

SMART WASTE MANAGEMENT SYSTEM FOR METROPOLITAN CITIES

- By,

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ABSTRACT:

Waste Management is the most challenging issue of modern society. Fast growth in population, increased factory presence and modern lifestyle have contributed towards the large amount of waste. An efficient waste management system mainly revolves around waste segregation and processing. We hope our Waste Management System will handle this issue in perfect manner. **This is one of best solution for keeping INDIA clean.** The prototype of the proposed system is developed using Raspberry Pi Controller, website to govern the entire process with comfort and simplicity. The most important part of the proposed system is the sensory unit which helps in identifying different types of waste (Plastic, Waterbottles, Glasses, etc). The module contains Cameras for Identifying object so as to categorize different categories of waste. The major units of the module consist of **four noticeable components** such as Camera, IR sensor, DC motor and Cash dispenser. While the waste management is performed at the software system, first the object is identified by the camera then identified the exact name object then information is shared

to processor and to cash dispenser unit. According to the output of processor (Raspberry Pi) the cash will be delivered. If the garbage reaches the maximum limit, the IR sensor will detect it and sends alert to the processing unit (Raspberry Pi). After the information (Dustbin filled) shared to respective department using GSM.

The location is identified by GPS. The **major difference** in our project is **at the end of process people will receive cash or coin according to the type, quantity of garbages that is put it into the machine**. This quantity and other metadata of the collected waste is monitored and will be dispatched by the respective department.

INTRODUCTION:

_WASTE MANAGEMENT SYSTEM IN INDIA:

Waste management in India falls under the purview of the Union Ministry of Environment, Forests and Climate Change (MoEF&CC). In 2016, this ministry released the Solid Wastage Management (SWM) Rules, which replaced by the Municipal Solid Waste (Management and Handling) Rules, and 2000 of which had been in place for 16 years. This national policy plays a significant role in the acknowledgement and inclusion of the informal sector (waste pickers) into the waste management process for the first time.

India generates 62 million tonnes of waste each year. About 43 million tonnes (70%) are collected, of which about 12 million tonnes are treated, and 31 million tonnes are dumped in landfill sites

With changing consumption patterns and rapid economic growth, it is estimated that urban municipal solid waste generation will increase to 165 million tonnes in 2030.

But In India:



In Other Countries:



To overcome these different between India and other countries here our project will help us little bit to keep INDIA clean.

LITERATURE SURVEY:

[1] Author: Theodoros Vasileios Anagnostopoulos (2014)

He have proposed a useful garbage collection through shortest path semi static and dynamic routing for controlling traffic that is created by the trucks which carrying the waste. Here they have used two layers, in which upper layer is semi static shortest path routing model. This layer contains the waste collection terrain for each city sector. Lower layer dynamic shortest path routing model handles the dynamic requirements of real time routing in case of emergency. Waste routing was achieved by the Ant colony system algorithm (ACS), in turn to group the garbage bins allocation in the form of clusters, they have used K-means algorithm. By using above mechanisms the authors effectively measured distance covered, time spent, fuel consumption and the quantity of solid waste collected. They have mentioned the future work will be in the area of time critical scheduling, where once the waste bins are full and need to be emptied at the earliest by available waste collecting vehicles.

[2] Author: Theodoros Vasileios Anagnostopoulos and Arkady Zaslavsky, Alexey Medvedev, Sergei Khoruzhnirov (2015)

He have illustrated the Top-k query based dynamic scheduling for smart city garbage collection. They introduced Top-k query to denote the number of filled bins in turn to begin dynamic scheduling. Authors have used adaptive large neighborhood search algorithm to determine the cost optimal routes for the trucks to empty the bins. They used roll on-roll off routing mechanism to help several dumping services to collect large amount of garbage from the location of shopping malls and construction sites. The demerit of this model is, in dynamic scheduling depending on the k-value, CPU overhead cost is high. The future work they mentioned is dynamic routing model depends on fuzzy demands. Here the customer acts as variables of fuzzy.

[3] Author:-Theodoros Vasileios Anagnostopoulos and Arkady Zaslavsky, Alexey Medvedev (2015)

He describes the waste collection as a potential Internet of things service which exploits robustness and cost efficiency of a different types of fleets. Authors have used robust dynamic routing algorithm to find the shortest path, by this they achieved cost efficiency. They used Android app for truck navigation, GPS to track the truck location, RFID to identify the certain bins and actuators to lock the lid of the bin when bin gets full to avoid the overflow of the garbage. Here they used two types of trucks: High Capacity Trucks (HCT) to transport waste from depots to dump yard and Low Capacity Trucks (LCT) to transport waste from dump yard to depots.

[4] Author:- Martijn Mes, Marco Schutten , Arturo Perez Rivera(2014)

The authors aims at inventory routing for dynamic waste collection. Here they mainly focus on the problems of scheduling of emptying the containers and to take quick decision on selection of nearest route for the vehicles. By this the garbage collection costs can be minimized and at the same time customer satisfaction can also be improved. Here they used heuristic approach to deal with the dynamic and stochastic nature of the problem. Here they considered two policies viz. Sequential Kriging Optimization (SKO) and Hierarchical knowledge gradient (HKG). HKG quickly identify the optimization areas within the network space and then use SKO for communication.

[5] Author:- Parkash, Prabu(2015)

He have proposed a system, where multiple dustbins are located throughout the city. These dustbins are embedded with low cost devices and unique ID will be given for every dustbin in the city. This will help in tracking the level of garbage in each bin. In this system, these bins are

connected to the internet to get the real time information of the smart bins. By implementing this system authors have achieved cost reduction, resource optimization, real time data transmission and effective use of smart dustbins. They have mentioned the future work as; the system can be implemented with time stamps.

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