SMART DUSTBIN USING ARDUINO, ULTRASONIC SENSOR, AND SERVO MOTOR

OBJECTIVE:

The main objective of this project is to

- Design and build a prototype for an automatic open dustbin that can automatically open the lid when it detects the people who want to throw out their trash. It also can detect the level of the trash that inside the dustbin.
- To get familiar with the Arduino and the respective sensors how to use them for a cause.
- To analysis the dustbin program and set it up according to the physical distance for best Working.

ABSTRACT:

In the recent decades, urbanization has increased tremendously. At the same phase there is an increase in waste production. Waste management has been a crucial issue to be considered. This proposal is a way to achieve this good cause. In this project smart dustbin is built on a microcontroller based platform Arduino Uno board which is interfaced with the Servo motor and ultrasonic sensor. Ultrasonic sensor is placed at the top of the dustbin which will measure the stature of the dustbin.

The threshold stature is set at a particular level. Arduino will be programmed in such a way that when someone will comes in front of dustbin the servo motor will come in action and open the lid for the person to put the waste material into the dustbin. Once these **smart bins** are implemented on a large scale, by replacing our traditional bins present today, waste can be managed efficiently as it avoids unnecessary lumping of wastes on roadside. Foul smell from these rotten wastes that remain untreated for a long time, due to negligence of authorities and carelessness of public may lead to long term problems. Breeding of insects and mosquitoes can create nuisance around promoting unclean environment. This may even cause dreadful diseases.

INTRODUCTION:

Dustbins (or Garbage bins, Trash Cans, whatever you call them) are small plastic (or metal) containers that are used to store trash (or waste) on a temporary basis. They are often used in homes, offices, streets, parks etc. to collect the waste. In some places, littering is a serious offence and hence public waste containers are the only way to dispose small waste. Usually, it is a common practice to use separate bins for collecting wet or dry, recyclable or non-recyclable waste.

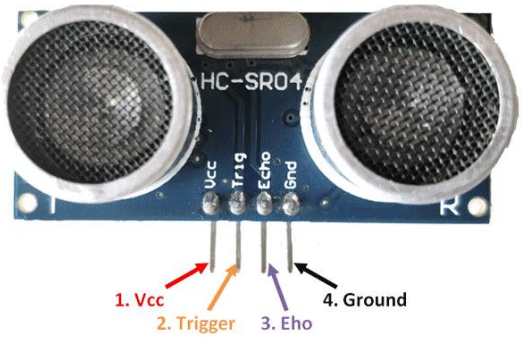
In this project, I have designed a simple system called Smart Dustbin using Arduino, Ultrasonic Sensor, and Servo Motor, where the lid of the dustbin will automatically open itself upon detection of human hand. The **smart dustbin** is a carefully designed solution that solves the social issue of waste disposal; the **smart dustbin** identifies the kind of material being thrown inside it and segregates it into bio or non-biodegradable.

HARDWARE/SOFTWARE REQUIREMENTS:

- Arduino Uno:

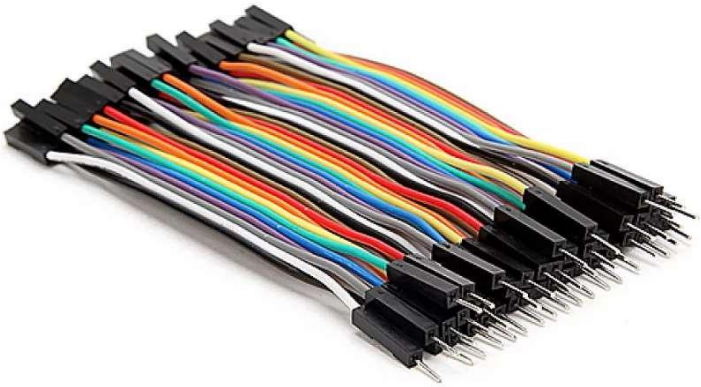
- Servo Motor:

- Ultra-Sonic Sensor:

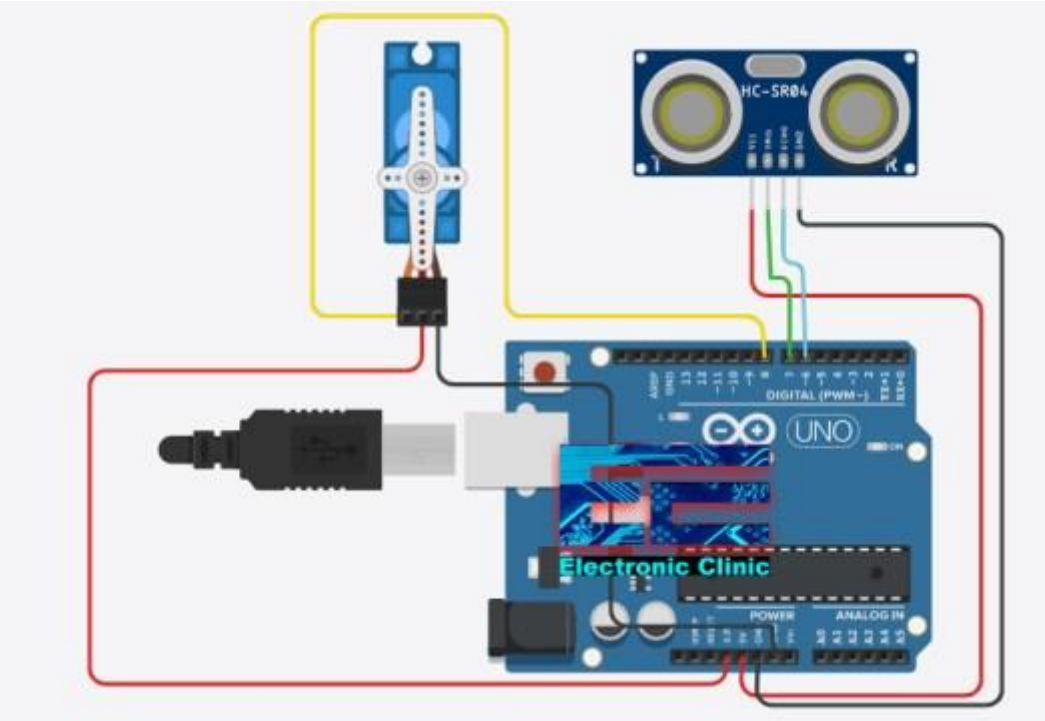


- Male to Male Jumper Cable Wire:

- Male to Female Jumper Cable Wire:



CONCEPTS/WORKING PRINCIPLE



The dustbin **opens automatically when it receives the signal and closes its hatch**. Also the dustbin consists of a level sensing ultrasonic sensor that constantly measures the level of garbage in the bin and automatically detects if it is about to fill up.

APPROACH/METHODOLOGY/PROGRAMS:

```
#include <Servo.h>   //servo library
Servo servo;
int trigPin = 5;
int echoPin = 6;
int servoPin = 7;
int led= 10;
long duration, dist, average;
long aver[3];   //array for average


void setup() {
   Serial.begin(9600);
   servo.attach(servoPin);
   pinMode(trigPin, OUTPUT);
   pinMode(echoPin, INPUT);
   servo.write(0);        //close cap on power on
   delay(100);
   servo.detach();
}

void measure() {
```

```
 digitalWrite(10,HIGH);
digitalWrite(trigPin, LOW);
delayMicroseconds(5);
digitalWrite(trigPin, HIGH);
delayMicroseconds(15);
digitalWrite(trigPin, LOW);
pinMode(echoPin, INPUT);
duration = pulseIn(echoPin, HIGH);
dist = (duration/2) / 29.1;    //obtain distance
}
void loop() {
  for (int i=0;i<=2;i++) {   //average distance
    measure();
   aver[i]=dist;
    delay(10);              //delay between measurements
  }
 dist=(aver[0]+aver[1]+aver[2])/3;

if ( dist<50 ) {
//Change distance as per your need
 servo.attach(servoPin);
  delay(1);
 servo.write(0);
 delay(3000);
 servo.write(150);
 delay(1000);
 servo.detach();
}
Serial.print(dist);
}
```

OUTPUT:

CONCLUSIONS:

A simple but useful project called Smart Dustbin using Arduino is designed and developed here. Using this project, the lid of the dustbin stays closed, so that waste is not exposed (to avoid flies and mosquitos) and when you want dispose any waste, it will automatically open the lid.