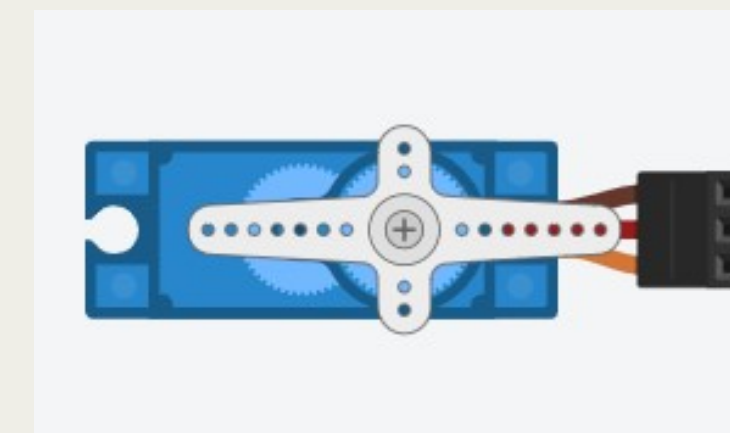
# CIRCUIT DIAGRAM AND DESIGN

The circuit design involves the use of an ultrasonic sensor, a servo motor, an LED, and a buzzer. The ultrasonic sensor (with Trig and Echo pins connected to pins 10 and 11) detects objects within a range of 30 cm. A servo motor (attached to pin 12) rotates from 0 to 180 degrees, scanning for obstacles. When an object is detected, an LED (connected to pin 7) and a buzzer (connected to pin 8) are activated to indicate the presence of an obstacle. The Arduino board communicates with the computer via the Serial Port to transmit servo position and distance measurements.
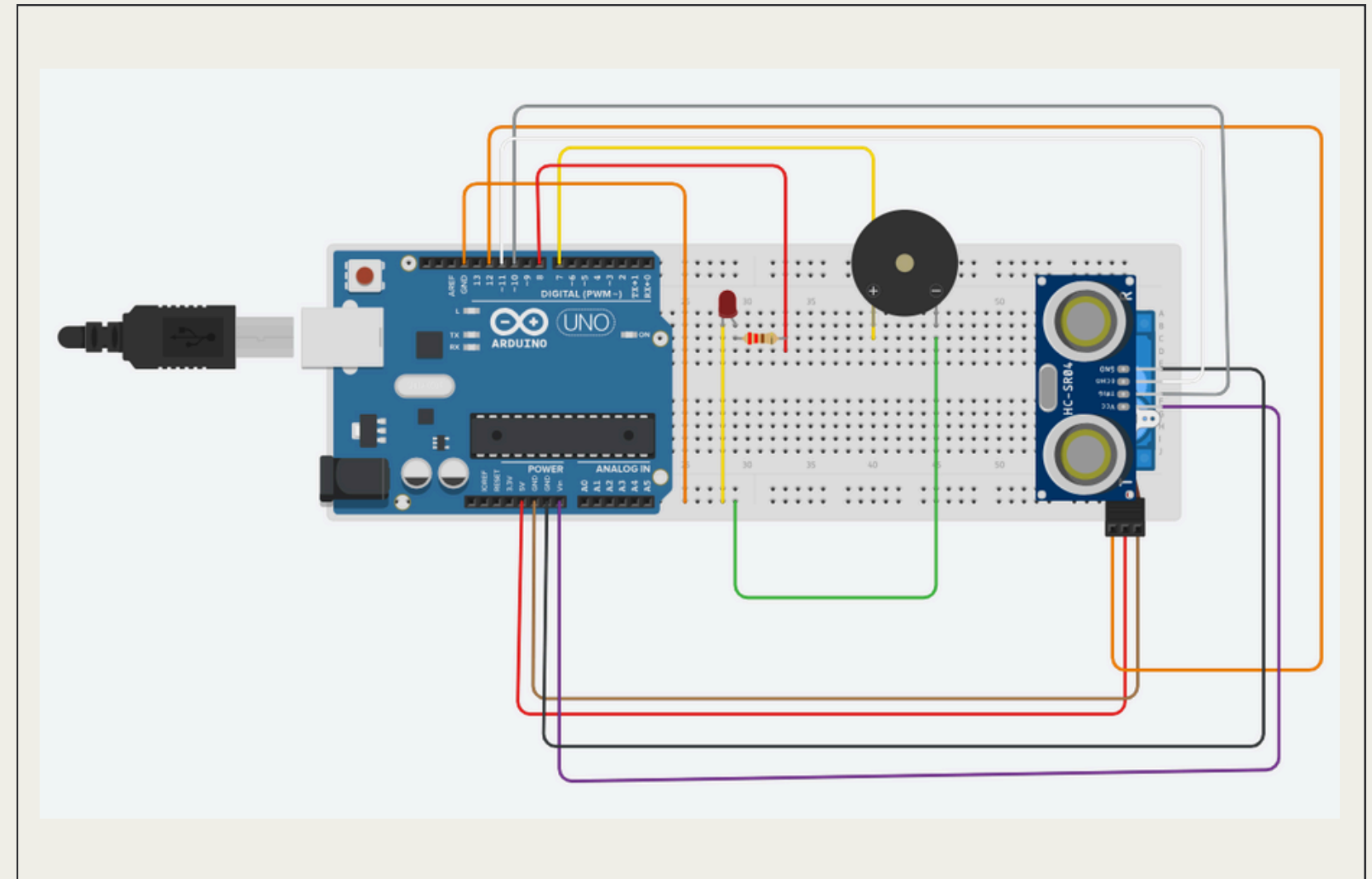
# WORKING

First of all, all the required connections of the resistor, LED, piezo buzzer and Arduino are made on the breadboard using jumper wires. Then below code is uploaded on the arduino which is connected to the computer for power supply. Now as per the uploaded code, the ultrasonic sensor emits high-frequency sound waves and measures the time taken for the waves to bounce back after hitting an object. By rotating the servo motor, the sensor covers a wide range of angles. When an object is detected within a certain range, the LEDs light up, and the buzzer sounds an alarm, alerting the user. In addition to this, we get the exact distance as well as the angle of the unauthorized object for precise tracking of its location.
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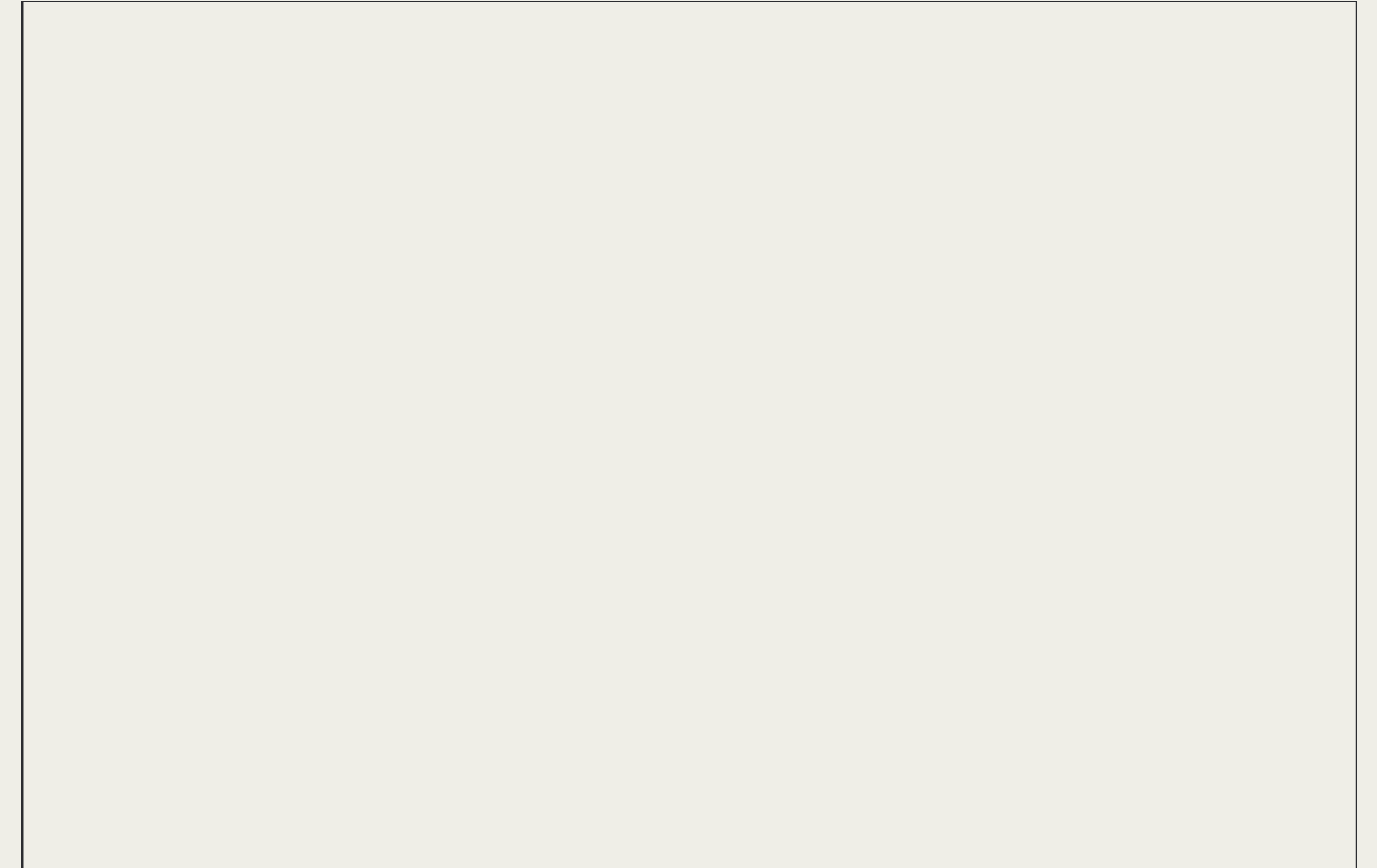
# APPLICATIONS



## Military surveillance

Utilizing the radar system to detect and track unauthorized personnel or vehicles in restricted military zones.



## Wildlife monitoring

Tracking the movement of animals or detecting intrusions in protected areas for conservation purposes.



## Nuclear Power Plants

For monitoring equipment in hazardous environments: Detecting the presence of objects near sensitive machinery to prevent accidents.

# References

- ·https://nevonprojects.com
- ·https://chat.openai.com
- ·https://youtu.be/F3C1LtXdQ7Q

# Thank you!

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