

Smart Dustbin using Arduino with GSM Module

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ABSTRACT: The main objective of the project is to design a smart dustbin which will help in keeping our environment clean and also ecofriendly. 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, microcontroller, IOT, circuitry,GSM

I. INTRODUCTION

“ENVIRONMENT” is essential for everyone and present everywhere, that supply all natural needs in an abundant manner but also we have some responsibilities towards our environment. In several urban areas although the dustbins are provided so that it can be used by the people but its proper maintenance is also needed lacking of which inhygeine increases destroying our environment day by day also resulting severe adverse effects for mankind . This paper presents some revolutionary remedies in this context. People are more interested to use such technologies which can reduce their time and effort in efficient manner. Automation is the most demandable feature now a day. For this purpose smart dustbins are the much suitable approach. It will be helpful to develop green and smart city. [1]. For this we have to develop a fully automatic dustbin which will first be able to detect the current status and connected to local area network and servers by sending the data to computer system about its current status.

II. METHODOLOGY

SMART DUSTBIN USING ARDUINO is an IOT 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 some hardware. We have developed a dustbin which is advance and we call it smart dustbin. GSM AND ARDUINO MODULE is used with it. This is done by the process flow of sensing, data transfer and messaging which make the dustbin able to sense to be open automatically as we come near to this and we get the display message on LCD screen that the dustbin is full, dump the garbage and At the same time it is connected to the servers and GSM system which send the information about the status of dustbin that either it is full or empty [2],[3],[4]. This whole process is controlled by the ARDUINO platform.

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

A. *Required Software:*

1. ARDUINO IDE

B. *Required Hardware:*

1. ARDUINO UNO R3
2. ULTRASONIC SENSOR
3. SERVO MOTOR
4. 9V BATTERY
5. DUSTBIN
6. GSM Module

III. PROCEDURE

SERVO MOTOR CONNECTION SETUP:

Now, let me take you through the actual setup and build process of the Smart Dustbin using Arduino. First, I will start with the mechanism to open the lid. As you might have already guessed, I have used a Servo Motor for this purpose. In order to open the lid, I have fixed a small plastic tube (like an empty refill of a ball-point pen) to the servo horn (a single ended horn) using instant glue. For this mechanism to be able to open the lid of the dustbin, it must be placed near the lid. In this the actual setup of dustbin design and build the system by using Arduino. Starting with the mechanism of opening the lid of dustbin, for this purpose Servo motor has been used. To open the lid, I have attached a small plastic tube (like an empty refill of a ball-point pen) to the servo horn (a single ended horn) using instant glue.

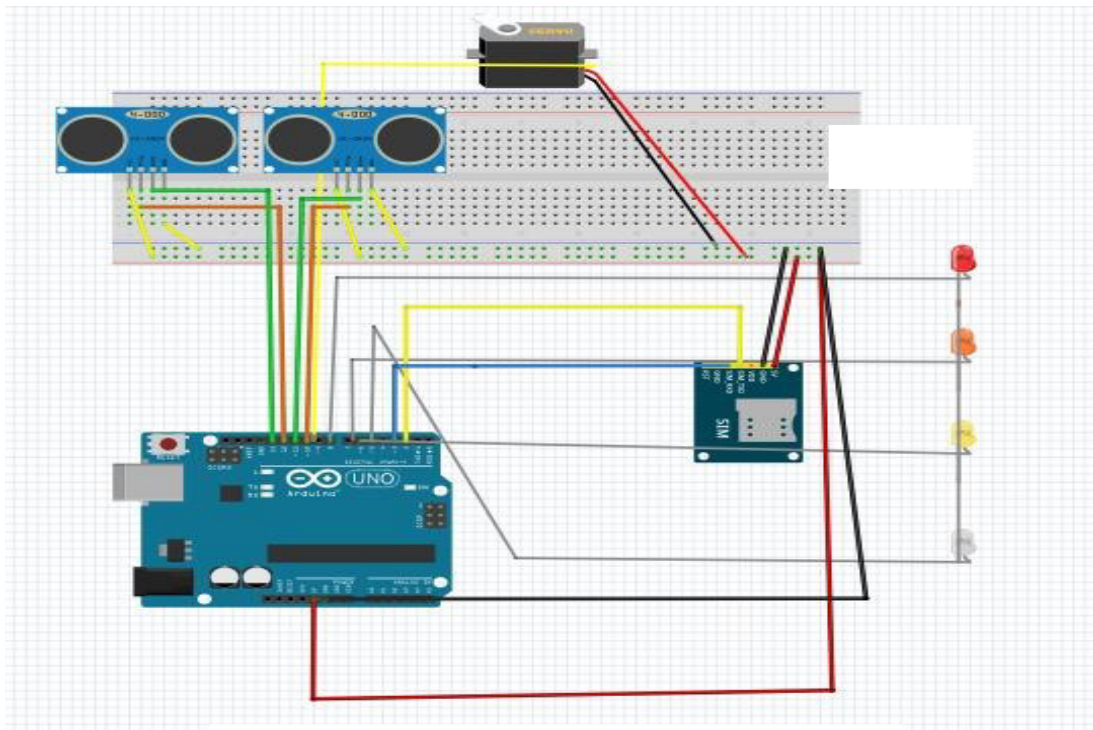
ULTRASONIC SENSOR CONNECTING:

After successfully servo motor is placed now it's time for sensor, so HC-SR04 Ultrasonic sensor is placed at the front of the dustbin.

WIRING UP THE COMPONENTS:

The final step in the build process is to make the necessary connections using long connecting wires as per the circuit diagram and securing these wires so that they don't hang around. All the wires from both the components i.e. Ultrasonic Sensor and Servo Motor are connected to respective pins of Arduino. This finishes up the build process of the Smart Dustbin. In Arduino Code has been submitted, and with all hardware and software connection in Dustbin. We will run our dustbin, wait its working or not.

CIRCUIT DIAGRAM:



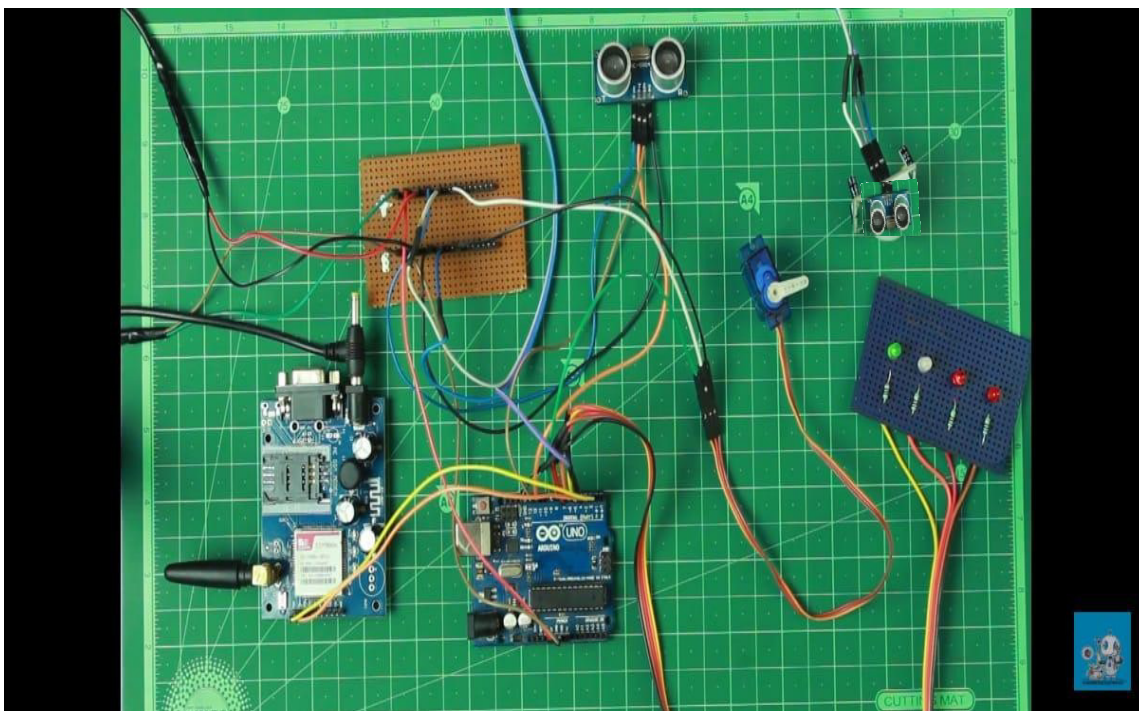
Above circuit diagram shows the arduino based smart dustbin. In this project we use the gsm module, arduino uno, led, ultrasonic sensor, and servo motor. We connect the gsm module's tx pin with arduino 2nd pin and rx pin with 3rd pin of arduino. Then we connect the ultrasonic sensor for distance measurement of garbage; we connect vcc and gnd pins of the ultrasonic sensor to the power supply and trigger pin to the 12th pin of arduino and echo pin to the 13th pin of arduino. Then we connect the 2nd ultrasonic sensor for opening the lid of the dustbin; we connect trigger in to the 10th pin of arduino and echo pin to the 11th pin of arduino. Then we connect the servo motor to the arduino; we connect vcc and gnd to the power supply and control pin to the 9th pin of arduino. Then 4 LEDs to detect the level; we connect common cathodes to the gnd pin and vcc pin to the digital pins of arduino to 5, 6, 7, 8 pins of arduino.

IV. WORKING

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 come 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. Then when the dustbin reaches to fill the led indicates the level of dustbin and ultrasonic sensor measures the level of dustbin. When dustbin is full fill then the arduino sends message through gsm i.e. DUSTBIN IS FULL message sent on mobile.

V. SIMULATION RESULTS

The dustbin is able to open the lid with the help of servo motor and PIR sensor whenever it detects motion. The ultrasonic sensor is giving the details about the waste present in the dustbin. The status of the waste is transferred to the municipal authority whenever it is exceeding the threshold value. And 2nd ultrasonic sensor detects the level of garbage filled in the dustbin whenever garbage is filled then the message sent to the registered mobile number.



VI. CONCLUSION AND FUTURE WORK

Here we are going to make an evolution changes toward cleanliness. The combination of intelligent waste monitoring and trash compaction technologies, smart dustbins are better and shoulders above traditional garbage dustbin. It is equipped with smart devices like sensor Arduino etc. Lid of the dustbin will automatically open when an object comes near to the dustbin and after certain time period it will close the lid. 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. Believe this will bring something changes in term of cleanliness as well technology. So our next work will be adding one more sensor which will sense whether our dustbin is full or not. And there will be a display will be added so that user can notify that dustbin is full or not.

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