

VIDYASAGAR UNIVERSITY



B.Sc(Hons) 5th SEM Under CBCS

**Hands-On Arduino Training
Programme (2022)**

Project : Smart Bin

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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, we 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.

Concept behind Smart Dustbin using Arduino:

The main concept behind the Smart Dustbin using Arduino project is Object Detection. We have already used Ultrasonic Sensor in Object Avoiding Robot, where upon detecting an object, the Robot will change its course of direction.

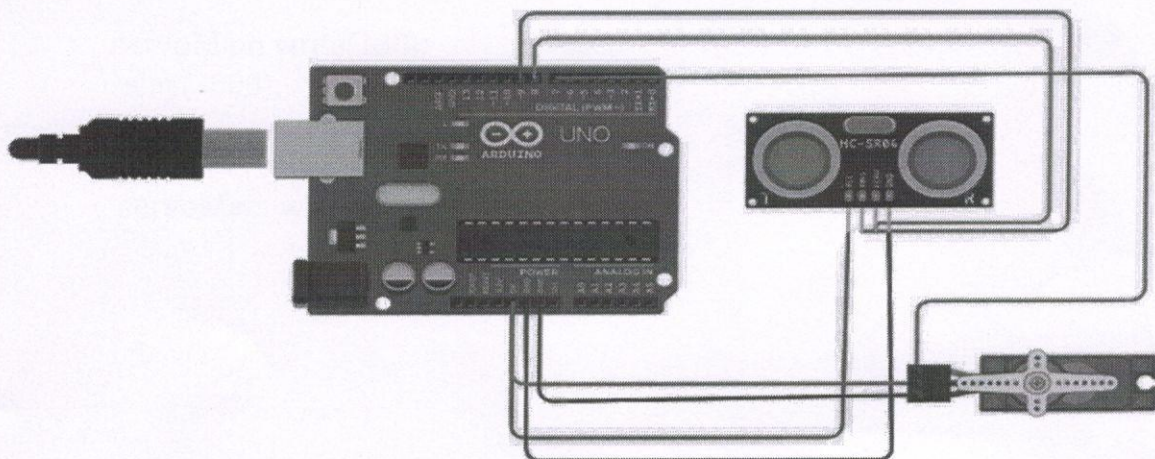
A similar methodology is implemented here, where the Ultrasonic Sensor is placed on the dustbins and when the sensor detects any object like a human hand, it will trigger Arduino to open the lid.

Required Components:

- ARDUINO UNO
- ULTRASONIC SENSOR
- SERVO MOTOR
- 5V POWER SUPPLY
- DUSTBIN
- Connecting Wires
- Miscellaneous (glue, plastic tube, etc.)

Circuit Diagram:

The following image shows the circuit diagram of the Smart Dustbin using Arduino. It is a very simple design as the project involves only two components other than Arduino.



Code:

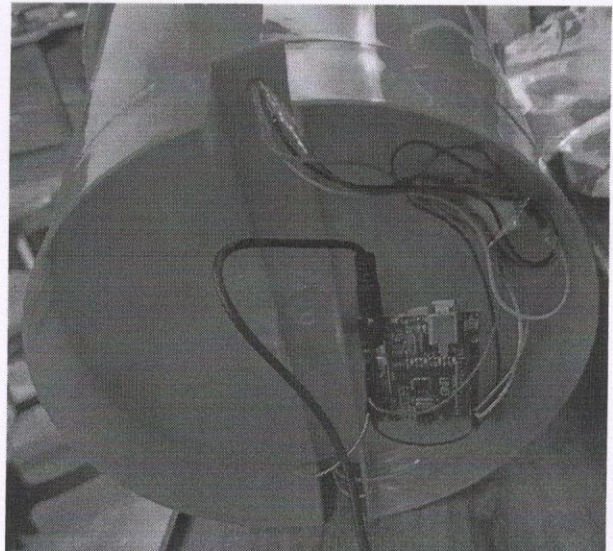
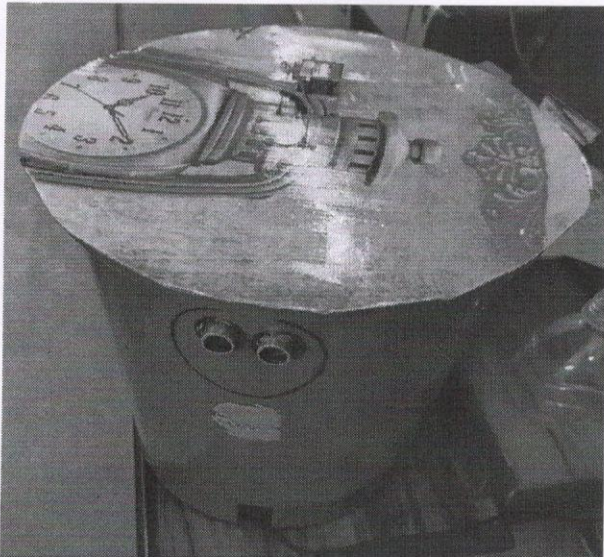
The code for the project How to Smart Dustbin using Arduino is given –

```
#include <Servo.h>
Servo servoMain; //
int trigpin = 9;
int echopin = 8;
int distance;
float duration;
float cm;
void setup()
{
  servoMain.attach(7);
  pinMode(trigpin, OUTPUT);
  pinMode(echopin, INPUT);
}
void loop()
{
  digitalWrite(trigpin, LOW);
  delay(2);
  digitalWrite(trigpin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigpin, LOW);
  duration = pulseIn(echopin, HIGH);
  cm = (duration/58.82);
  distance = cm;
  if(distance<30)
  {
    servoMain.write(180);
    delay(3000);
  }
  else{
    servoMain.write(0);
  }
}
```


Working:

After setting up the Smart Dustbin and making all the necessary connections, upload the code to Arduino and provide 5V power supply to the circuit. Once the system is powered ON, Arduino keeps monitoring for any object near the Ultrasonic Sensor.

If the Ultrasonic Sensor detects any object like a hand for example, Arduino calculates its distance and if it less than a certain predefined value. Arduino will activate the Servo Motor and with the support of the extended arm, it will lift the lid open.



Benefits of using Smart Dustbin Bins:

- It will stop overflowing of dustbins along roadsides and localities as smart Dustbins are managed at real time.
- It also aims at creating a clean as well as Green environment.

Conclusion:

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 mosquitoes) and when you want dispose any waste, it will automatically open the lid.



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VIDYASAGAR UNIVERSITY



B.Sc(Hons) 5th SEM Under CBCS

**Hands-On Arduino Training Programme
(2022)**

Project : Weather Box

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Weather change and Air quality is a global challenge for government, regulators, city administrator and citizens. Multibillion dollar sums are invested by governments in policies and solutions all around the World to improve the air quality and their empowering cities to tackle air pollution.

As of today air quality monitoring is performed by large, expensive scientific instruments, installed and maintained professionally at a relatively small number of fixed location.

According to the Indian government report, cities that share similar air quality as Delhi are Faridabad, Jodhpur, Lucknow, Moradabad, Muzaffarnagar, Pali and Varanasi; out of which Lucknow has 4 air quality monitoring station and rest all have only one station.

For Air quality monitoring, the Air Quality Index (AQI) is important. It is an index prepared by government institution to categories risk of air pollution. Lower AQI value represents pleasant air quality. The various algorithm and hardware descriptions are used to read the various gas sensor to monitor and control air quality.

Within the same context the temperature and the humidity level of the current air is also necessary to know for calculating the current total air condition of a particular location or cities.

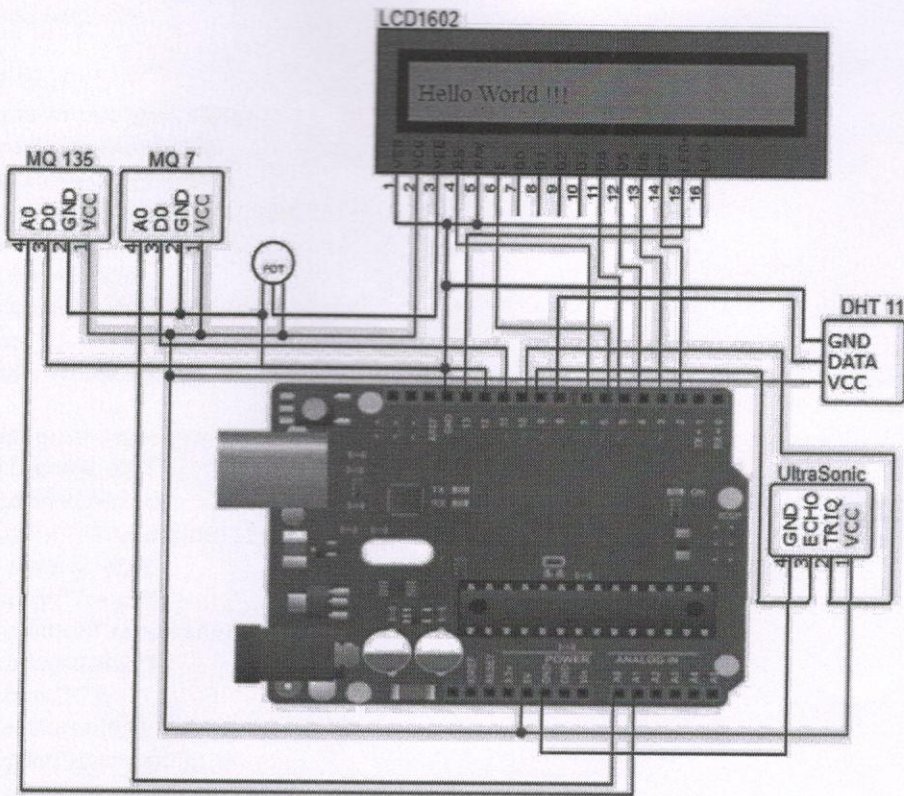
Introduction :

In today's first faced and industrialized society air quality is becoming topic of prominent concern. In India about 12 million people are affected by Chronic Obstructive Pulmonary Disease and about 1.5 million people in India die each year due to disease cost of fostered by air pollution, that is, one-sixth of all Indian deaths. Even now comma when the numbers are two high there is no chief and simple solution to monitor the indoor air quality and this idea is also not popular. This section purpose is simple Arduino control device which record Temperature, Humidity, CO level and Quality of Air present indoor and show it in the LCD panel. And the whole project will be power efficient as we used ultrasonic to detect if someone close to the system then it's screen light will be automatically.

System Description :

- Arduino UNO
- Temperature & Humidity Sensor (DHT 11)
- Carbon Monoxide (CO) Sensor (MQ 7)
- Air Quality Sensor (MQ 135)
- UltraSonic Sensor
- Connecting Wires
- 5V Power Supply
- Box
- Miscellaneous

Circuit Diagram :



Code :

```

#include <LiquidCrystal.h>
#include <Mouse.h>
#include <dht.h> //Temp

const int trigpin= 10;
const int echopin= 9;
long duration;
int distance;
const int AOUTpin=0;//the AOUT pin of the CO sensor goes into analog pin A0 of the arduino
const int DOUTpin=11;//the DOUT pin of the CO sensor goes into digital pin D8 of the arduino
int limit;
int value;
int sensorValue;
int digitalValue;
dht DHT; //Temp
#define DHT11_PIN 8 //Temp
LiquidCrystal lcd(7, 6, 5, 4, 3, 2);
int num=1;
int backLight = 13; // pin 13 will control the backlight
void setup() {
  // set up the LCD's number of columns and rows:
  pinMode(trigpin,OUTPUT);
  pinMode(echopin,INPUT);
  Serial.begin(9600);
  lcd.begin(16, 2);
  pinMode(backLight, OUTPUT);

```



```
Serial.begin(115200);//sets the baud rate
pinMode(DOUTpin, INPUT);//sets the pin as an input to the arduino
pinMode(12, INPUT);
}
```

```
void loop() {
  digitalWrite(trigpin,HIGH);
  delayMicroseconds(10);
  digitalWrite(trigpin,LOW);
  duration=pulseIn(echopin,HIGH);
  distance = duration*0.034/2;
  if(distance<200)
  { digitalWrite(backLight, HIGH);}
  else{
    digitalWrite(backLight, LOW);
  }
}
```

```
Serial.println(distance);
lcd.begin(16, 2);
//lcd.print(distance);
int chk = DHT.read11(DHT11_PIN);
lcd.setCursor(0,0);
lcd.print("Temp: ");
lcd.print(DHT.temperature);
lcd.print((char)223);
lcd.print("C");
lcd.setCursor(0,1);
lcd.print("Humidity: ");
lcd.print(DHT.humidity);
lcd.print("%");
digitalWrite(trigpin,HIGH);
delayMicroseconds(10);
digitalWrite(trigpin,LOW);
duration=pulseIn(echopin,HIGH);
distance = duration*0.034/2;
if(distance<200)
{ digitalWrite(backLight, HIGH);}
delay(2000);
digitalWrite(trigpin,HIGH);
delayMicroseconds(10);
digitalWrite(trigpin,LOW);
duration=pulseIn(echopin,HIGH);
distance = duration*0.034/2;
if(distance<200)
{ digitalWrite(backLight, HIGH);}
lcd.begin(16, 2);
```

```
value= analogRead(AOUTpin);//reads the analaog value from the CO sensor's AOUT pin
limit= digitalRead(DOUTpin);//reads the digital value from the CO sensor's DOUT pin
lcd.setCursor(0,0);
Serial.print("CO value: ");
lcd.print("CO Value: ");
Serial.println(value);//prints the CO value
lcd.print(value);
digitalWrite(trigpin,HIGH);
delayMicroseconds(10);
digitalWrite(trigpin,LOW);
duration=pulseIn(echopin,HIGH);
distance = duration*0.034/2;
if(distance<200)
{ digitalWrite(backLight, HIGH);}
```



```
lcd.setCursor(0,1);
lcd.print("Stay Safe");
digitalWrite(trigpin,HIGH);
delayMicroseconds(10);
digitalWrite(trigpin,LOW);
duration=pulseIn(echopin,HIGH);
distance = duration*0.034/2;
if(distance<200)
{ digitalWrite(backLight, HIGH);}
delay(2000);
digitalWrite(trigpin,HIGH);
delayMicroseconds(10);
digitalWrite(trigpin,LOW);
duration=pulseIn(echopin,HIGH);
distance = duration*0.034/2;
if(distance<200)
{ digitalWrite(backLight, HIGH);}
sensorValue = analogRead(1); // read analog input pin 0
digitalValue = digitalRead(12);
lcd.begin(16, 2);
lcd.setCursor(0,0);
lcd.print("Air Qyality: ");
lcd.print(sensorValue,DEC); // prints the value read
digitalWrite(trigpin,HIGH);
delayMicroseconds(10);
digitalWrite(trigpin,LOW);
duration=pulseIn(echopin,HIGH);
distance = duration*0.034/2;
if(distance<200)
{ digitalWrite(backLight, HIGH);}
lcd.setCursor(0,1);
lcd.print("Stay Healthy");
digitalWrite(trigpin,HIGH);
delayMicroseconds(10);
digitalWrite(trigpin,LOW);
duration=pulseIn(echopin,HIGH);
distance = duration*0.034/2;
if(distance<200)
{ digitalWrite(backLight, HIGH);}
delay(2000);
digitalWrite(trigpin,HIGH);
delayMicroseconds(10);
digitalWrite(trigpin,LOW);
duration=pulseIn(echopin,HIGH);
distance = duration*0.034/2;
if(distance<200)
{ digitalWrite(backLight, HIGH);}
}
```


Working :

After setting up the Weather Box and making all the necessary connections, upload the code to Arduino and provide 5V power supply to the circuit. Once the system is powered ON, Arduino keeps monitoring for the Temperature and Humidity as well as CO and Air Quality of in the room and show it in the LCD panel and at the same time it will continuously monitoring for any object near the Ultrasonic Sensor, if it found one then the Backlight of the LCD will on so that the screen can be see clearly.

Benefits :

- It will keep monitoring the Temperature and Humidity, so that we can plan our health plan efficiently.
- It monitor the CO level of the room so that we can get the information and can take action about it and can be cautious about the situations.
- It also monitor the current Air Quality of the room so that we can be aware of the situation and get some fresh air as well as can try to evacuate the harmful air from the room.
- It is also power efficient because the backlight of the screen only turns on when the system get indicate that someone is in front

Conclusion :

A simple but useful project called Weather Box using Arduino is designed and developed here. Using this project we can make our life much healthy despite of the fact that nowadays Air Pollution is a huge problem for us. This project can be used in most of the place like Bedroom, hall room, office room, hospital etc. This is as efficient and trustworthy device that we can make in our home with just some of the equipment available in online or offline market.



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20-10-22

VIDYASAGAR UNIVERSITY



B.Sc(Hons) 5th SEM Under CBCS

Hands-On Arduino Training Programme (2022)

Project : Automatic Water Dispenser

Submitted By:
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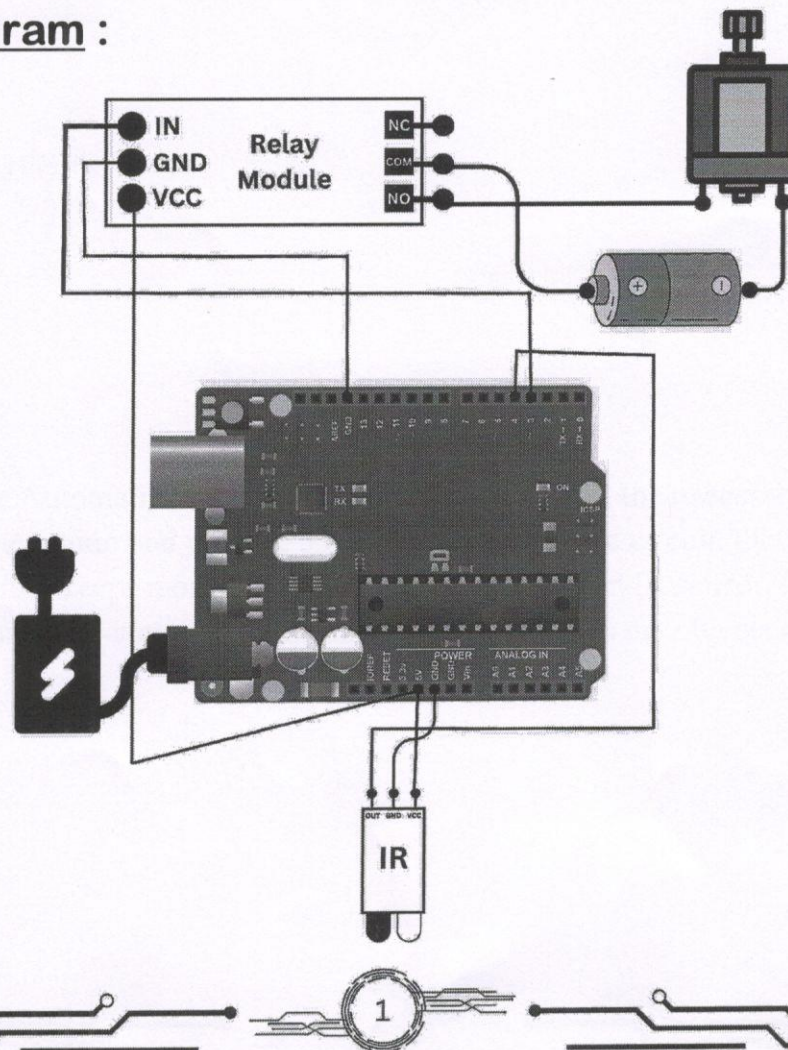
Introduction :

In today's first faced and industrialized society Water is becoming most important thing to watch for. Water is one of the most essential things of our life. In this project we are going to build an Automatic Water Dispenser using Arduino. It's primary work will be serve water automatically whenever someone comes near this device and place any objects or hands near the water dispensing pipe.

System Description :

- Arduino UNO
- IR Sensor
- Water Pumping Motor
- Relay Module
- 5V Power Supply
- Connecting Wires
- Battery
- Box
- Miscellaneous

Circuit Diagram :



Code :

```
int IRSensor = 4; // connect ir sensor module to Arduino pin 9
int relay = 3;
void setup()
{
  Serial.begin(115200); // Init Serial at 115200 Baud
  pinMode(IRSensor, INPUT); // IR Sensor pin INPUT
  pinMode(relay, OUTPUT);
}
void loop()
{
  int sensorStatus = digitalRead(IRSensor); // Set the GPIO as Input
  Serial.println(sensorStatus);
  if (sensorStatus == 0) // Check if the pin high or not
  {
    digitalWrite(relay, LOW);
  }
  else
  {
    digitalWrite(relay, HIGH);
  }
}
```

Working :

After setting up the Automatic Water Dispenser and making all the necessary connections, upload the code to Arduino and provide 5V power supply to the circuit. Once the system is powered ON, Arduino keeps monitoring if any object detects on IR sensor, If detects then the motor will be on and water will be dispensed and as soon as the objects move away the water will be stop.

Benefits :

- It helps reduce the Wastage of water as it is fully automatic.
- We do not need to do anything to get the water as it flow as soon as we come near the IR sensor

Conclusion :

A simple but useful and impactful project called Automatic Water Dispenser using Arduino is designed and developed here. Using this project we can make our life much easier. This can be used in Kitchen, hallroom, bathroom as well as bedroom and also in office room, hospital etc. In simple words this project can be used in everyplace where there is a Water system.



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