

SMART DUSTBIN USING IoT

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Abstract: Smart Dustbin is designed by combining the knowledge of internet of things, sensors and electronics. The dustbin is made with low cost approach. Each dustbin is attached with ultrasonic sensors at the top. A distance is fixed in the sensor. After the garbage reaches or crosses that level, it sends intimation to the Arduino which in turn sends the signal to GSM module. GSM module intimates by sending a message to the registered sim within it (Driver's). So the driver can go and collect the garbage. Another reason for this project is that one cannot check the amount of garbage in the dustbins manually, as there are plenty of dustbins and requires real time monitoring for proper efficiency. It also reduces the operation cost because garbage collection vans goes daily and many time it comes empty handed, however by using this project it will go when the dustbin is actually filled.

INDEX TERMS: Trash Bin, Arduino, GSM 900A module, Ultrasonic Sensor.

I.INTRODUCTION

Smart Dustbin is the application of sensors and electronics with a subtle touch of internet of things known as one of most populated country, the major problem in our country can be quoted as the solid waste management. In a scenario like this, maintaining "Swatch Bharath" or clean India is a strenuous task. Not only the population

but also the waste around is increasing. Around the world there are countries and methods which are proven affective to achieve cleanliness. Technology has lead many effective changes in other fields, but we still see the manual method in the field of checking waste disposal. This project brings the required change in the solid waste management..

2. LITERATURE REVIEW

Existing System:

The current system of solid waste disposal is manual. Garbage from the dustbin is removed irregularly. This leads to accumulation of immense amount of garbage. Just as the intervals of collecting garbage are irregular, so be the heap of garbage. As the delay continues, there will be raise in the number of pathogenic organisms which is a threat to the public. This problem arises due to the uncertainty in figure of days required. There are systems similar to the proposed system but they are not effectively implemented as they are expensive. During our literature survey we had come across various smart dustbin projects where different authors have explained in different ways about their implementation.

- Dhaval Patel in the year 2019 they introduced the system which provide greater approach to the garbage disposing points. Model is efficient in terms of fuel and time cost. Provide data gather solution which shows that how much a place generates garbage and appropriately plan disposing process and identification of wet and dry garbage in dustbin.
- Al Mamun Smart in the year 2010 introduced waste bin using WSNs to collect waste bin status and communicate waste bin information wirelessly the admin. They created a system where they receive the status of the dustbin and they created web-based application that is developed to monitor the waste bin status and collection activity.
- Manikandhan introduced a smart dust bin using the LoRa technology.

They modeled smart dustbin which receives the information will move to the place of that bin for replacement. The garbagebin can communicate with other garbagebin. Garbagebin can be controlled using LoRa technology and wide range of functions can be performed including braking by detecting the distance perfectly. The smart dustbin is a carefully modeled solution that has solution of the social issues of wastes disposal.

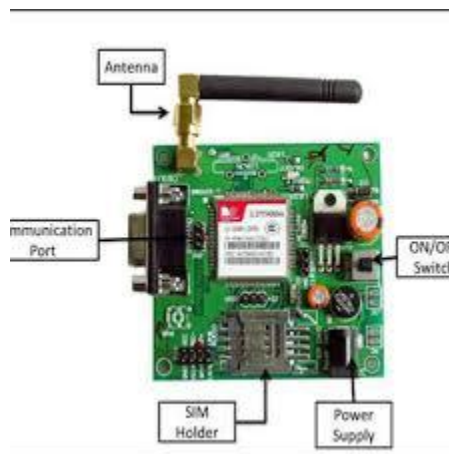
- Ujwala Ravale introduced the Monitoring solid waste management. That will help to provide a better standard of living for people. Then waste generated can be forwarded to recycling location and biodegradation location according to the type of waste. The main object of model is to stop the dustbin overflowing around the road side and localities as smart bins are used in real time.
- Uttkarsh kumar in the year 2019 introduced application on the Smart Dust bin using gps tracking project involves less effort while automating the waste disposal by hardware and application. The hardware detects the level of garbage and the application sends the notification of garbage retrieval. They designed a project saves effort of garbage collectors by saving their time and cost of fuel of the vehicle. The provided a proper disposal method of garbage, eliminating the dustbin getting completely filled and Garbage spilling out

PROPOSED SYSTEM:

3. SYSTEM DESIGN

A Bluetooth is used in transmitter section for communication purposes. Bluetooth is a wireless technology system that is used with remote control system and sensor applications. But, the main disadvantage of

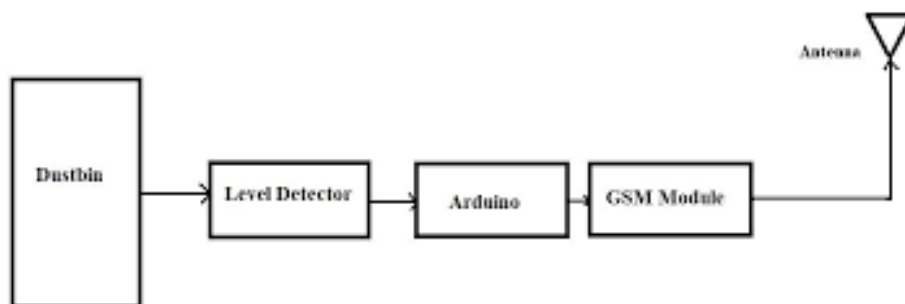
Bluetooth is short range, low complexity, and low data speed. So, to overcome these disadvantages, GSM modem is used. A GSM modem is a special type wireless modem that works with a GSM wireless network. It uses a SIM card and operates just as a mobile phone.



GSM

In the transmitter section, the level detector consists of ultrasonic sensors which are used to detect the level of garbage in the dustbin. When the dustbin is being filled to the highest level, the distance between the sensor and garbage is displayed. Based on

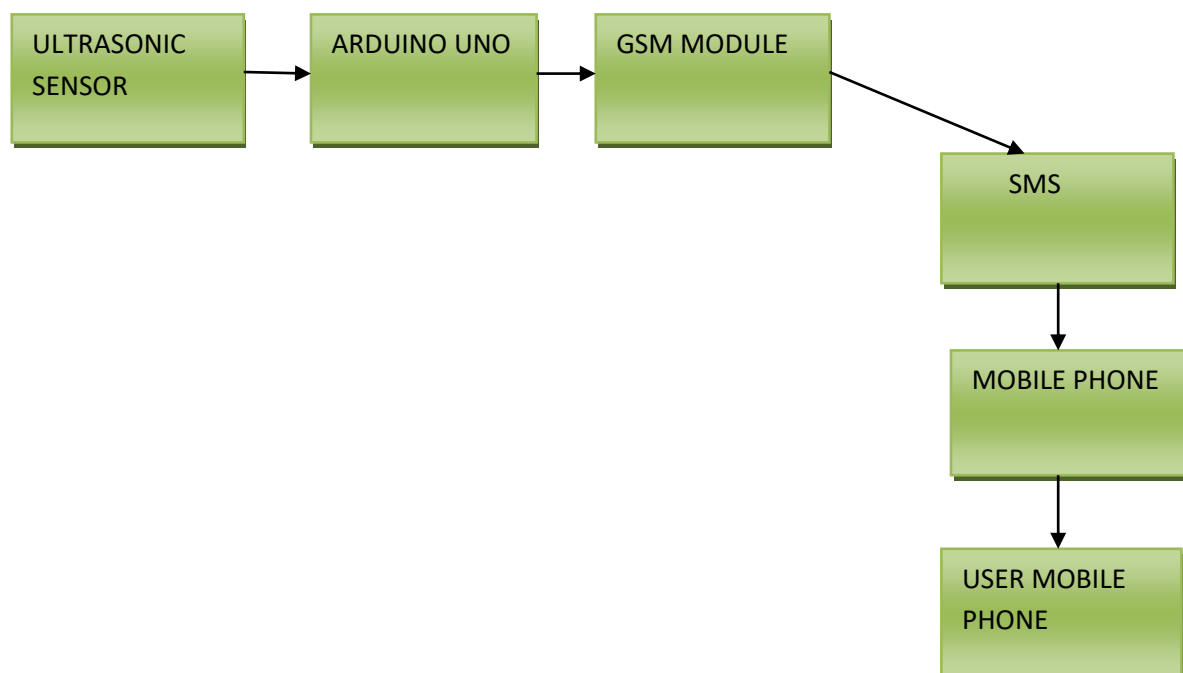
the continuous data sent by the sensors, after the bin reaches threshold value, arduino sends a signal to the GSM module. Then a pre-written message is sent to the mobile number of the sim which is present in GSM module.

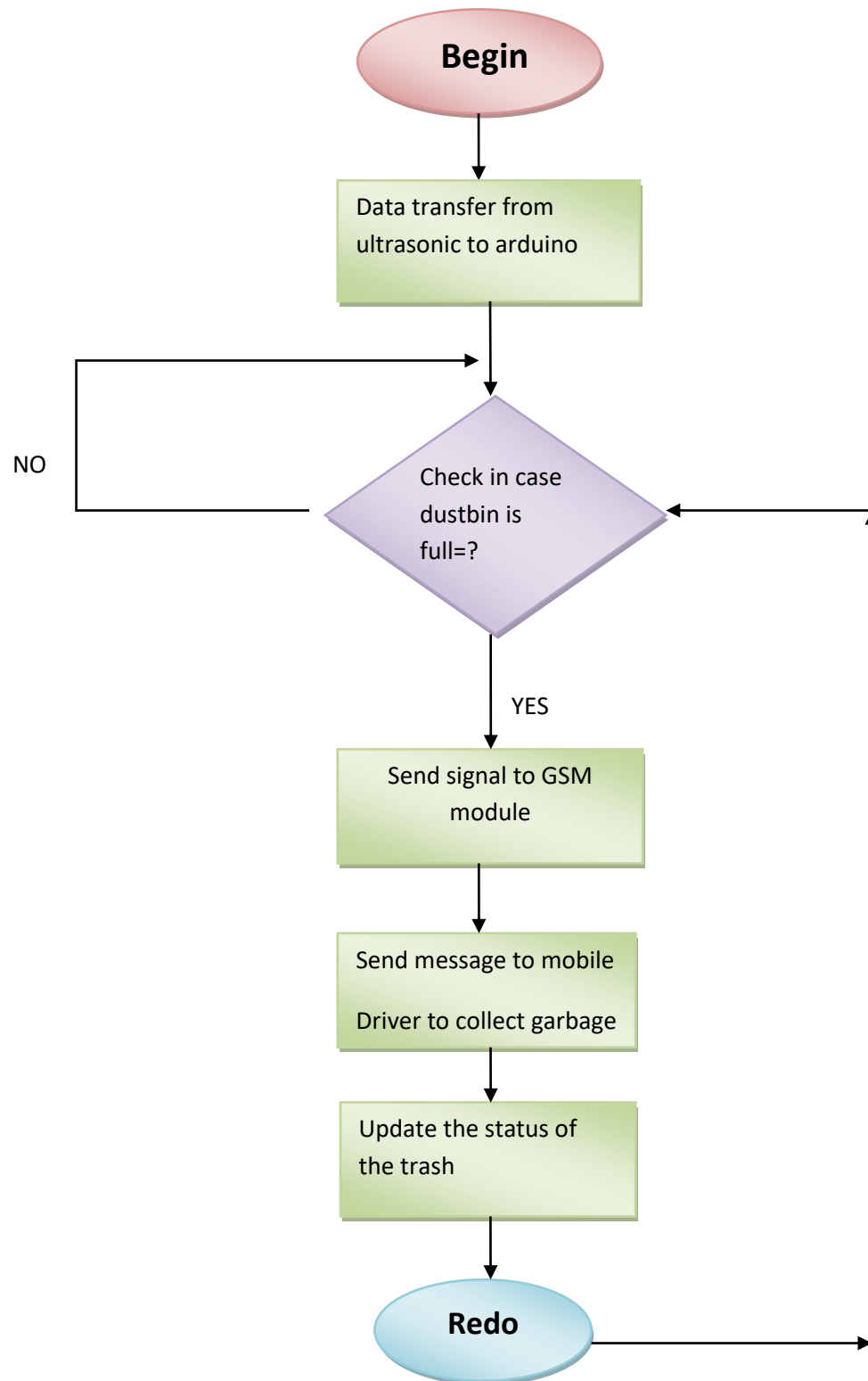


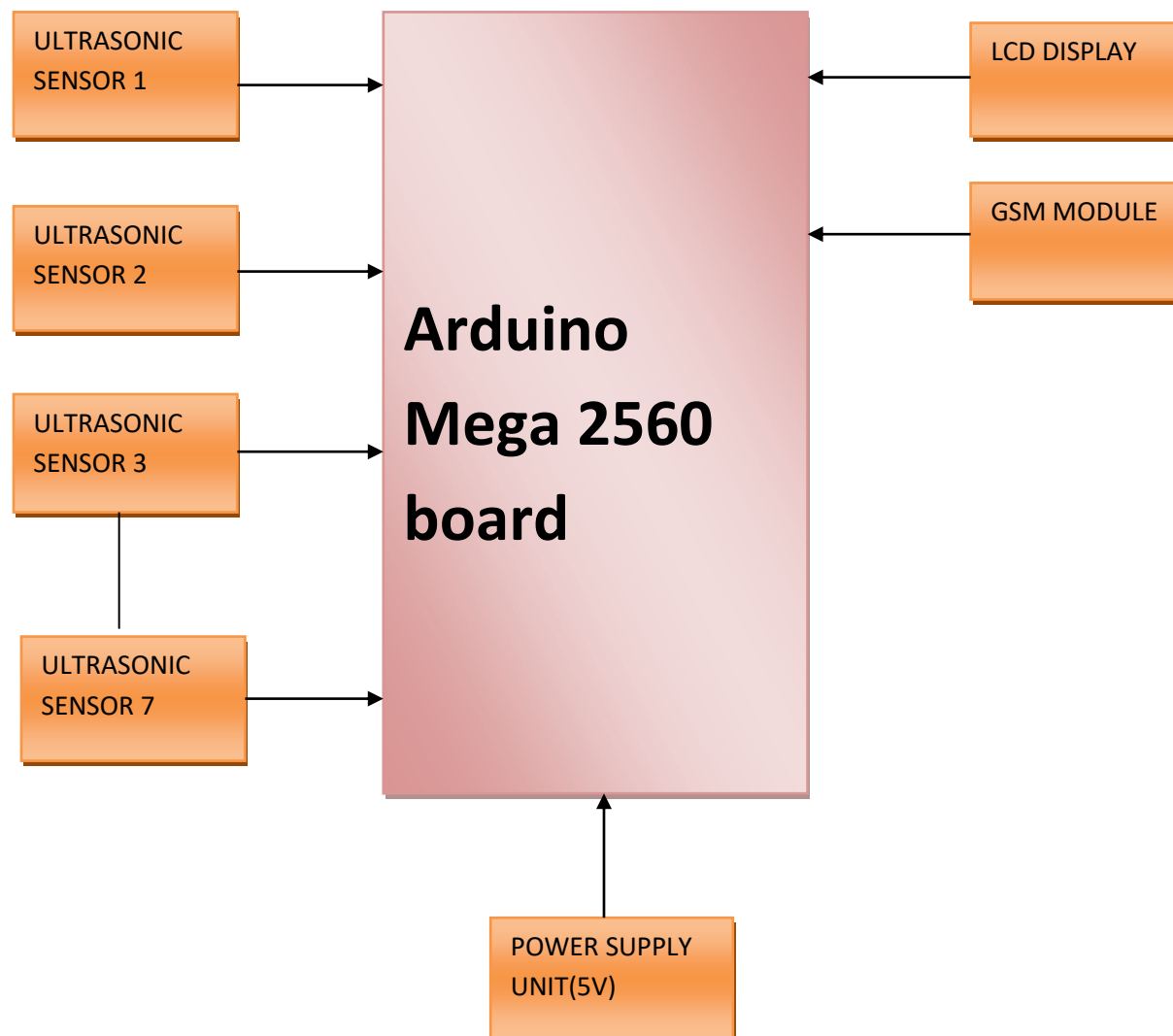
The figure below depicts the block diagram of receiver section. The mobile number of the sim placed in the GSM module belongs to a driver who is held accountable for that particular dustbin. When the garbage in the

bin reaches the set maximum value, the total process in the transmission section takes place rapidly. As soon as driver receives the message, he should rush to bin to collect the garbage

FLOWDIAGRAM:



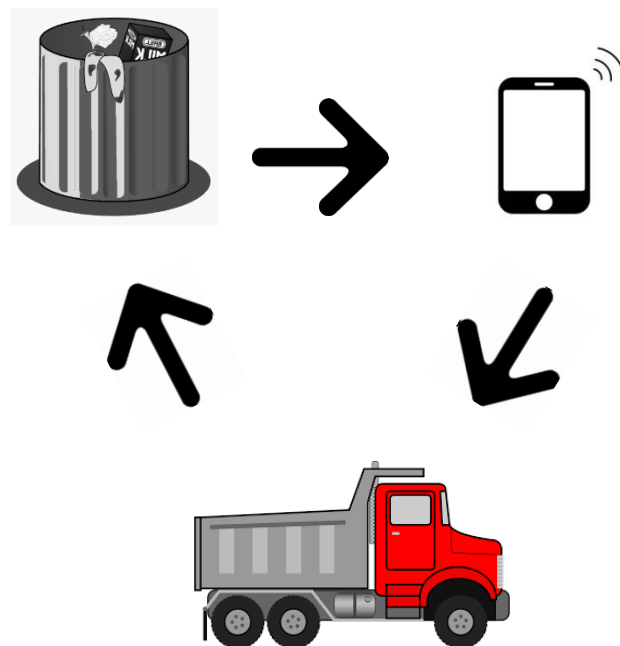
WORKING PRINCIPLE:

BLOCK DIAGRAM FOR GARBAGE MONITERING UNIT SYSTEM

4. METHODOLOGY AND WORKING

This method is proposed to achieve "Swatch Bharat". Ultrasonic sensor is used to sense

the level of garbage and as it reaches alarming level a message is sent to concerned employees.

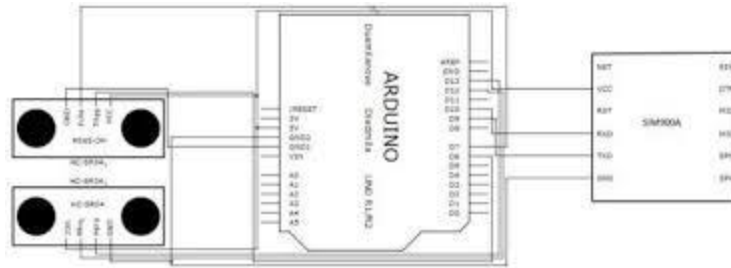


5. CIRCUIT DIAGRAM

The circuit diagram shows the Smart Dustbin. It consists of components as in the hardware table. The Arduino is used as a controller. The ultrasonic sensor detects the level of garbage.

Circuit Diagram works as follows:

When the level is detected by ultrasonic sensor, it sends non-interrupting signals to arduino. As the arduino receives the signal of threshold value, it activates the GSM Module. As the GSM Module is activated, GSM(SIM900A) sends a text message to the concerned employee. Then, the employee is sent to empty the bin. This whole process repeats indefinitely.



6 PROCESS HOWTO BUILD SYSTEM

A. Connecting Ultrasonic sensors and Arduino:

Ultrasonic sensors are used to detect the height of garbage by calculating the distance between garbage and sensor. As, the sensor is attached to the top side of the bin, the distance gradually decreases as the garbage increases. This data of distance is sent as an input to arduino. The distance between sensor and garbage is calculated by the formula:

$$\text{Speed} = \text{Distance} / \text{Time}$$

Here, Speed is always has a constant value of 340 m/s as this is speed of ultrasonic signal. The Arduino and sensors are connected using connecting wires.

B. Connecting Arduino and GSM Module:

GSM SIM900A is the type of GSM used. The GSM uses the AT commands to send a text message to concerned employee who is responsible to collect garbage. Generally 2G or 3G sim cards are preferred.

C. The Final Process

The sensor is connected to arduino which is connected to GSM module. Both the sensor and GSM Module are connected to both ends of arduino. This whole setup works as shown in the circuit. This whole set up is placed on the bottom side of the dustbin lid. The circuit is to be placed in a garbage-proof box to ensure smooth running of the project.

7.EXPECTED OUTPUT:

Threshold value=180cm

S.No	ULTRASONIC SENSOR READING	DATA SENT TO ARDUINO	COMPARISION WITH THRESHOLD	SIGNAL SENT TO GSM(yes/no)	GSM RESPONSE	MESSAGE TO DRIVER
1	120cm	120cm	< (Less than)	No	-	-
2	95cm	95cm	< (Less than)	No	-	-
3	180cm	180cm	= (Equal)	Yes	Activation Of message	Bin is full
4	190cm	190cm	>(Greaterthan)	Yes	Activation Of message	Bin is full
5	10cm	10cm	< (Less than)	No	-	-
6	193cm	183cm	>(Greaterthan)	Yes	Activation Of message	Bin is full
7	189cm	189cm	>(Greaterthan)	Yes	Activation Of message	Bin is full
8	90cm	90cm	< (Less than)	No	-	-
9	200cm	200cm	>(Greaterthan)	Yes	Activation Of message	Bin is full
10	43cm	43cm	<(Less than)	No	-	-

7. CONCLUSION

The proposed model ensures that solid waste management is done in an effective manner. The true potential of this project lies in the fact that this project allows real time monitoring of the garbage disposal. It helps in felicitous removal of garbage from the bins and forbids the development of pathogens. The usage of advanced controller in the form of arduino along with GSM enabled system enhances the potency of garbage disposal system. Thus, the Smart Dustbin can play a major role in accomplishing clean and tidy environment and resulting in "Swatch Bharath"

IX. REFERENCES

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