21ST CENTURY BIN: THE DESIGN AND IMPLEMENTATION OF SMART TRASH BIN

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Abstract: The govt. of India has recently launched a smart city project and for these smart cities to be smarter it is necessary that the garbage collection system has to be smarter and in addition to that the people need easy accessibility to the garbage disposing points and garbage collection process has to be efficient in terms of time and fuel cost. Urbanization has increased tremendously. Waste management has been a crucial issue to be considered. This paper is a way to achieve this good cause.

I. INTRODUCTION

Most of the urban cities and town in India are not well designed to facilitate the proper garbage disposing collection mechanism. Also the cities are expanding rapidly putting the pressure on existing infrastructure which is not expanding at the same pace that of urbanization. As the govt. of India has launched smart city projects to utilize the IT enabled solution so there is an implicit need to make the city cleaner. Our proposed system provides an IT based solution to garbage collection providing greater accessibility, planning appropriately for disposing processes and at the same time enabling collection of garbage generation data.

Our proposed system solver three related problems:

- Greater access to garbage disposing points.
- Efficient in terms of time and fuel cost.
- Provide a data collection facility on how much a city generates garbage and accordingly plan disposing processes.

WASTE MANAGEMENT

In This modern together with super advanced Technology day and the fast development in the human population, the waste problem has become one of the worst environmental problems in many of the countries. The reason for this problem occurs due to the way of controlling waste collection and management in the country where the waste is not managed efficiently. Wastes are created from different types of sources where it could cause the environmental pollution. It also can give a risk to the health. Lack of proper management solutions is one of the big difficulties in managing landfill for the liable.

II. PROBLEM DEFINITION

As there is rapid growth of population in many of the cities and states, There are a lot of problems faced by the people, like environmental issues in which increasing garbage waste, increases various types of diseases and creates health problems and many more. In recent times garbage waste collection and its management is a very critical issue. To

Overcome the drawbacks produced by previous systems and produce a system which gives greater access to the garbage disposing points (public dustbins), efficient in terms of time and fuel cost, and provide data collection facility on how much a city generates garbage and accordingly plan disposing process, and to detect wet and dry garbage in dustbin.

III. DESCRIPTION

Our system consist of three layers:

1. Dustbin Layer- This layer consists of Internet and WIFI enabled dustbins.
2. Server Layer: It collects the fill up status and location of dustbins.
3. Client Layer: Client request for nearest location of it enabled dustbin to the server using mobile app.

3.1 SCHEDULING

1. Fixed Scheduling: With fixed priority preemptive scheduling, the scheduler ensures that at any given time, the processor executes the highest priority task of all those tasks that are currently ready to execute. Fixed scheduling is a scheduling system commonly used in real-time systems. With fixed scheduling, the scheduler ensures that at any given time, the garbage collection van follows its schedule. In this type of scheduling no matter how much the dustbin is fill after a fixed interval van comes and collects the garbage.

2. Priority Scheduling: Here based on Priority that means the fill up status of the dustbin is checked and accordingly

garbage gets collected. This can be used for routine check of bins for saving resources. In this scheduling according to the status of the dustbins, their priority is decided and collection of garbage is carried out accordingly. In this method, the scheduler chooses the tasks to work as per the priority, which is different from other types of scheduling, for example, a simple round robin.

3. Average Threshold Scheduling: This type of scheduling has its own advantages and disadvantages. According to the average threshold value set by the authority, if the dustbin capacity reaches this value, only than the van will collect the garbage from it. There are some drawbacks in this scheduling, as if one of the dustbins in the area reaches to its full capacity while the average of all the dustbins in the area has not reached the threshold value, the dustbin will remain unattended.

4. Full Dustbin Capacity Utilization Scheduling: This type of scheduling is most efficient in terms of cost because garbage is collected only when all the dustbins are filled. Until all the dustbins in the area are filled to its full capacity, the garbage collection van will not come. Some dustbins which are filled to its full capacity will remain unattended. Thus, it refers to the relationship between actual output produced and potential output that could be produced with installed equipment, if capacity was fully used.
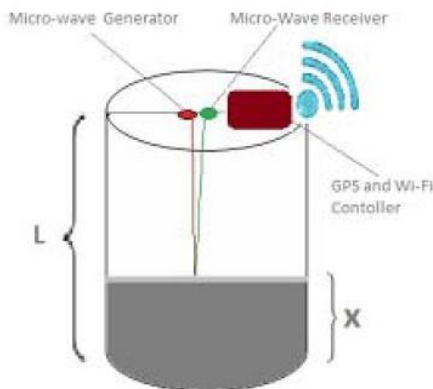
3.2 WORKING PRINCIPLE

Fig.2 shows the Working principle of dustbin

X is current fill up status, T is time duration between generation of wave and wave received by receiver and C is the speed of light. And we will calculate the value of X using formula given below:

$$X=L-(CT)/2$$

And percentage of fill up is calculated using formula given below:

$$P= (X/L)*100$$

Where P is the % fill up. Here we are assuming the wave path is almost vertical.

3.3 SYSTEM ARCHITECTURE

1. Dustbin Layer- This layer consist of Internet and WIFI enabled dustbins. Every dustbin contains the sensor which senses the fill up status of dustbin and sends data to the server.

2. Server Layer: It collects the fill up status and location of dustbins. It processes the client query and it respondswith the nearest dustbin location.

3. Client Layer: Client request for nearest location of it enabled dustbin to the server using mobile app.

3.4 ADVANTAGES

Proposed system provides greater accessibility to the dustbin.

- In the proposed system if the position of dustbin is changed from one place to another place its position will automatically get changed in the server with the help of GPS module.
- It will save our fuel and time using appropriate route planning algorithms. Here we are using a traveling salesman problem.
- Less pollution is generated as we are saving fuel which is mainly petrol and diesel.
- We can plan and design the collection mechanism based on the garbage collected in the previous month by using the previous data available on cloud and analyzing the data.

IV. CONCLUSION

This project work is the implementation of Automatic Garbage Fill Alerting system using Ultrasonic sensor, Arduino Uno, Buzzer and Wi-Fi module. Cleaning of dustbin is done as the garbage level of dustbin reaches up to the maximum level. Alarms when wet garbage is poured in dry dustbin. If the dustbin is not cleaned in a fixed time then the message will be sended to higher authority and they will take appropriate action on the sweeper or concerned contractor. Fake reports cannot be generated as previous data is always available when the dustbin is cleaned in this way corruption is reduced in management. By using appropriate algorithms we can reduce the no of trips of collection van and hence we can save expenditure and resources. It ultimately helps to keep the city and country clean. Therefore, the Smart dustbin makes garbage collection more efficient, which will

ultimately make our dustbins and cities smart at the same time.

V. ACKNOWLEDGEMENT

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