Sensor Based Waste Management System: A Review

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Abstract:
The urbanization of cities is rapidly increasing from past few years. As population increases the requirement of smart city is also getting increased. But, to become a smart city the main aim is to create a clean city. In smart cities the problem of waste management is at highest level. The garbage collecting vans are coming in 2 or 3 days in a week, it is difficult to manage the garbage spread controlling. It leads to hazardous diseases and unhygienic environment which is responsible for unhealthy surroundings. To overcome this problem, we are introducing a smart and sensor based waste management system that will sense the garbage level and when it crosses over 80%, it will send notification through GSM module to the authorized person with the help of Android app. As application is becoming more feasible for handling. This paper discusses the literature review of existing sensor based waste management system also the garbage container will be anti-theft. This will be achieved with the help of ultrasonic sensors, Wi-Fi, GSM Module and GPS system.

Keywords: Smart city, waste management, Ultrasonic Sensors, Android application.

I. INTRODUCTION:

As Nowadays in the smart city, the basic requirement is to have healthy environment for the healthy life. Waste Management is one of the most important step that has been taken as social responsibility from the people. As many times it has seen that the overflow of garbage bins is now becoming the biggest issue in the smart cities. This problem occurs because the garbage collecting van does not reach to the area in the specific time interval to empty the garbage container, resulting spread of garbage on the roads. This also results in the unhealthy environment and unwanted diseases.

The traditional way of manually monitoring the wastes in waste bins is a complex, cumbersome process and utilizes more human effort, time and cost which is not compatible with the present day technologies. Irregular management of waste typically domestic waste, industrial waste and environmental waste is a root cause for many of the human problems such as pollution, diseases and has adverse effects on the hygiene of living beings. In order to overcome all these problems, we are proposing the idea of smart waste management system which helps in auto-management of waste without human interaction in order to maintain a clean environment.

The concept of smart waste management is implementable in cities where waste production is domestically high but the effort put to control it is relatively very low. This idea is compatible mainly with the concept of smart cities.

The smart waste management mainly avoids the congested collection of waste generated domestically which creates difficulty to manage its disposal. All cities, regardless their size, their geographical location or their economic level, spend huge amount of money every year for wastecollection. There are various techniques required for management of waste: Garbage collecting using Embedded system, Tracking the garbage bins having unique ID, Wireless sensor network (WSN) for smart waste management system, Advanced decision support system for efficient waste collection, Total garbage level detection according to the size of the bins, PIR sensor based waste management system. These above techniques are explained in the next section.
II. LITERATURE REVIEW:

The Authors of paper[1], have designed a sustainable waste management system to incorporates feedback loops, is focused on processes, embodies adaptability and diverts wastes from disposal.

In paper[2], the Authors have created the SmartGarbageBin, which gave information to the authorized person when the garbage bin is about to fill and send the location of bin by using GSM.

The Researchers of this paper[3] have designed the effective project for garbage collection using Embedded System. The main aim of that system was to inform the authorities, when the garbage reached to the extreme level, that will sense by using ultrasonic sensors.

This system was created to detect the cleanliness issues in real time. The dustbins were provided with embedded system that helps in tracking the garbage bins which have a unique ID so that it is easy to identify the user. When user put that ID to the web app he/she give back password for Wi-Fi and avail the facility for the user in paper[4].

In paper[5], the Authors have proposed a scheme using Wireless Sensor Network(WSN) for smart waste management system. The bins were embedded with sensors and were networked using WSN. The sensors fitted in the were collect the data with a particular time interval. Once the garbage filled up to a defined level, it creates a request to GarbageCollector Agents and then agents will collect the garbage.

This paper[6] provides an advanced Decision Support System for efficient waste collection in smart cities. This system was provided with a model for data sharing between garbage collectors on real time. Surveillance cameras were help to capture the problem and provide evidence to the concerned/local authorities.

The researchers of this paper[7] have use the sensors on the top of the dustbins that detects the total garbage level according to the size of bins. When the bins were at its highest level it will generate an alarm and notify the concern authorities about it and then employees take the further steps for garbage collection.

The Researchers of paper[8], have created a waste management system for domestic use which could eliminate or significantly reduce the stage of waste collection.

In paper[9], the garbage monitoring system was developed. This system was detecting the garbage level and sends an alert to the NMCs. PIR sensors were used to detect the motion and were helped to provide a message through speakers. A GUI was developed to get the desired information and location of garbage bins. The message received through GSM were displayed on LCD at control room and authorized person inform about it to the garbage collectors and the garbage has collected by them.

III. PROPOSED SYSTEM:

The Sensor Based Waste Management System that has been introduced, which will help to reduce the problem of garbage overflowing and to keep the environment hygienic. This is an automated system that senses the level of garbage in the dustbins and sends an alert to the local/concerned authorities. This system is activated when the amount of waste material in a dustbin exceeds the level and becomes extremely hazardous. In this system it provides introduction of the new concept of Android app for the notification through Wi-Fi and GSM module. Also with this the concept of anti-theft dustbin is introduced in the project.

The concept of the project is that, the dustbins that are situated in local areas are fitted with the Ultrasonic Sensors. This sensors will sense the level of garbage and when the dustbin gets 80% full it will generate an alarm/message and then send it to the local/concerned authorities, achieving this with the help of an Android application. The Android app in this system will also provide a dashboard for the continuous notification and constant monitoring for sensing the nearby bins. This constant monitoring will definitely reduce the fuel cost that is required for Garbage Collecting Vans.
effectively. When the vans are going for the garbage collection they can sense the conditions of nearby bins through this constant monitoring system availed by the application. The dustbins will be anti-theft. The ultimate aim is to provide the clean, healthy and waste ridden environment.

IV. DISCUSSION:

As it has been seen that, one of the major issues in smart cities is the garbage collection. According to the survey[2], more than 70% litter is collected from urban cities. Leading population in the country is one of the biggest parameter that responsible for unhygienic environment. The overflowing of garbage bins leading to spread the deadly diseases. To avoid this problem, we are implementing the Sensor Based Waste Management System. With the help of different automation techniques, and to reduce the human efforts we are implementing this smart bins. We are taking this small step as a social responsibility to keep our environment clean, healthy and litter free.

As implementing the proposed system using ultrasonic sensors, Wi-Fi and GSM module, and an Android application. The ultrasonic sensors will detect the the level of garbage in the container and send this data to the GSM module and it will create an alert and send this notification through Android app.

V. CONCLUSIONS:

This is an attempt toward clean, healthy and hygienic surroundings. So the proposed system will sense the level of garbage and generates an alert and send it to the particular authorities through the developed Android app. The garbage containers will be make anti-theft since it is fitted with the sensors. The various approaches related to cleanliness has been discussed and also explain the various parameters properly in this paper.

REFERENCES:


