

IoT based smart waste management for smart city

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ABSTRACT

Waste management is one of the primary problem that the world faces irrespective of the case of developed or developing country. The key issue in the waste management is that the garbage bin at public places gets overflowed well in advance before the commencement of the next cleaning process. It leads to various hazards such as bad odour & ugliness to that place which may cause for spread of various diseases. To avoid all such hazardous scenario and maintain public cleanliness and health our project is mounted on a smart garbage system. This system proposes a smart alert system for garbage clearance by giving an alert signal to the municipal web server for instant cleaning of dustbin with proper verification based on level of garbage filling. The ultrasonic sensor measures the level of the garbage inside the dustbin. The Gas sensor senses the unwanted or bad smell from the dustbin. The Measured information is updated in the server page using the IoT. If the value of the sensor crosses the threshold value, the alarm will get ON. The wet in object will create the bad smell, so here the moisture sensor is used to find it. The automatic open and closing of the garbage is done by means of an IR sensor, if it finds any person in front of garbage bin. If any person comes to put the garbage, the garbage bin will open automatically. Also, the metal detector is used for the segregation. If the metallic object is sensed, then DC motor will gets ON and rotate the pan to the one side of the dustbin. If the non-metallic object is sensed, the DC motor gets ON and rotates the pan to the other side of the bin.

Keyword:-Dustbin, waste segregation, IoT,

1. INTRODUCTION

Waste management is one of the primary problem that the world faces. The key issue in the waste management is that the garbage bin at public places gets overflowed. It leads to various hazards such as bad odour & ugliness to that place which may cause for spread of various diseases. To avoid all such hazardous scenario and maintain public cleanliness and health the following system is used. With the ever-growing Internet of Things, every object can now be uniquely identified and made to communicate with each other. This approach has been applied to dustbins too, to monitor garbage collection.

2. EXISTING SYSTEM

In the existing system garbage is collected by corporation by weekly once or by 2 days once. Though the garbage shrinks and overflows the garbage bin and spread over the roads and pollutes the environment. The smell will be heavy and produces air pollution and spreads disease. The street dogs and animals eat the waste food and spreads it over the area and creates dirty environment. Now a day, many times it is found that the garbage bins or dust bins are placed at public places in the cities are overflowing due to increase in the waste every day.

It creates unhygienic condition for the people and creates bad smell around the surroundings this leads in spreading some deadly diseases and human illness; to avoid such situation it is planned to design—IOT based waste management for smart cities. In this proposed system there are multiple dustbins located through the city or the campus, these dustbins are provided with low cost embedded device which helps in tracking the level of the garbage bins and an unique ID. It will be provided for every dustbin in the city so that it is easy to identify which garbage bin is fill. When the level reaches the threshold limit, the device will transmit the level along with the unique ID provided. These details can be accessed by the concern authorities from their place with the help of internet and an immediate action can be made to clean the dustbins.

3. PROPOSED SYSTEM

Here, in this system different types of sensors are used to monitor the dustbin. The Measured information is updated in the server page using the IoT. The ultrasonic sensors measure the level of the garbage inside the dustbin. The Gas sensor sense the unwanted or bad smell from the dustbin. The Moisture sensor sense the moisture level inside the dustbin. If the value of the sensor crosses the threshold value, the controller sends the alert to the control room. Here metallic detector is used for the segregation. If the Metal detector sense, then motor will get ON and the waste gets on to the metallic waste side and if it is non metallic waste the waste are put on to the other side.

3.1 Block diagram description

The main components used in the system are Ultrasonic sensor, IR sensor, Moisture sensor, Gas sensor, Metal detector. All the sensors are connected to the arduino microcontroller and the information is got by means of an IOT and the informations are updated in the webpage. Ultrasonic sensor is used to detect the level of the garbage in the dustbin ,if the threshold level is reached the indication is send to an alert unit. IR sensor is used for the automatic open and close of the dustbin and also for sensing the object in the pan.

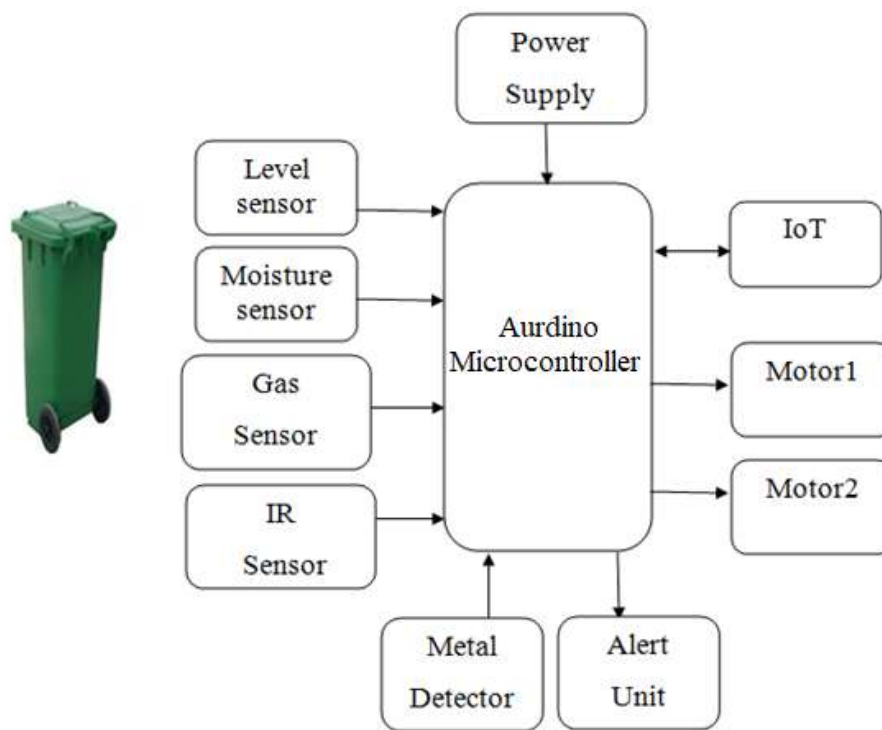


Fig -1 Block Diagram of the waste managemet (Trash Box Section)



Fig-2 Server Section

The automatic open and closing of the lid is controlled by a DC motor. Moisture sensor is used to detect the water content in the garbage, it is placed in the non-metallic side of the dustbin. Gas sensor is used to detect the toxic gases, odours which is generated by the wastes in the dustbin, if the toxic gases are identified, the information is sent to an alert unit immediately. This sensor is mainly used for controlling the diseases spreading across.

The main key is to segregate the metallic and non-metallic wastes by using the Metal detector. The pan is placed in the centre splitting of the dustbin. The pan is rotated by means of an DC motor. If the metal waste is detected the pan is rotated into a clockwise direction. If the non-metal wastes is detected the pan is rotated into an anti-clockwise direction respectively and puts the waste in the respective places.

3.2 Results and Analyses



Fig-3 Outer view of Smart Dustbin



Fig-4 Inner view of Smart Dustbin



Fig-5 Hardware connections

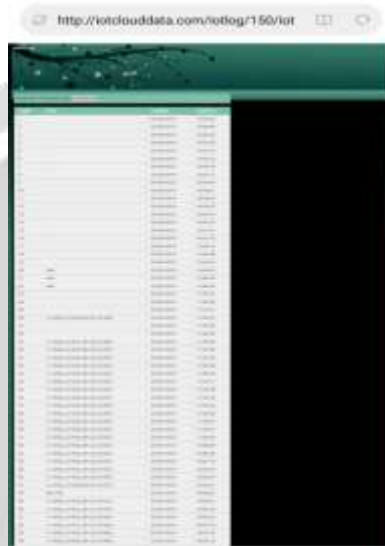


Fig-6 Information updated in the webpage

4. CONCLUSIONS

The overall conclusion is that by using this system monitoring of the garbage and segregation of the waste into metallic and nonmetallic waste is done. An integrated system of Wi-Fi modem, IOT, Sensor is introduced for efficient and economic garbage collection. The developed system provides improved database for garbage collection time and waste amount at each location. It is analysed that the solutions currently available for the implementation of IOT. IOT based garbage monitoring system is a very innovative system which will help to keep the cities clean.

Future Scope:

With the ongoing changes in the current technology the inlet section can be provided with crusher mechanism. The segregation levels can be further classified and recycled. The proposed system works in real-time by providing ID numbers to the dustbins. Solar power can be attached for power supply.

5. REFERENCES

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