2nd National Level Students' Research Conference on
"Innovative Ideas and Invention with Sustainability in Computer Science and IT-2021"
In association with International Journal of Scientific Research in Computer Science, Engineering and Information Technology | ISSN : 2456-3307 (www.ijsrcseit.com)

Artificial Intelligent (AI) Based Smart Dustbin

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ABSTRACT

The government of India launched newly designed smart and developed city concept. For this, to make newly developed cities to be actually smart the garbage collection system have to be newly developed and designed for new changed cities and now the people need easy accessibility for the garbage collecting and towards the waste management.

It will provide the AI based waste collecting process solution. This will also help for managing the waste collecting. It will check the Waste garbage in particular area and collect it by using sensor. If the waste level crosses 90% of the container then it will move automatically to the garbage drop point and empty the whole garbage waste. On the drop point one person will connect dustbin to the garbage collector. After dropping the Waste into garbage collector dustbin will come to the collect point automatically.

Keyword: Garbage, IOT, Sensor, Dry/Waste, Dustbin, GPS, Smart Dustbin, Dry/Wet Compartment, AI

I. INTRODUCTION

In India cities are growing but they are not well designed with the proper garbage collection systems. Also, the newly developed cities are increasing and putting the pressure on existing garbage collection infrastructure which is not developing like cities. The gov of India started smart and clean city project.

This system will provide the Information Technology based solution for the waste collection with the best accessibility, and it will also set the time period for the planning for disposing collected waste.

The Government of India had also launched the "**Swachh Bharat Abhiyan**". In this mission the Smart Dustbin concept can also help to increase the speed of cleanness in smarter way. Our Dustbin can do garbage collection by its own.

1. Types of waste - Dry/Wet.
2. It will check type of waste using sensor that the garbage is Dry/Wet.
3. According to that it will divide the garbage into separate compartment.
4. After Separation it will move to next area to collect waste.
5. One Person from the Management team can change the area of Dustbin.
6. After changing the area of waste, it will move automatically to Specified area.

II. LITERATURE REVIEW

"Dustbin waste management system" [1] which is published in 2018 by the D.Naveenreddy, I.V.Sudarsan Reddy, M.Pavan Reddy. This concept is based on IOT which can calculate and display the waste percentage on the screens and if the waste percentage is fulfilled then it will send the message to waste collector vehicle for the collection of that particular waste in dustbin it also start the alarm when dustbin is full.

"An Intelligent Approach to Fulfill Swatchh Bharat Mission [2]" it is published on the 2017 by Priyam Parikh,Dr.Rupesh Vasani,Akshar Raval. This concept is attaching the dustbin at the one place and it will calculate the total percentage og the waste in the particular dustbin if the dustbin get filled then it will send the message to vehicle man for the collection of the waste into dustbin it will also send the particular address of that dustbin to the vehicle operator he will came there and collect all waste into dustbin.

"SMART GARBAGE COLLECTOR AND DISPOSER [3]" published in 2018 by Thiyagesan M, Shyam Shankaran R, Ravi M, Viswesh Kumar N and This project depicts the model of a smart trash can for malls, airports, hospitals, schools and colleges. The Smart garbage collector and disposer is nothing but a normal dustbin modified with the help of embedded system enhancing it to be intelligent

III. PROPOSED MODEL: LAYERED ARCHITECTURE OF SMART DUSTBIN:

1. Increase access towards the waste disposing
2. Effective for the time and fuel cost.
3. It will provide the accurate data of collecting garbage in specified area. For eg- (Office, University, etc.)
4. Smart Dustbin also drop the all garbage to the specified drop point.

This Model has divided into three layers:

1. Server layer:

Server can locate live location of every dustbin with the help of GPS location and Server can also know the waste collection percentage of dustbin. Server is also able to change the particular collection area of dustbin. Server can also send the query to the dustbin if a particular dustbin should come to the dropping point.

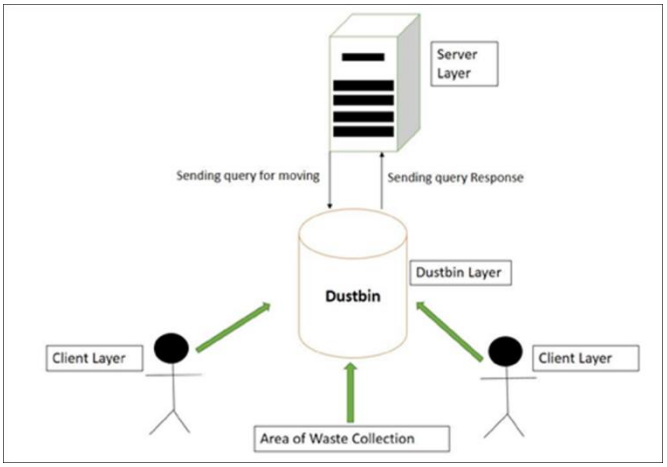
2. Dustbin Layer:

This layer includes the some Wi-Fi and Internet accessible. Dustbin will contains some sensor which helps to senses the types of waste into Dry or Wet and collect it into two separate compartments. It also checks fill up status of dustbin and move to the dropping point by own and drop all collected garbage into garbage collector with the help of one person who will connect it with garbage collector. It will also transfer the current location on server.

3. Client layer:

Clients can access dustbin physically only if they want to throw some garbage waste in the dustbin. The **"Smart Bin"** can move into the specific area as the dustbin location is not fixed and Client can go near the bin and put all the waste into dustbin compartments.

Figure 1 : Architecture of Smart Dustbin



❖ **Working Principle of Smart Bin**:

D is percentage of Dry waste and W is Percentage of Wet Waste and X is current fill up status and A is total percentage of waste collection. Researcher are going to calculate X value using formula below formula:

$$X=(D+W)$$

And fill up status of dustbin will calculate using below formula:

$$A=X/2$$

Here A means the percentage of waste collected. The authors are assuming total waste into two types. Now the question is how we are going for waste collection optimally. For this following scheduling Algorithm can be used.

a. Fixed Scheduling:

This Fixed algorithm process will start in fixed time laps. For example collecting waste after two days. Here researchers will use the Travelling salesman problem algorithm for route planning.

b. Priority Scheduling:

This priority algorithm the waste will be collect on Priority. Area wise like if we consider the College Campus the Entrance part and office area consider in priority area then we can send the dustbin over there first and after that other area will be cleaned.

c. Average Threshold Scheduling:

With this algorithm firstly we will calculate the average of waste collection status level. if total is more than 70% then start the waste collecting process and in this algorithm collect waste according to the Priority algorithm.

d. Dustbin Fixed Collection Area Scheduling:

This algorithm authors can fix the collection of the dustbins and they will move only in particular fixed area.

IV. STRUCTURE OF SMART DUSTBIN

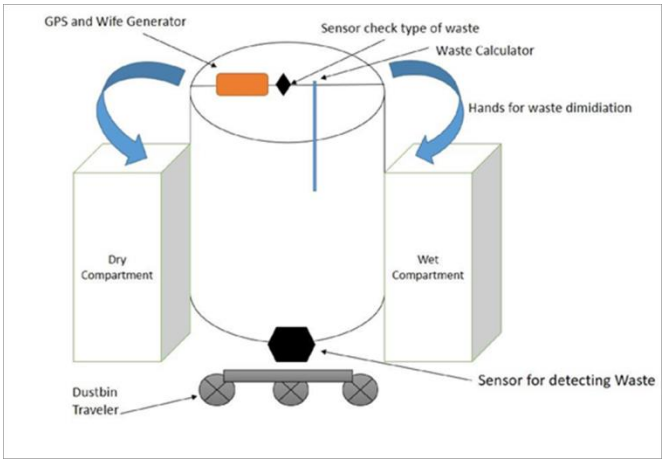


Figure 2: Smart Dustbin Structure

This Diagram represent the basic structure of Smart dustbin here traveller is used for the move the dustbin from one location to another. While traveling to another location sensor at the bottom it will sense the waste on the road and using the hands of smart dustbin it will collect. Here we give another sensor to differentiate collected waste into two types mainly Dry and Wet. After differentiating it will put by hands into two different compartments and using percentage calculator, we will calculate the collected waste into dustbin. WIFI and GPS locator also used to send the current location to the server and accepting and sending queries.

V. BENEFITS OF PROPOSED SOLUTION:

1. This system will provide accessibility.
2. When dustbin will change location, it will sent the current location to the server.
3. This system will save the fuel and time with the planning.
4. This will also decrease the man power and budget of waste collection
5. It will run on the electrical power and generate less pollution.
6. Researcher can plan and design the collection process.

VI. FUTURE SCOPE OF WORK

1. In Future authors proposed to increase the area of garbage collections.
2. This mechanism can be used in vehicle to collect garbage on the city roads.
3. Garbage collector is maintained and manage by the human we can create it fully AI based.

VII. CONCLUSION

The proposed system utilities are that the government will be able to use these statistics for design and policy. If the proposed model will setup properly it will surely make the cities clean in modern way. It will also reduce the time that is required to collect the garbage resulting in less manpower and fuel use and save the cost. It can also provide analysis of data to manage garbage collection routes and the location of dustbins more effectively.

VIII. REFERENCES

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