Project:

Smart Garbage IoT

By:

Sagarika Santosh Choudhary

Submitted to:

Mr. Raghudathesh G P

GitHub:

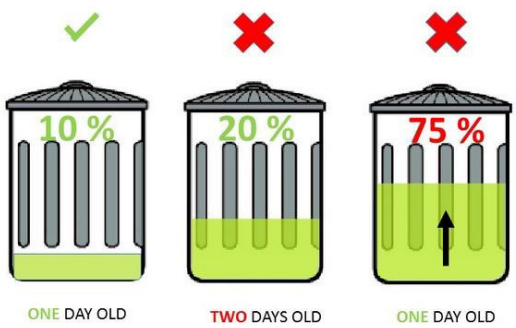
https://github.com/Sagarikac310/Smart-Garbage-IoT

The idea struck when I observed that the garbage truck use to go around the town to collect solid waste twice a day. Although this system was thorough it was very inefficient. For example let's say street A is a busy street and we see that the garbage fills up really fast whereas maybe street B even after two days the bin isn't even half full.

What the system does is it gives a real time indicator of the garbage level in a trashcan at any given time. Using that data we can then optimize waste collection routes and ultimately reduce fuel consumption. It also allows trash collectors to plan their daily/weekly pick up schedule.

COMPONENTS IN OUR SYSTEM

To start with you will first have to enter the height of the dustbin. This will help us generate the percentage of trash in the trashcan. We then have two criterias which needs to be satisfied to show that the particular bin needs to be emptied :



1. The amount of trash, in other words let's say if your bin is half full you don't really need to empty it. Our thresh, or maximum amount that we permit of trash, is 75% of the bin. (You could alter the thresh according to your preference.)

With these criterias in mind let's understand the technical part:

- An ultrasonic sensor (A.K.A a distance sensor) will be placed on the interior side of the lid, the one facing the solid waste.
- Arduino
- A LED to know the state.

MATERIALS NEEDED

HARDWARE:

- 2 x AA Batteries - these batteries will power the Arduino board
- Plastic Container
- Battery Holder Case
- Ultrasonic Sensor An ultrasonic sensor measures distance. Our system's key component.
- Jumper Wires
- Arduino
- LED lights

TOOLS:

- Electric Drill
- Hot Glue Gun

SOFTWARE:

- Arduino IDE

SET UP

(1) Constructing the Model

Look for an old small plastic container and make sure your components fit. Now remove the lid and trace the two "eyes" of the ultrasonic sensor. this will be the side facing the bottom of the bin. Take your drill bitand drill out the holes. If they still are a bit small lightly file them till the ultrasonic sensor snugly fits in, completely flush to the surface.

(2) Attaching the ULTRASONIC SENSOR

Push in the sensor and apply dabs of hot glue to secure it in place. Then make a slot for your switch and fit everything into place.

(3) Installing Drivers and Libraries Necessary

(4) THE CIRCUIT

Once you've installed the libraries and drivers, connect the ultrasonic sensor to the arduino.

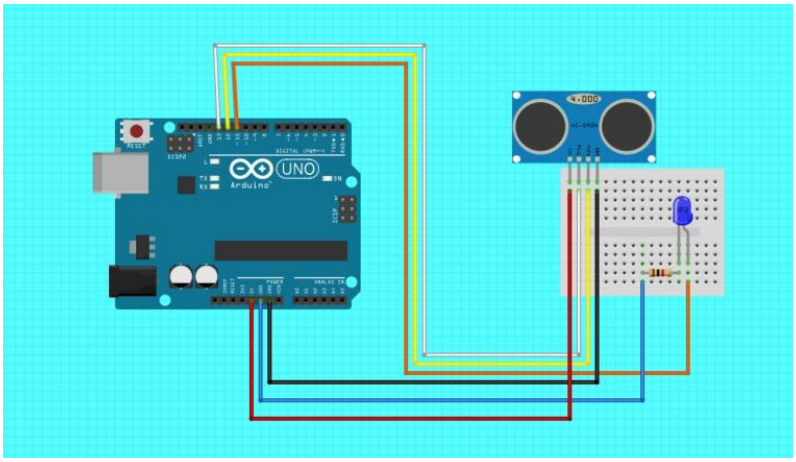
- **vcc** on sensor goes to **5v** on arduino
- **gnd** on sensor goes to **gnd** on arduino
- **trig** of sensor goes to **pin 6** of arduino
- **echo** of sensor goes to **pin 7** of arduino

(5) SETTING UP THE CODE

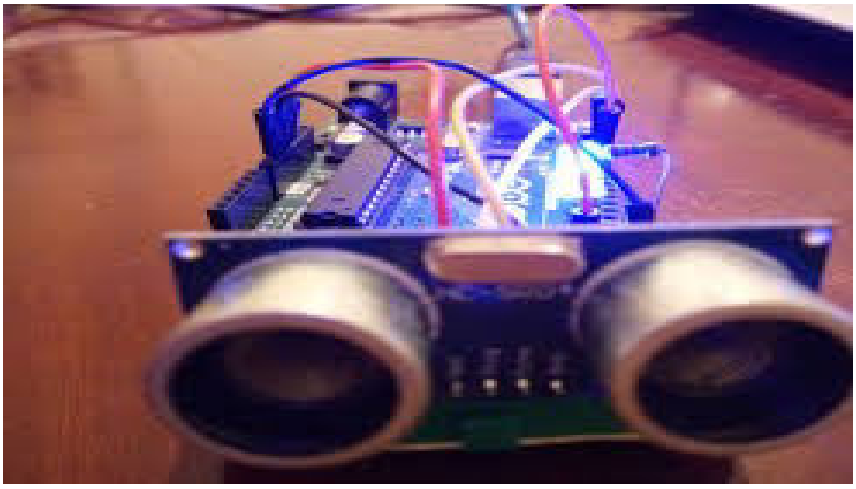
The program lights the LEDs up according to how close something is to the sensor.

WORKING PROJECT

When the set-up has been completed, and the ultrasonic sensor is connected to the bin under observation, it begins to radiate ultrasonic waves. We set a pre-defined height at which the bin is full. Continuous observation of the bin is done by the sensor. If the garbage accumulated in the bin crosses the pre-defined limit, the LED lights up, indicating the requirement to empty the bin.



(Circuit Set-up)



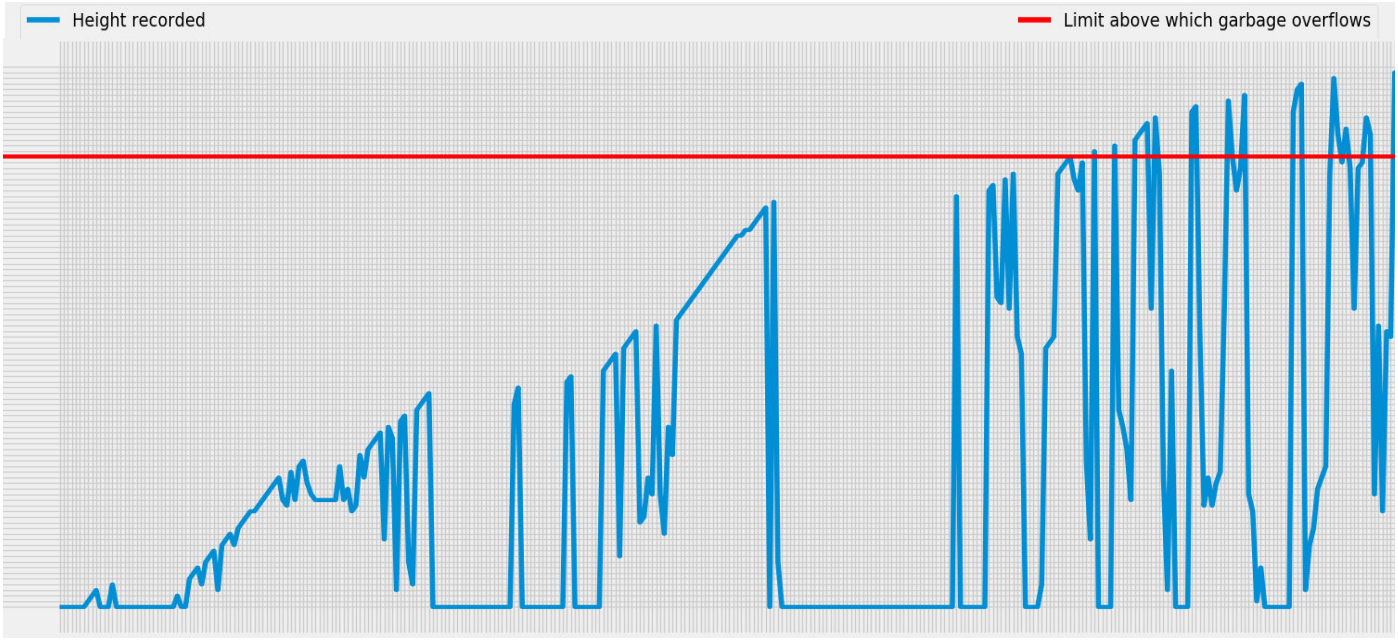
(LED litting up when threshold is crossed)

	A
1	Field 1
2	74 cm
3	40 cm
4	72 cm
5	59 cm
6	0 cm
7	40 cm
8	38 cm
9	39 cm
10	45 cm
11	59 cm
12	65 cm
13	66 cm
14	71 cm
15	72 cm
16	82 cm
17	81 cm
18	83 cm
19	82 cm
20	90 cm
21	92 cm
22	93 cm
23	94 cm
24	94 cm
25	98 cm
26	100 cm
27	101 cm
28	95 cm
29	96 cm
30	97 cm
31	100 cm
32	98 cm
33	109 cm
34	100 cm
35	99 cm
36	102 cm
37	96 cm
38	101 cm
39	100 cm
40	100 cm
41	100 cm
42	100 cm
43	100 cm
44	100 cm
45	99 cm
46	100 cm
47	95 cm
48	94 cm

testfile

Sheet 1 of 1 | Default

(Data of height being stored)



(Graph plotted)

CHALLENGES

That said there are a few complications that we thought would occur if we took this product on a big scale.

• Ensuring the Ultrasonic distance sensor are correctly placed. If the pile of dump increased in the middle the sensor could be giving misleading data.

• There could be liquid/water thrown in to the bin. The design needs to have water proof electronics and embedded software.

• The BIGGEST issue availability of 3G/4G Cellular networks(if real-time data were to be monitored).

FUTURE SCOPE

The ultimate goal of IoT applications in waste management is producing leaner operations and delivering higher quality services to citizens. A growing collection of interlinked autonomous systems are managing everyday urban operations and improving both citizen experiences and our carbon footprint.

This project can be connected to the google map navigation system, and be provided to municipal coorporation garbage collectors. They will come to collect the trash from the garbage bins only when the the bin is overful, saving a lot of time and fuel as well, all while making the process faster and more efficient.

(Help Source:https://www.instructables.com/id/Smart-Garbage-Monitoring-System-Using-Internet-of-/)