Effective Waste Management Using Smart Dustbins

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Abstract- *The today's world is moving fast along with the rapid change in technology . With the increased industrialization of nations throughout the globe,waste is becoming one of the challenges. Using new technologies we have introduced "Effective waste management using smart dustbins". Our aim is to achieve a healthy environment in public places and to reduce the climate change crisis and global warming using these smart dustbins.*

Keywords- *arduino, ultrasonic sensor , IOT, IR Sensor , smart dustbins..*

I. INTRODUCTION

Nowadays the population rate is increasing rapidly. Due to this demand for natural resources and technology are increasing . Along with advanced technology we also have increased pollution and garbage percentage . Dustbins contain non-recyclable products like plastic and other recyclable,compostable and non-decomposable material.We generally use a dustbin in home and offices. Sometimes dustbins get full and garbage spills out . garbage which is present in the surrounding dustbin responsible for formation of bacteria and viruses.

This also increases air pollution levels. to avoid such problems we have come up with a smart dustbin. Smart working dustbin is a gadget which will open it's lid automatically after detection of any object close to it. Due to this if any person comes close to the dustbin it will open directly and it will be easy to throw the garbage . It is seen that due to laziness or due to unpleasant smell of garbage which is present inside the dustbin many people don't open the lid of the dustbin in public places and throw garbage around the dustbin which makes public places dirty . To reduce such things we can use this smart working dustbin. We have used an IR sensor to design smart dustbin for indoor places and ultrasonic sensor , Arduino uno , servo motor to design smart dustbin for places where sunlight is present in high amounts .

II. METHODOLOGY AND TECHNIQUES USED

Techniques :

1. Smart dustbin with the help of Arduino uno and ultrasonic sensor.

2. Smart dustbin with the help of IR sensor.

Methodology :

1.Smart dustbin with the help of Arduino uno and ultrasonic sensor : Smart dustbin is self sensing an IOT based project. Depending upon condition the ultrasonic sensor will sense objects and pass information to the arduino uno. Using the given code it will perform action . To build a smart dustbin we need some hardware and software.

● **Required Hardware:**

1. Ultrasonic sensor
2. Arduino uno
3. Servo motor
4. Battery(9v)
5. Jumper wires
6. Dustbin
7. Glue

● **Required Software:**

1. Arduino IDE

Ultrasonic Sensor:

This sensor is used to locate the distance between the obstacle which can be a human hand or anything and dustbin. The principle behind finding distance of obstacles is sonar waves.
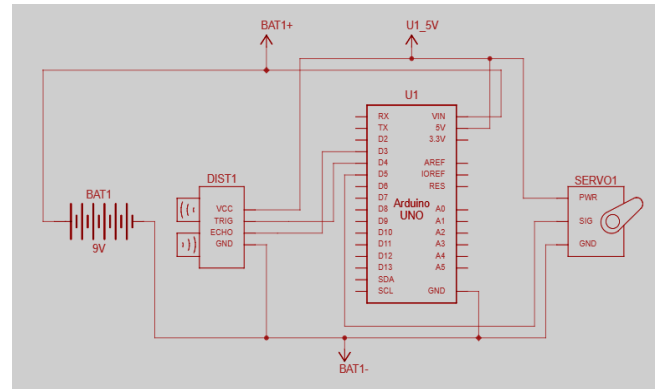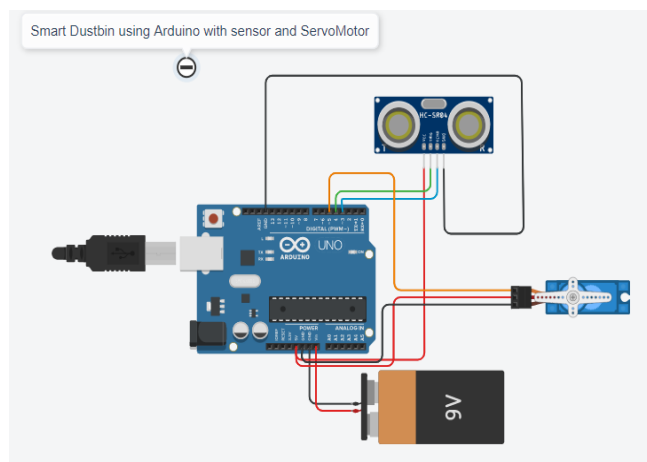

Servo Motor :

Servo Motor is a small device that has an output shaft. Servo motors are extremely useful in robotics.

Arduino uno :

It is a programmable open-source microcontroller board that can be integrated into a variety of electronic projects. Arduino boards can read inputs - light on a sensor.

Circuit Diagram :

Connections :

1. Echo pin of the ultrasonic sensor is connected to the D3 pin.
2. Trigger pin of the ultrasonic sensor is connected to the D4 pin.
3. +Vcc pin of the ultrasonic sensor is connected to +5V supply.
4. The Sig pin of the servo motor is connected to the D5 pin.

Working :

After connecting all the components we need to power up the circuit using a 9v battery .We also need to upload code given above into the Arduino Uno using Arduino IDE and supply power to the circuit.

When the system is ON, Arduino always keeps checking for human interaction near the ultrasonic sensor at a given distance. When an Ultrasonic sensor senses any item or human interaction for example like hand or others, then using given code Arduino calculates its distance from the dustbin and if it finds out less than a given distance then it will pass instruction to the servo motor . According to instructions, the motor will rotate and the lid will open. After a certain time mentioned in the code, the lid will close. While the above process, if an ultrasonic sensor finds any more interaction within range then it will execute the above process till the object moves away.

2. Smart dustbin with the help of IR sensor :

These types of dustbin can be used in indoor places like malls , colleges , etc. 5

● **Required Hardware:**

1. IR Sensor
2. LED
3. Battery (5V - 9V)

4. **Motor (Low voltage)**
5. **Connecting Wire**
6. **Dustbin**
7. **Glue**

IR Sensor : IR sensor detects infrared radiation in its surrounding environment. There are Two types of IR sensor : Active and Passive . Active IR sensors act as proximity sensors, and detect obstacles in its path .
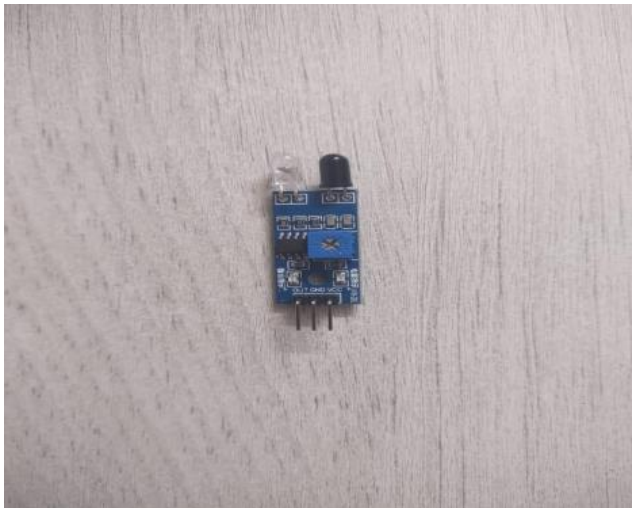
Circuit Diagram :
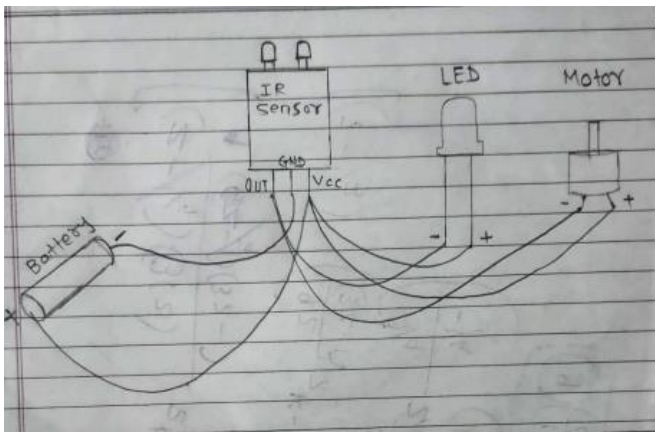
Working :

When the IR sensor senses any obstacle then the led glows and the motor starts functioning .Half portion of Lid of dustbin is connected to motor . When it starts functioning
the lid opens and closes automatically .

Advantages :

Conditions of dustbins without lid :

We can avoid this with the help of smart dustbins as these smart dustbins have a lid so no garbage will come out of it . And due to automatic opening of the lid of the dustbin after sensing any obstacle will help in keeping the area around the dustbin clean .

III. CONCLUSION

These smart dustbins are made with various features such as durability, affordability . Maintenance issues are addressed when these smart dustbins are designed. This Smart Dustbin can contribute a lot towards a clean and hygienic environment in building a healthy environment at public places . But since the technology is new, proper awareness should be created among the public before it is implemented on a large scale. Otherwise, sensitive devices like sensors might be damaged due to rough action of the users.

So from the project , we can conclude that design of smart dustbins are :

1. Cheaper 2. Components are easily available 3.User friendly.

IV. FUTURE SCOPE

Smart dustbin helps us to reduce the pollution. Many times the garbage from the dustbin overflows and many animals like dogs or rats enter inside or near the dustbin. This creates a bad scene. Birds , animals try to take out garbage from the dustbin and eat that garbage which is harmful for their health . So in future these types of dustbins will help in protecting our environment and also will help to reduce hand contagious diseases.

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