IoT Garbage Monitering System

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Problem ID : PID457

Department/Office/Industry Name : MNC

Introduction

In this present time one of the biggest challenge is waste management and monitoring system. Due to improper waste management and monitoring system the large amount of waste is spilled around the trash cans, cleanliness of the city is affected and **stray animals feed on the waste due to which their health is affected.** The current waste management system does not provide data of amount of garbage filled in a trash-can which results into inefficient trash picking routes hence increasing the fuel consumption unnecessarily.

Our system known as **e-Kachra Daan** an underground garbage monitoring/management system based on IoT will bring solution to all these problems. This system will be available in both cities and villages.

Current Problems

The following problems are observed with current open garbage bin methodology :

1) Overflowing waste bins with garbage lying in open are an ideal breeding ground for bacteria, insects and vermin. The flies that visit the garbage are also the same flies that roam around your lunch buffet and drop their offsprings on your plate

2) Particularly in monsoon season garbage contaminates surface waters, which affects all ecosystems.

3) Overflowing waste causes air pollution and respiratory diseases.

4) Stray animals are feeding on the waste.

5) There is direct human interaction for waste collection and transportation.

6) Due to irregular cleaning of bins, places with open garbage containers are dirty, this gives foul smell in nearby area.

7) Garbage collecting trucks have to collect garbage from all over the city twice a day weather trash cans are full or not they have to go there and collect the waste so, the main problem due to that is excess fuel consumption and waste of time for the drivers and workers.

8) unhygienic & uncleaned city/ surrounding leads to tourism rejection.

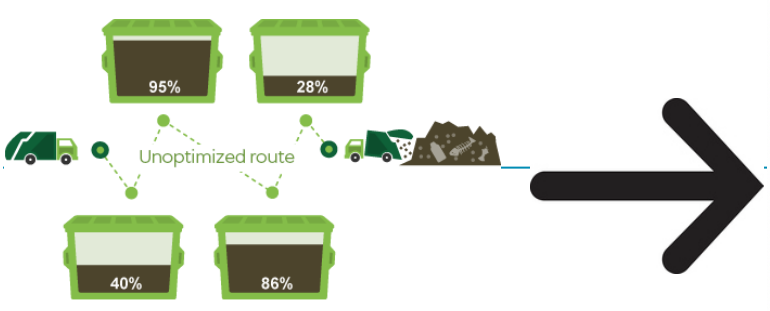
Solutions

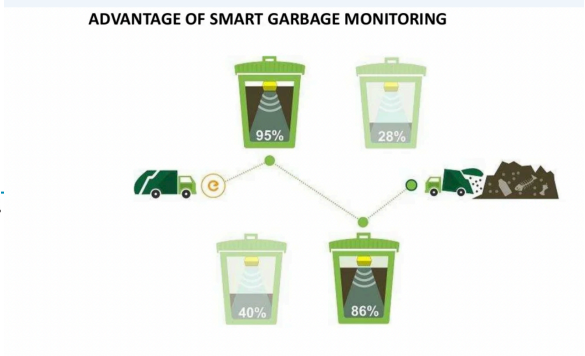
Currently our waste collection system is fairly under developing and so we need to revolutionise the system

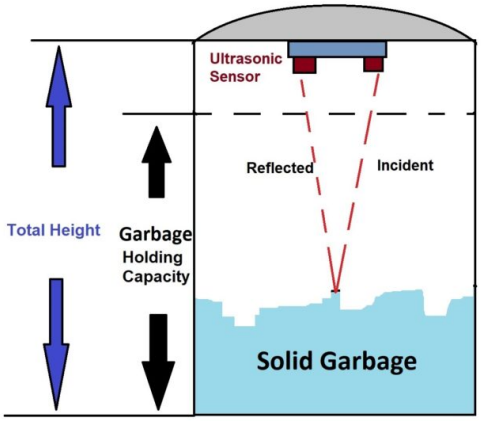
1. To solve the issue to spillage of waste around the trash cans, stray animals eating plastic, bad odour around trash cans and also to make our surroundings more clean we have created an IoT based underground garbage monitoring system.

2. First and one of the biggest issue in traditional public garbage bins is spillage of waste all around the bin, so, the solution to that is making underground garbage bins.

3. This underground garbage collection system will also solve the issue of stray animals feeding on toxic waste and plastic waste.
4. Another breakthrough our system will bring is that it will constantly measure the amount of garbage in bin and that will be sent to a central server.
5. Our central server will collect data from number of garbage bins and then it will send data to our application,
6. That will provide the driver of the garbage collection truck a optimised route so that the driver will only be needed to go can collect waste from filled bins that are filled 75% or more. Which will make our system fuel efficient.



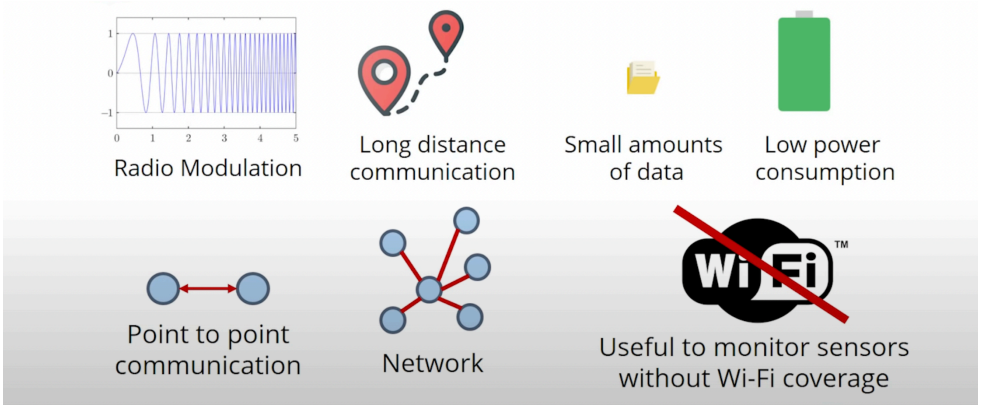




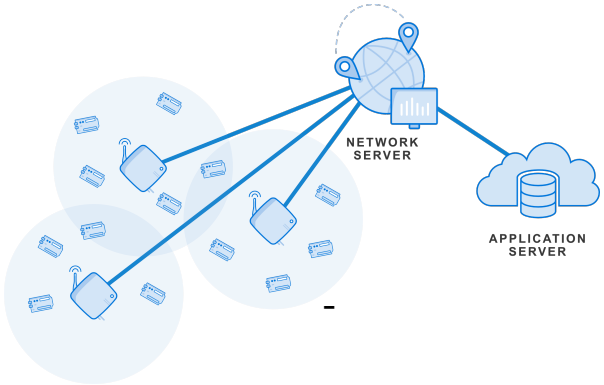
7. Further with proper collection of data of all the dustbins for about 2-3 months of time we can create two fixed routes, one for day and one for evening for the driver which means one truck with only two shifts can clean the whole town with proper data collection and management which will make our system far more efficient.

How we will do this ?

- For being cost efficient we will create a kit which could be installed in any dustbin easily so that we do not have to change the whole dustbin. For measuring garbage level we will use ultrasonic sensor.
- Then to process the data we will use an Arduino nano, reason for choosing it is, firstly it is fairly inexpensive and secondly it is very compact.
- For transferring data we will use LoRa system. We will use this system because in India every place does not have availability of network due to which there will be problem in collecting data from remote villages.
- LoRa system will transmit data to a central server with help of radio frequencies which do not require any type of network availability, the central server will be in an area with network availability so that it can transfer data to our application. i
- **Advantages of using LoRa :**



- **Basic working of LoRa network :**



- For power we will use solar panel since our system can run on low power levels because LoRa system and Arduino are very power efficient.
- This way IoT garbage monitoring system can be implemented at most places.

What if we do not want to dug pits for making underground system ?

- Even if we do not make underground dustbins, our system still solves issue of over fuel consumption by optimising rides also our system alerts the driver to collect waste after 75% of bin is full and after proper data collection we will be able to make our routes in a way that garbage is collected before the bin gets overfilled, this way we can avoid spillage of waste.

Comparison Between Other System and Our System

OTHER SYSTEMS :

- Generally cellular network is used to connect with trash cans.
- Only government can access these data.
- When the bin is 70% full, central monitoring system will get alert to empty the bins.
- When the truck driver gets alert from the central monitoring system then only he can empty the bin.

e-Kachra Daan:

- We will use RF (radio frequency), so it can easily to connect to the system even in remote areas.
- As soon as the bin gets filled, central monitoring system as well as the truck driver (app holder) will receive the alert.
- Truck drivers can optimize their own routes.

Thus, by implementing our system we can contribute to make current system more effective and efficient.