

Sensor Based City Garbage Collector

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ABSTRACT

A healthy environment is imperative to a healthy and happy community. With the age-old system of hiring people to regularly check and empty filled dustbins, the process has been prone to human error and neglect. Additionally, due to different frequency of usage of dustbins in different areas, routine checks which are based on time crevices is inefficient because a dustbin might get filled early and may need immediate attention or there might not be any need of a routine check for a long period of time. This makes present system resource expensive and ineffectual, as overflowing, stinking dustbins become more of a problem than a solution

INTRODUCTION

The abundant increase in population led to the improper waste disposal. Managing the garbage consumes more time and requires a lot of man power. The most common method of waste disposal today is unplanned and it is dumped at the landfill sites. This method causes ill effects to all living beings also accelerates harmful diseases which leads to the degradation of the aesthetic value of environment.

In developing countries, more than 377 million urban people live in towns. They generate more than 62 million tons of municipal solid waste per annum. Out of these only 43 million ton of the wastes are collected by the municipality. Rest of the wastes are left scattered in the streets due to poor maintenance of garbage bins. The existing system has no proper planning regarding the collection of garbage which makes the city or town unhygienic which has a disadvantage of more fuel consumption and time consuming too.

In this project, we present a solution about the City Garbage Collection System which integrates the idea of IoT with Wireless Sensor Networks along with the tracking system of particular locations. We also put forward the concept of a network of smart garbage bins based on integrating Wireless Sensor Network with the Cloud computing and discuss how Machine Learning techniques can be applied to the sensor data leveraged by the system to gain useful insights for future prospects to improve the efficiency of the garbage segregation, transportation, handling, disposal and monitoring.

PROPOSED SYSTEM

Most of the time, the garbage bins are overflowing with excess waste and are scattered out in the street. These scattered wastes get either decayed or burnt in that place or overflows all over which leads to serious health issues to humans. The wastes which are dumped are segregated by Humans which leads to health problems to them. To overcome this problem a well-organized waste segregation and monitoring system has been designed. It is an IOT based Waste Segregation and monitoring system which is an innovative way to keep the cities clean and healthy. Since the population of our world is increasing rapidly, the environment should be clean and hygienic in order to lead a better life. This is a model for Waste Segregation for Smart cities.

The foremost goal of this project is to automatically segregate the wastes and to perceive the level of the dustbins which is delivered through GSM Module. With such information, litter bin providers and cleaning contractors are able to make better decision for the efficient disposal. IR sensor identifies the objects, Moisture and metal sensors detects the wet and metal waste. Ultrasonic sensor observes the levels of bin. The

waste is dropped inside the bin where the sensor identifies the type of the waste. The Bin consists of two partitions inside where each bin collects each waste respectively. The motor then rotates and respective partitions gets opened and respective wastes are collected. The status of the bin is displayed in the LCD screen.

I Issues in Existing Methodology

Excessive dumping of waste in the garbage bin.

- Residentials facing lot of problems in their day-to-day life.

Regular complaints and requests by localities, yet no arrangements being done.

- Manual method of tracking out the trash bins is tedious because sometimes a few bins will be filled fast and some late.

Environment pollution is happened due to improper disposal and improper maintenance of waste.

Significant Contribution:

Some significant contributions of the proposed framework are as follows:

- (i) Proposing a smart bin mechanism that is based on IoT technology and applications
- (ii) Real-time monitoring of the trash bins in a smart city
- (iii) Using trash bins in an effective way to facilitate the municipal department and citizens as well
- (iv) Reducing labour cost and optimizing resources
- (v) Improving environment goals and cleaning cities with limited resources.

IMPLEMENTATION

The implementation of this system can be categorized into two parts. The first part comprises of Segregator followed by the second part named as level detector.

Segregator

The segregator comes into the major play as soon as the smart waste system is put to use. The purpose is to separate the wet and the dry waste at the very initial level of dumping. It makes the process much easy to recycle and less waste will be dumped into landfill which will result to less area consumption of the landfill and definitely reduces the labour cost.

Level detector

The second implementation of our proposed smart waste management system is the level detection provided with live monitoring of the level of waste present in the dustbin. It will be directly beneficial as the additional labour is required to look after whether the dustbin is full or not. This system will be provided with live GPS tracker which will indicate the exact place at which the dustbin is located and the level of the waste in it.

Location Tracker Using GSM Module or Wi-Fi Module

GSM module sends the message to Municipal Corporation about the bin which is fully filled and notifies its location. The authority central data is used as an information centre as well as a storage point, which contains each and every detail of the trash Bins, Trash Bin IDs, Trash Collecting vehicles, their locations, and every single detail about these entities using either a GSM module or a Wi-Fi Module.

Trash Collecting Vehicle

The vehicles that collect waste from the trash bins are dependent on the populated areas of smart cities. Mostly, smart cities are overpopulated which leads to difficulty in the collection of waste from densely populated areas using the same size of collecting vehicles.

These Trash Collecting Vehicle are sent to that particular location with filled dustbins which is connected with the central authority from where it gets information about the requesting trash bin covering the shortest path. The Trash Collecting Vehicles collect waste from the trash bins and bring it to the factories for further treatment.

The Trash Collecting Vehicles forward the status of the requesting Trash bins to the database for

updating the status of requesting TB in the central database after collecting waste from the bin.

RESULT AND DISCUSSION

This system is using Arduino UNO and various components that attach with the garbage bins to show the real application. This circuit are made from several components which comprises of Arduino UNO board, ultrasonic sensor, Infrared sensors GSM module, LCD that are connected to systems to display the messages, servomotor, and some wires as connection.

The system is evaluated by testing the emptiness and fullness of the garbage bin. When the garbage bin is empty thus level of garbage is empty. Data will then display the percentage of the fullness of the bin on LCD that attach at the bin to alert the users percentage of the fullness of the bin.

When the dustbins are full with garbage. The sensor at the bin will detect the level of garbage and will convert it to the percent. The sensor will connect to Arduino that control system operation. Moreover, data for each bin will display on LCD that attach at the bin to alert the user how many percent of the garbage in the bins.

CONCLUSION

This garbage collection system makes our environment clean and ensure hygienic surrounding. Improper disposal and improper maintenance of the domestic garbage creates issues in public health and environmental pollution. This project attempts to provide practical solution to help the local municipal administrator in garbage management system i.e. monitoring of domestic garbage clearance at proper time to avoid damage to public health. In real sense, it is great help for society cleanliness. Therefore, it is more efficient and costs effective system. Technology demand "To be smart" possible only if we adopt intelligent systems for our problems solving needs.

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