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# Smart Dustbin Using Arduino

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**ABSTRACT.**This paper presents a smart dustbin using arduino so that we can maintain the cleanliness. In today's world ,everyone is facing major health issues because of the germs and insects caused by unhygeinic environment.

This smart dustbin is having a arduino uno with a ultrasonic sensor and a servomotor.the lid of the dustbin will automatically get opened and closed by sensing the object infront of it.

The main objective of the project is to design a smart dustbin which will help in keeping our environment clean and also Eco friendly. We are inspired from "Swaach Bharat Mission". Nowadays technologies are getting smarter day-by-day so, as to clean the environment we are designing a smart dustbin by using Arduino. This smart dustbin management system is built on the microcontroller based system having ultrasonic sensors on the dustbin. If dustbin is not maintained than these can cause an unhealthy environment and can cause pollute that affect our health. In this proposed technology we have designed a smart dustbin using ARDUINO UNO, along with ultrasonic sensor, servo motor, and battery jumper wire. After all hardware and software connection, now Smart Dustbin program will be run.Dustbin lid will when someone comes near at some range than wait for user to put garbage and close it. It's properly running or not. For social it will help toward health and hygiene, for business for we try to make it affordable to many as many possible. So that normal people to rich people can take benefit from it.

**KEYWORDS:**Arduino uno, Ultrasonic sensor and Servomotor.

## I. INTRODUCTION

### 1.1 BASIS:

Dustbin is a container which collects garbage's which recyclable or non-recyclable, decompose and non-decompose. They are usually used in homes, office . The surrounding of a dustbin is also conducive for increasing the pollution level. Air pollution due to a dustbin can produce bacteria and virus. The rate increasing population in our country has increasing rapidly and also we have increase in garbage which have increased environmental issue. Dustbin is a container which collects garbage's or stores items which recyclable or non-recyclable, decompose and non-decompose. They are usually used in homes, office etc., but in case they are full no one is there to clean it and the garbage are spilled out. The surrounding of a dustbin is also conducive for increasing the pollution level. Air pollution due to a dustbin can produce bacteria and virus which can produce life harmful diseases for human. Therefore, we have designed a smart dustbin using ARDUINO UNO, ultrasonic sensor which will sense the item to be thrown in the dustbin and open the lid with the help of the motor. It is an IOT based project that will bring a new and smart way of cleanliness. It is a decent gadget to make your home clean, due to practically all offspring of home consistently make it grimy and spread litter to a great extent by electronics, rappers and various other things. Since the smart dustbin is additionally intriguing and children make fun with it so it will help to maintain cleanliness in home. It will be applied for various type of waste. Dustbin will open its lid when someone/object is near at some range then it will wait for given time period than it will close automatically. Here lid will close when you don't want to use and it will only open when it require.

### 1.2 PROBLEMS FACED BY HUMANS

The bacteria and viruses causes life harmful diseases for human. Humans have to suffer with a lot of major diseases which can lead to death also .as whenever human wants to throw some gardage in the dustbin they have a direct contact with the dustbin.

The lid of the dustbin will automatically get opened and closed .there is no direct contact between human and the dustbin so that humans can protect themselves from unwanted diseases.



## II. RELATED WORK

In ref. paper 1, the whole procedure is aided by the ultrasonic sensor which is interfaced with Arduino UNO to check the level of garbage filled in the dustbin and sends the alert to the civic through the GSM once if garbage is filled. In this project, when garbage reaches the level of sensor, then that indication will be given to the microcontroller unit of Arduino UNO and microcontroller sends signal to the user throughout GSM, so nonstop monitoring of garbage bin will stay the environment as clean.

In ref. 2 to mitigate waste management problem, the system designed with more capacity, user friendly, motivating and very easily accessible waste management system required in public places. In the proposed Smart Hands Free waste compactor Bin system, it compact the waste PET bottles and paper cup by 7x and 12x smaller respectively by electrical actuator, IR sensor also check the status of garbage bin with GSM module send notification to control room. LCD display, GSM, sensor and Relays with Actuator used are interfaced with Arduino. By the user choice in LCD display, issue of Greeting to user or e-Wallet Coupons provided. Nearby Garbage System Locations also tracked by public with Google Map.

### METHODOLOGY

Working principle of the project is “ When Ultrasonic sensor detect any object for example like hand or others, here Arduino calculates its distance and if it less than a certain predefined value then servo motor get activate first and with the support of the extended arm of the lid. Lid will open for a given time than it will automatically closed”.

SMART DUSTBIN is an ARDUINO based project. Here we are using Arduino for code execution, for sensing we used ultrasonic sensor which will open lid and wait for few moment. It will bring drastic changes in term of cleanliness with the help of technology. Everything is getting with smart technology for the betterment of human being. So this help in maintaining the environment clean with the help of technology. It is a sensor based dustbin so it would be easy to access/use for any age group. Our aim is also to make it cost effective so that many numbers of people can get the benefit from this. And it should be usable to anyone and helpful for them.

└ To complete our project, we require some software as well as hardware.

Required Software:

1. ARDUINO IDE

Required Hardware:

1. ARDUINO UNO.
2. ULTRASONIC SENSOR.
3. SERVO MOTOR.
4. 9V BATTERY.
5. DUSTBIN.
6. JUMPER WIRES.

### COMPONENTS USED:

#### Servo Motor:

The micro servo motor 9G is a light , good quality and very fast. This servo is designed to work with most radio control systems. It is perfect for small robotics projects. The SG90 Micro servo with accessories is perfect for remote-controlled helicopters, planes, cars, boats, trucks etc.

#### Arduino Uno :

Arduino Uno is an open-source microcontroller board based on the processor ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a USB connection, a power jack, an ICSP header and a reset button.

└ Microcontroller- ATmega2560

└ Operating Voltage -5V

└ Input Voltage (recommended)- 7-12V

└ Input Voltage (limit)- 6-20V

└ Digital I/O Pins 54 (of which 15 provide PWM output)

└ Analog Input 1



#### Ultrasonic Sensor:

HC-SR04 is an ultrasonic distance sensor used for measuring the distance at which an object is located. The principle used by this sensor is called SONAR.

It is perfect for small robotics projects such as obstacle avoiding robot, distance measuring device etc. It has two parts, one emits the ultras

Technical Specifications:

- └ Power Supply – +5V DC
- └ Quiescent Current – <2mA
- └ Working Current – 15mA
- └ Effectual Angle – <15°
- └ Ranging Distance – 2cm – 400 cm/1" – 13ft
- Rechargeable Battery:
  - └ Resolution – 0.3 cm
  - └ Measuring Angle – 30 degree

ound sonar to measure the distance to an object. The other part is the receiver which listens for the echo. As soon as the ultrasound hits the object it bounces back and is detected by the receiver.

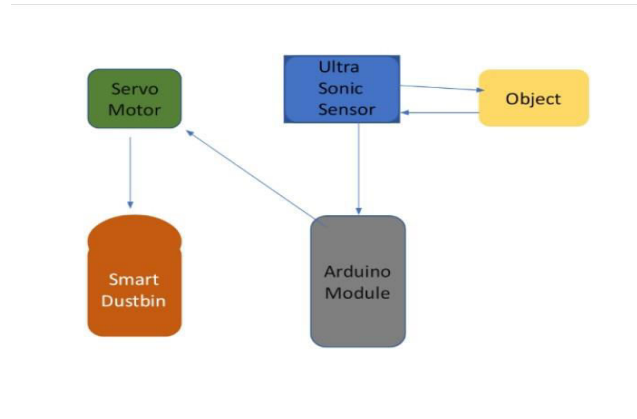
#### Rechargeable Battery:

A rechargeable battery, storage battery, or secondary cell (formally a type of energy accumulator), is a type of electrical battery which can be charged, discharged into a load, and recharged many times, as opposed to a disposable or primary battery, which is supplied fully charged and discarded after use.

#### Jumper Wire:

A jumper is a tiny metal connector that is used to close or open part of an electrical circuit. It may be used as an alternative to a dual in-line package (DIP) switch. A jumper has two or more connecting points, which regulate an electrical circuit board.

**BLOCK DIAGRAM:**



Block diagram

Above figure shows the block diagram of smart dustbin using arduino as we can see in above figure it consists of 3 major blocks like servo motor, Arduino uno, and ultrasonic sensor.the working steps for this is:

After wiring and attaching all the devices and setting up to the Smart Dustbin, now observe all the important setup whether they are well connected or something missed.

- After connection set up now next step is to submit/upload code in Arduino and supply power to the circuit. When system is powered ON, Arduino keeps monitoring for any things that comes near the sensor at give range.
- When Ultrasonic sensor detect any object for example like hand or others, here Arduino calculates its distance and if it less than a certain predefines value than servo motor get activate first and with the support of the extended arm of the lid. Lid will open for a given time than it will automatically close.

**ADVANTAGES:**

Following are the advantages of using Smart dustbin:

1. A reduction in the number of waste collections needed by up to 80%, resulting in less manpower, emissions, fuel use and traffic congestion.
2. A reduction in the number of waste bins needed.
3. Maintain environment hygiene (i.e. No overflowing of waste and less unpleasant odor).
4. It will help in bringing evolution by technology in term of cleanliness.

**IV. CONCLUSION& FUTURE SCOPE**

We are going to make an evolution changes towards cleanliness .it is equipped with smart devices like sensor arduino etc.lid of the dustbin will automatically get opened and closed.so there is no direct contact between the human and the dustbin. Two bins can be placed to collect wet and dry waste separately. And a GSM module can be used so that a message can automatically be sent to the sweepers when the dustbin become full.

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