Project title: Smart Dustbin

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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 come 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 to Smart Dustbin using Arduino and Ultrasonic Sensor: -

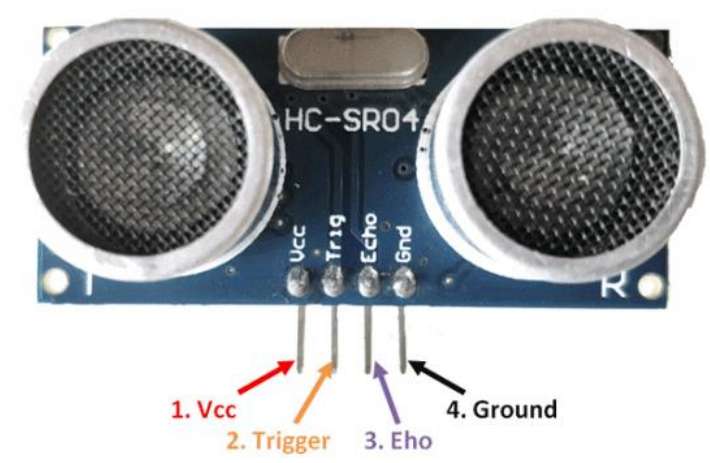
Dustbins (or Garbage bins, Trash Cans, whatever you call them) are small plastic (or metal) containers that are used to store trash (or waste) on a temporary basis. They are often used in homes, offices, streets, parks etc. to collect the waste. In some places, littering is a serious offence and hence 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.

Ultrasonic Sensors: -

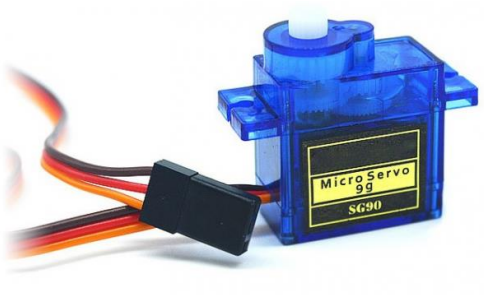
Ultrasonic sensors work by sending out a sound wave at a frequency above the range of human hearing. The transducer of the sensor acts as a microphone to receive and send the ultrasonic sound. Ultrasonic sensor, like many others, use a single transducer to send a pulse and to receive the echo. The sensor determines the distance to a target by measuring time lapses between the sending and receiving of the ultrasonic pulse.



Servo Motor: -

A servo motor is an electrical device which can push or rotate an object with great precision. If you want to rotate an object at some specific angles or distance, then you use servo motor. It is just made up of simple motor which run through servo mechanism. If motor is used is DC powered then it is called DC servo motor, and if it is AC powered motor then it is called AC servo motor. We can get a very high torque servo motor in a small and light weight package. Due to these features, they are being used in many applications like toy cars, RC helicopters and planes, Robotics, Machine etc.

Tiny and lightweight with high output power. Servo can rotate approximately 180 degrees (90 in each direction), and works just like the standard kinds but smaller. You can use any servo code, hardware or library to control these servos. Good for beginners who want to make stuff move without building a motor controller with feedback & gear box, especially since it will fit in small places. It comes with 3 horns (arms) and hardware.



Arduino UNO:-

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board. The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) in order to load new code onto the board — you can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package.

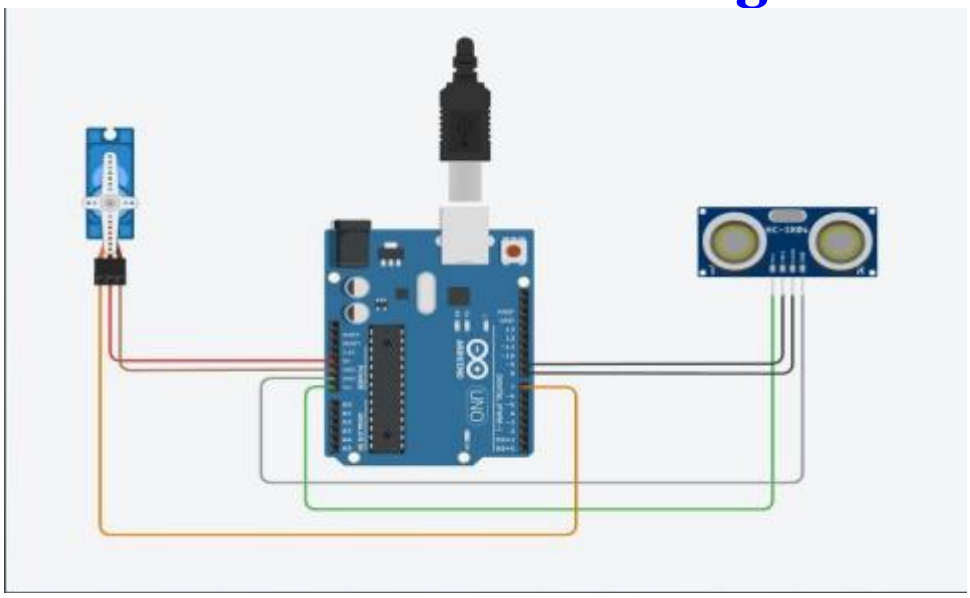
The Uno is one of the more popular boards in the Arduino family and a great choice for beginners. The Arduino hardware and software was designed for artists, designers, hobbyists, hackers, newbies, and anyone interested in creating interactive objects or environments. Arduino can interact with buttons, LEDs, motors, speakers, GPS units, cameras, the internet, and even your smart-phone or you're TV! This flexibility combined with the fact that the Arduino software is free, the hardware boards are pretty cheap, and both the software and hardware are easy to learn has led to a large community of users who have contributed code and released instructions for **a huge** variety of Arduino-based projects.

OBJECTIVES: -

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.

Smart Dustbin Circuit Diagram: -



CONNECTIONS: -

- **Servo Motor SG-90**

1. Red Pin (Servo Motor) with Arduino 3.3v
2. Black Pin (Servo Motor) with Arduino GND (Ground)
3. Orange Pin (Servo Motor) with Arduino Pin 8

- **Ultrasonic Sensor**

1. VCC (Sensor) with Arduino 5v
2. Trig (Sensor) with Arduino Pin 7
3. Echo (Sensor) with Arduino Pin 6
4. GND (Sensor) with Arduino GND

How it works: -

• Suppose if the ultrasonic sensor detects a hand or a leg of a human being or any other object placed nearby, then Arduino will measure the distances, if the distance is less than the predefined value then the Motor will be activated and Arduino servo motor will start and hence the head of the dustbin will be opened which is attached with the servo motor.

• After a few seconds, it will close automatically.

• Because the predefined value is given, it can easily be changed.