SMART WASTE MANAGEMENT IN METROPOLITAN CITIES

1. PROBLEM STATEMENT:

In developing countries like India where a rapid increase in population has been observed in past decades , solid waste management has become a critical issue. This issue arises mainly due to the improper segregation of waste. Waste management and dumping of solid wastes in India have been researched and findings show that municipal solid wastes are mostly composed of biodegradable and non biodegradable materials .Organic and Inorganic waste are treated in the same way and are not collected on time . This leads to loss of potential energy generated using organic wastes. As of now to overcome this disadvantage , household garbage can be converted into biogas and can be utilized for cooking purposes in home as well as it can be collected and thrown in the trash bin instead of making the environment unhygiene. This will reduce amount of waste generated by each families which helps in planned and organized waste management solution . This step will serve as a huge step in formation of smart cities.

2. IDEA/SOLUTION DESCRIPTION:

The main theme of this work is to develop a smart garbage alert system for a proper garbage management which helps in giving an alert signal to the municipal web server for the instant cleaning of dustbin with proper indication based on the level of garbage filling. The current idea for the process of collecting the waste is setting of 2-3 trash bins in particular locations which consists of Ultrasonic sensor, Level Monitor sensor, Servo motor along with the LCD Display. Ultrasonic sensor is used to detect the distance, Level monitor sensor is used to detect the level of the waste filled in the bin. Here we set limits for each bins for giving alert to the people of particular area, where the limits are known to the people by the indications set on the LCD, so that the people can easily throw their waste in the near-by bin before the bin gets closed, if the 1st bin gets closed, by displaying the message through the LCD the people can move to next bin and put their waste in the 2nd bin, at last the 3rd bin gets filled by the waste, before filling the last bin the alert is given to the tuck or municipal office so that they can clean the 1st and 2nd bins.

3. NOVELTY/UNIQUENESS:

As day-by-day gets developing our technologies also gets developed. Before technologies came into progress and plays a major role in some of the applications, the waste which are collected are stored for many days and the bins are not maintained properly, which created a bad environment which causes illness to human beings. After the implementation of this trash bins the waste are collected thrice a week or on daily basis by indicating the filling of each bins through an alert to the waste collecting truck or municipal office, so that the waste has been collected properly without any cause. This will reduce the amount of waste generated by each families which helps in planned, distributed waste management system.

4. SOCIAL IMPACT/CUSTOMER SATISFACTION:

As the waste management is an serious issue faced in our country, resolving it will be a great help for our environment. As the project is going to be IOT, it is undeniably beneficial for saving the environment, reducing the cost and boosting the efficiency. As the filling of trash bins are reported in correct time to the municipal corporation , the necessary action is taken soon and this saves a lot of environmental issues like breeding of mosquitoes , spreading of diseases and generation of foul smell etc.

5. BUSINESS MODEL (FINANCIAL BENEFIT):

In highly populated areas, a rapid waste generation usually leads to overflowing waste bins and ugly streets. Smart Waste Management System empowers waste collection staff to know fill-levels in real-time and get notified of waste overflows. The benefits of this Smart Watse Management are of

- **Reduction in Collection Cost**

The solution reduces waste collection frequency dramatically, enabling you to save on fuel, labour, and fleet maintenance costs. It has been seen that the solution has reduced the operational cost of municipalities up to 80%.

- **No Missed Pickups**

Using the solution, the garbage truck drivers, can see which garbage containers are not picked up and needs to be picked. So, there will be no missed pickups, keeping the residents away from the disease which occurs due to bacteria, vermin and insects prosper from the garbage.

- **Reduced Overflows**

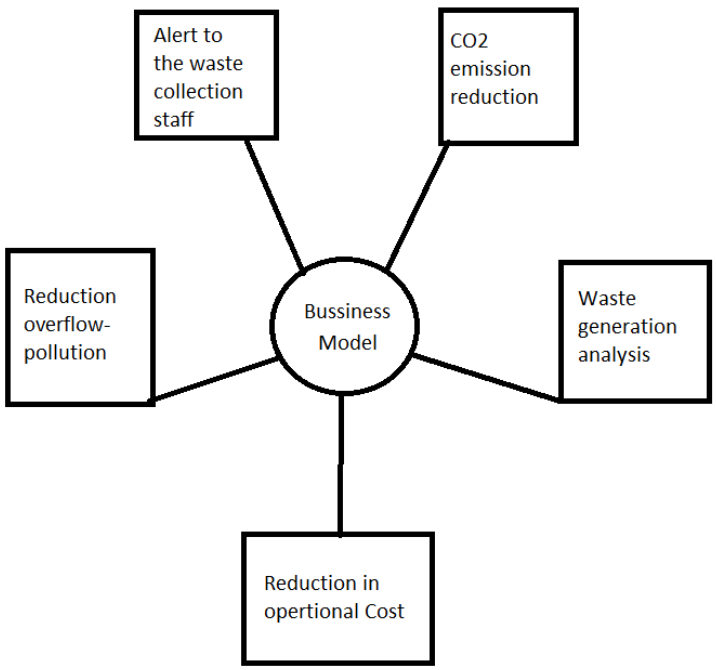
One of the ill effects of overflowing garbage containers is air pollution, which causes lung diseases and numerous health problems as contaminants are absorbed from lungs into other parts of a human body. Another malicious effect is on the waste collection staff and it is the risk of picking up and handling overflowing garbage which can cause them infections or chronic diseases. The solution takes care of this issue by allowing the waste collectors to keep track of every bin's fill status and schedule the pickup on time.

- **Waste Generation Analysis**

The solution does not limit to allowing the managers to set up the pickup routes. The solution also features Advanced Data Analytics through which the waste collection managers can know the future waste generation and can plan the resources accordingly.

- **CO2 Emission Reduction**

The solution decreases the fuel consumption which ultimately reduces carbon emission by up to 70%. This is indeed a huge reduction both in terms of finance and environmental impact.



6. SCALABILITY OF SOLUTION:

We can consider a garbage bin IOT sensor that has the following properties:

In the first scenario, showing the fill-levels of the bins and estimating the next date for garbage collection based on the fill level, and passing this information to the garbage trucks.

In the second scenario, if a garbage bin is not full for the next collection date, and it has been standing for 3 days in a row, to prevent rotting, schedule it for garbage collection immediately

Recording the last date on which garbage was collected to assist in forecasting the collection date pattern. Keep recording the fill levels of the bins at a regular interval to assist in determining the fill patterns.

- **Timely Alerts:** The garbage trucks receive timely alerts when bins are ready to be emptied
- **Forecast when bins will be full:** Over time, historical data collected by schedules which Reduce operation costs by 50%
- **Environmental Quality:** Prevents air pollution, water pollution, and harmful diseases which are dangerous to human as well as animal health by preventing garbage from overflowing**.**