SMART GARBAGE BINS

Activity Overview

Open Garbage is a home to several bacterial diseases. Inefficiency in emptying the garbage bins also leads to improper waste management.
Open Garbage causes several hazards like :

- Bacterial breeding– causing diseases among humans and animals
- Makes the cities filthy and dirty
- High odour emission from dumping sites

Timely collection of Garbage is not done because authorities cannot track if the Garbage bins are full or not. When garbage bins are full, people dump the waste voutside the bin making the city polluted.

In this activity we shall create a smart dustbin which shall notify the officials once the Garbage bin is full. Using Ultrasonic sensors and Genuino 101 we shall turn all garbage bins into Smart Bins.

SUBJECTS

Science Computing

TIME REQUIRED

2 Hours

AGE LEVEL

11 - 18 Years

What Shall We Learn?

- How to monitor the level of waste dumped in the Garbage bin
- How to use Ultrasonic sensors to detect level of waste in Garbage bins
- How to connect Genuino 101 with Ultrasonic sensors
- Controlling LED lights based on values of a sensor

Activity Objective

The problem is that the municipal officers do not know when the garbage bins are full and need to be emptied.
We shall design a Smart Garbage bin which shall notify them when the Garbage bins are full.

Components Needed

To design a Smart Garbage Bin we need the following components :

Genuino 101

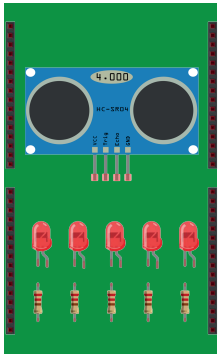
The brain of our device. It will receive data from the ultrasonic sensor and transmit the data to the Blynk mobile App.

Ultrasonic Sensor Shield

The Ultrasonic sensor shield is made up of an Ultrasonic sensor and 5 LED's which glows as per the volume of garbage in the bin. Ultrasonic sensor detects the depth of Garbage in the bin.

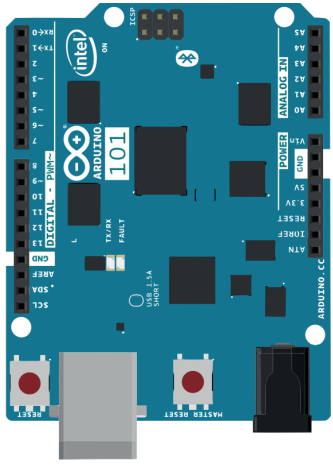
Power Supply

It provides energy to our controllers and sensors.



ULTRASONIC SHEILD

POWER SUPPLY

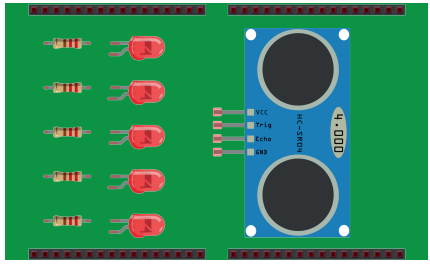


GENUINO 101

Understanding Sensors

We shall be using an Ultrasonic sensor to measure the depth of the Garbage bin and detect how empty it is. Ultrasonic sensors are defined as electronic devices that emit an acoustic wave and determine the distance between the sensor and an object based on the time it takes to send the signal and receive the echo.

So the sensor will send a sound wave to the bottom of garbage bin and detect the level based on the echo. If the garbage bin is full the echo would be low and it will alert to the Genuino about the level of waste in the garbage bin.

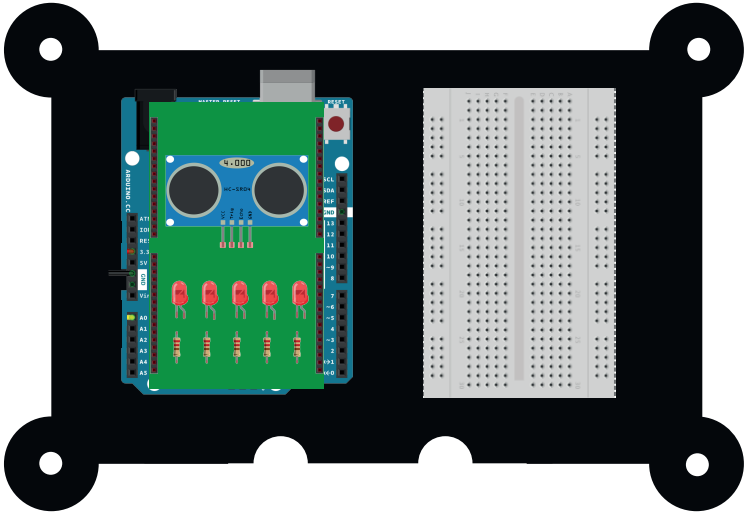


ULTRASONIC SENSOR

Connecting Your Sensors

We have all our components ready to be connected. Let us begin by connecting the Genuino 101 to the Ultrasonic sensor shield.

- Gently plug the Genuino 101 into the ultrasonic sensor shield.
- There are connectors which will perfectly fit your Genuino 101 into the shield.



TOP VIEW

After connecting the shield with the Genuino 101 we shall provide power using our laptop. Once the power is connected we shall begin with our programming.

Programming Your Sensors

Download and open the code from *bit.ly/SmartGarbageBin* and now you will have to upload the code on your Genuino 101 Click the upload button and once your code has been uploaded you have successfully programmed your device.

Yaay! You have successfully programmed your device.
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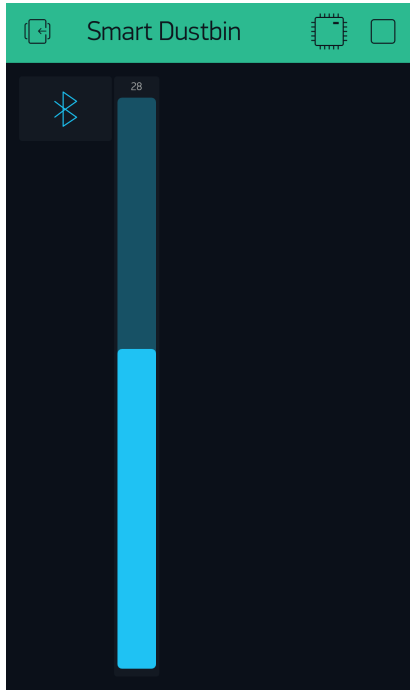
Upload Button
(Top Left)

Output

Let us try testing our device to see if it gives accurate results. After connecting the sensor in the garbage bin, try filling in the dustbin with a lot of waste papers. Once the dustbin is full. You will see all the LEDs lit up, which means the garbage bin is full.

We can also check the level of Garbage bin in the Blynk App. After scanning the QR code, we shall select our model from the list of devices. Once we select it the Blynk App will show how full our Garbage bin is, if it shows above 90% it means we have successfully created our Smart Garbagebin.

SCAN HERE



MAKE SURE THE BLUETOOTH OF YOUR MOBILE PHONE IS ON AT ALL TIMES

Model Creation

Before we begin with the model creation make sure you have:

- 4 Spacers
- 8 Screws
- Transparent acrylic board

We will now arrange all the components in a case and make it look cool and easy to put in the garbage bin.

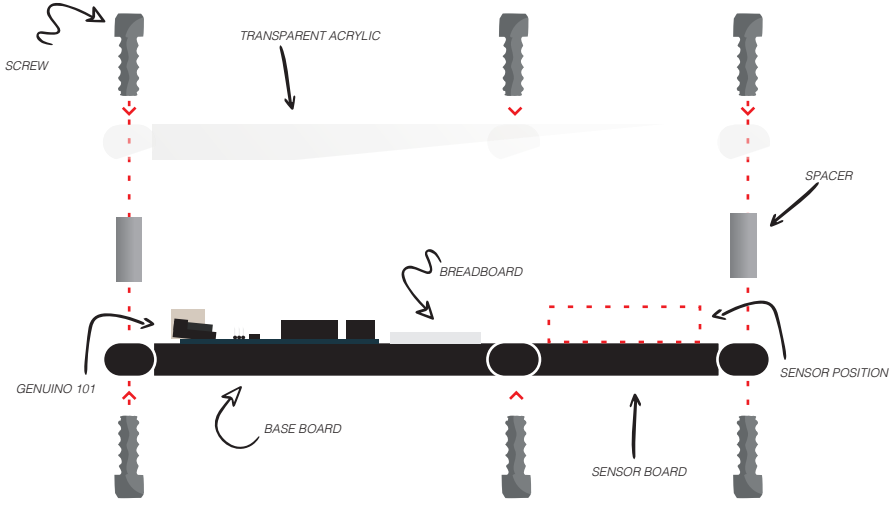
We will begin by connecting the Ultrasonic sensor module to the base module. The breadboard and Arduino 101 are on the base module while your ultrasonic sensor is on the shield.

Now insert the spacers on the cutouts which are given in the activity kit and tighten them using the screws provided to you.

We have our modules attached and spacers set up, now gently place the transparent acrylic board on the spacers and tighten it using the screw.

Once everything is ready, ensure all your screws are tightened and your modules are connected properly.

It should look something like this :



SIDE VIEW

Impact Analysis

Imagine if all the Garbage bins were turned into Smart Garbage Bins. The city would more clean and the citizens would lead a healthy life.

Future Scope

We can improve our Smart Garbage bin to be even more smarter and solve other complex problems :

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- We can integrate a PIR motion sensor in the Garbage bin so whenever a person comes near the garbage bin it opens up itself
- We can also use the data collected from Ultrasonic sensors to automate the Garbage Bins. So when the Garbage bin is full it automatically empties itself into a dumping pit which is usually below the bin.