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Smart Waste Management

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Abstract

Waste is an important issue, which needs to be tackled smartly. The main purpose of this paper is to develop the system which uses the information collected from sensors to manage the waste collection. In proposed system, Smart waste Dustbins are located in several areas of city are connected to Internet wirelessly, they equipped with sensors which collects the data about level of collected waste in Smart waste Dustbin. Then Smart waste Dustbin sends this information to central web portal using WIFI module. If the Smart waste Dustbin is filled up to its threshold value then the message is displayed on web portal and the responsible authority take proper action and it will shows the all information on to the Smart waste Dustbin Application on the users mobile phone.

Keywords: *Smart Dustbin, IOT, Ultrasonic Sensors, Arduino UNO Board.*

INTRODUCTION

Waste management is one of the major environmental problems of Indian cities. The problem is over flowing of wastage on the roads. This, in turn, leads to various hazards such as bad odor &ugliness to that place which may be the root cause for the spread of various diseases. Several efforts have been invested in tackling.

As we have seen number of times the dustbins get overflowed and the concerned people don't get the information within a time and due to which filthy condition formed around the surroundings, at the same time bad smell spread out due to waste, bad look of the city which paves the way for air pollution and to some harmful diseases around the locality which is easily spread able. It creates unhygienic condition for the people and creates bad

ugliness around the surroundings. This leads in spreading some deadly diseases & human illness, to avoid such a situation we are planning to design Solid Waste Management using Smart Bin. This will help to provide a better standard of living for people. The main aim of this application is to reduce human resources and efforts along with the enhancements of a smart city vision. At regular intervals dustbin will be squashed.

Once these smart bins are implemented on a large scale, by replacing our traditional bins present today, waste can be managed efficiently as it avoids unnecessary lumping of wastes on roadside. The system will consist of setting up smart waste bins/ trash cans per society, which will be IOT enabled. It will measures the fullness of the dustbins and updates the status of each dustbin on the municipal server. It notifies them when the dustbin is full and provides the shortest route to empty all the dustbins based on the capacity of the municipal waste loading vehicles.

The major advantage of this proposed system is it will stop the dustbin overflowing around the road side and localities as smart bins are used in real time. It emphasizes on “Digital India”. ***(See Figure:-1)***

OBJECTIVES AND SCOPE OF THE STUDY

Waste is an important issue, which needs to be tackled smartly. We got inspired from “Swatch Bharat Abhiyan” which is a national campaign by the Government of India, to clean the streets, roads and infrastructure of the country.

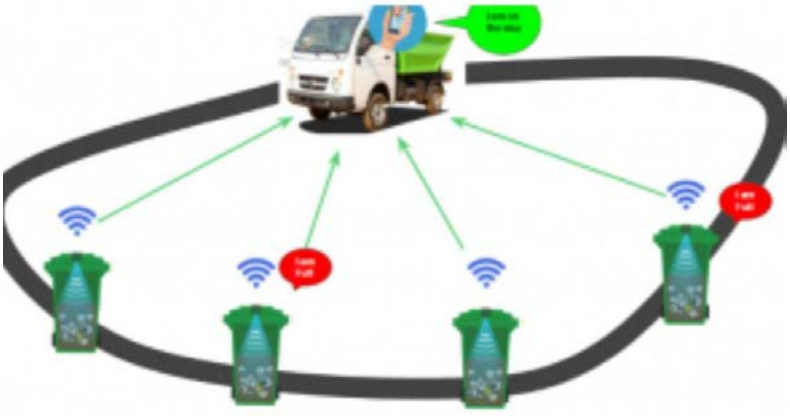

Fig. 1: Smart Waste Management

The major objective of this proposed system is to stop the dustbin overflowing around the road side and localities as smart bins are used in real time. This can create the surrounding area a neat and clean while eliminating the overflow of the wastage outside the dustbin due to regular cleaning of the dustbin. Our objectives for this project are as follows:

- Sensor based smart waste dustbin will judge the level of waste in it and send the message directly to the municipal corporation.

- According to the filled level of the smart waste dustbin, the vehicles from the municipal corporation will choose the shortest path which will save their time.

- It emphasizes on "Digital India" as well as "Swatch Bharat Abhiyan".

- The system is simple. If there is any problem with any equipment in the future, that part is easily replaceable with new one without any difficulty and delay

Discussing about the future scope in this project we can develop it as follows:

- In future, some additional features will add to this project to crush and recycling plastics and other materials automatically.

- We can develop the smart dustbin which will automatically separate trash into solid waste and liquid waste.

- For future, instead of person in the vehicle we can make use of a line follower robot which does not require a man power to move the vehicle.

- This path follower robot is able to follow line marked on contrasting background usually black line on a white surface or white line on a black surface.

METHODOLOGY

In proposed system, Smart waste Dustbins are located in several areas of city are connected to Internet wirelessly, they equipped with ultra-sonic sensors which collects the data about level of collected waste in Smart waste Dustbin. Then Smart waste Dustbin sends this information to central web portal using WIFI module. If the Smart waste Dustbin is filled up to its threshold value then the message is

displayed and the responsible authorities take proper action.

The main hardware requirements for this project are:

1. Arduino UNO Board
2. Ultra-sonic Sensors
3. Jumper wires

The sensors will be located on the dustbins to collect the information about the filled status of the dustbins. Ultra-sonic sensors will transmit the waves in the dustbin and receiving the reflected waves if the dustbin is almost full. The distance will be calculated and if it is near the goal then the alert message will be sent to the respective authority to clean the dustbin as earlier as possible. This will help to stop the overflowing of the garbage near the dustbin. The heart of the system will be an Arduino UNO board which will be responsible for all the action and performance of the system from receiving to transmitting the alert.

Modules of the project are:

Smart bin module

- Level detector consists of infrared sensor which is used to detect the level of the garbage in the smart waste dustbin.
- The output of level detector is given to Arduino.
- When the smart waste dustbin is filled up to the highest level, the output of infrared sensor receiver becomes active low.

IOT Module

This output is given to Arduino to send the message to the admin module via IOT module.

Admin module

- Admin module is present where all the activities are manage.
- Scheduling
- Routing
- Update status
- Send Notification

Driver module

• Receive notification
• Clean bin
• Send notification

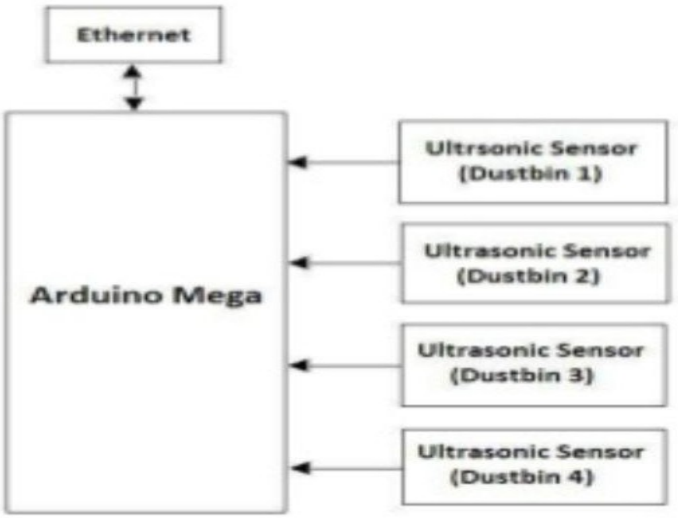

Fig. 2: Block Diagram

ADVANTAGES

- Main advantage of this system is that it will stop the overflowing of garbage near the dustbin by sending alert before it gets full.
- It will decrease the irresponsibility of the cleaning department of not cleaning the local dustbins regularly.
- It will help to decrease the pollution and disease which will be spread if there will if Overflowing of garbage on the roads.
- Helps to make our India to be a clean country following the path of Swatch Bharat Campaign and Digital India concept.

DISADVANTAGES

- We cannot say it as a disadvantage but the Arduino and the sensors should always be ON for better working.
- Very less but use of electricity to keep it always on.

APPLICATION

- Empowered „Swatch Bharat Mission".
- E-governance based on digital India.
- Reduce environmental pollution.
- Real time based cleaning of our cities
- It makes our system transparent between Municipal Corporation, workers and public

CONCLUSIONS

This proposed approach can be used to keep our city clean. We started from smart waste Dustbin. By using network environment, the real time accurate data from the implemented system could be used for the efficient solid waste management system. The system can collect accurate data on real time which can be used further as an input to a management system. With load cell calibration approach, it simplifies the calibration process so it can be attached to commonly used waste-bin without changed or modification.The level sensors also can be attached to common waste-bin. So the prototype is suitable for using in conventional waste management infrastructure helping a cost effective project for the betterment of our world.

REFERENCES

I. P. Haribabu, Sankit R. Kassa, J. Nagaraju, R. Karthik, N. Shirisha, M. Anila, "Implementationof a Smart Waste Management system using IOT", IEEE Proceedings of the InternationalConference on Intelligent Sustainable Systems, 2017.

II. Ujwala Ravale, Anindita Khade, Namrata Patel, Suvarna Chaure, "SMART TRASH: AnEfficient Way for Monitoring Solid Waste Management", IEEE International Conference onCurrent Trends in Computer, Electrical, Electronics and Communication, 2017.

III. Saurabh Dugdhe1, Pooja Shelar, Sajuli Jire, Anuja Apte, "Efficient Waste Collection System",IEEE International Conference on Internet of Things and Applications, 2016.

IV. Sahil Mirchandani, Sagar Wadhwa, Preeti Wadhwa, Richard Joseph, "IOT EnabledDustbins", IEEE International Conference on Big Data, IoT and Data Science, 2017

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