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## A Survey on Garbage Monitoring using IOT

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**ABSTRACT:** Waste management system is one of the primary problems that is faced throughout the world. The major hurdles in most of the smart cities is its solid waste management, if the waste is not disposed properly, it will cause severe diseases such as dengue, malaria etc. Although there are many organizations available for handling and managing wastes, still we are facing this major issue due to lack of co-ordination among government and local authorities. In this paper, we have survey on few of the techniques and methodologies to improve the garbage monitoring system using wireless sensors.

**KEYWORDS:** IOT, solid waste management, wireless sensors

### I. INTRODUCTION

IOT based system is the technology in which a developer connects multiple embedded devices to the internet. IOT for embedded systems consist of many things like collecting and analysing large amount of data from different perspectives and summarizing them into useful information to improve the way services and devices are used today and making the embedded devices smarter than before. Major players in embedded hardware and software development are aiming to bring these transformations into their products to take advantage of growing IT market. Smart embedded systems need architecture and design elements to suit real time operations. With billions of devices expected to join in the coming years, analysts expect that IOT will have significant impact on device design [1].

In today's era as the population is growing day by day, in most of the cities the overflowed garbage bins results in unhygienic environment which will further leads to rise of different types of unknown diseases degrades the standard of living [2]. As solid waste management is one of the major issues in the urban cities hence introduction of smart dustbins is one of the major requirements to eradicate this problem or at least reduce it to the minimum level. Our present Prime Minister of India, Sri Narendra Modi has recently introduced the concept of implementing 100 smart cities in India and "Swachh Bharat Abhiyan" to ensure a clean environment is one of the major initiatives included in this implementation [3].

So, in this paper we are going to analyse various smart garbage management system based on IOT for urban areas acts as one of the innovative systems to keep the cities clean.

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## II. LITERATURE SURVEY

In city areas, the clearance of waste management is one of the challenging tasks throughout the world. There is a need of well organization in monitoring garbage system. Although there are many organizations, still we are facing waste management system problem. Since lack of coordination among authorities and people. Therefore, smart garbage monitoring system and clearance system using internet of things paper focuses on clearing the waste efficiently by using wireless sensors system and GSM/GPRS. The ultrasonic sensor detects the level of the wastes in the dustbin. Force sensor is used to estimate wastes of the dustbin. Microcontroller acts an interface between the sensors system and the GSM/GPRS system. LED lights is used to indicate if the bin is full or empty. An android application is used through which the information is received by the concerned authority or truck driver. The hardware components such wireless sensors like ultrasonic and force and LED lights and microcontroller must be properly connected and ensure that the SIM card is placed correctly in the GSM module. And make sure that the android handset is connected to the internet [7].

As dustbin is considered as a basic need to maintain the level of cleanliness in the city, it is very important to clean all the dustbins as soon as they get filled up. We will use ultrasonic sensors for this system. The sensor will be placed on top of bin that helps in sending the information to the concerned truck driver that the level of garbage has reached its maximum level. Once the information is received, the bin should be emptied soon as possible. With this system, the minimal number of smart bins can be placed around the whole city and the city will still be much better. RFID is a modern and fast-growing mobile technology that differently and exactly identifies a RFID tag embedded in waste bin. The disadvantages of the existing system is that the employees have to go and check the bins daily if they are filled or not, this will results in high cost. If the bin doesn't get emptied on specified time, then the environment becomes unhygienic and illness could be caused and spread. The proposed system will help in removing all these disadvantages. Once driver clears the waste the PDA transfers all the data to the SQL. The back-end server is used to store and process the waste data which is transferred through Wi-fi (wireless fidelity) connection and the internet. Wi-fi is designed for the wireless Ethernet 802.11b standard for WLANs (wireless local area network) enhances bandwidth, making suitable for "local hot spot" service. The present information can be gained regarding the level of the dustbin filled. It will also help in reducing the cost as the truck drivers will have to go only at that time when the bin is full. This will also help in resource optimization and once the bins are emptied at time the environment will remain safe from all kinds of diseases. The cities will become more cleaner and the smells of the garbage will be much less and will keep our environment green and can support Swachh Bharat [8].

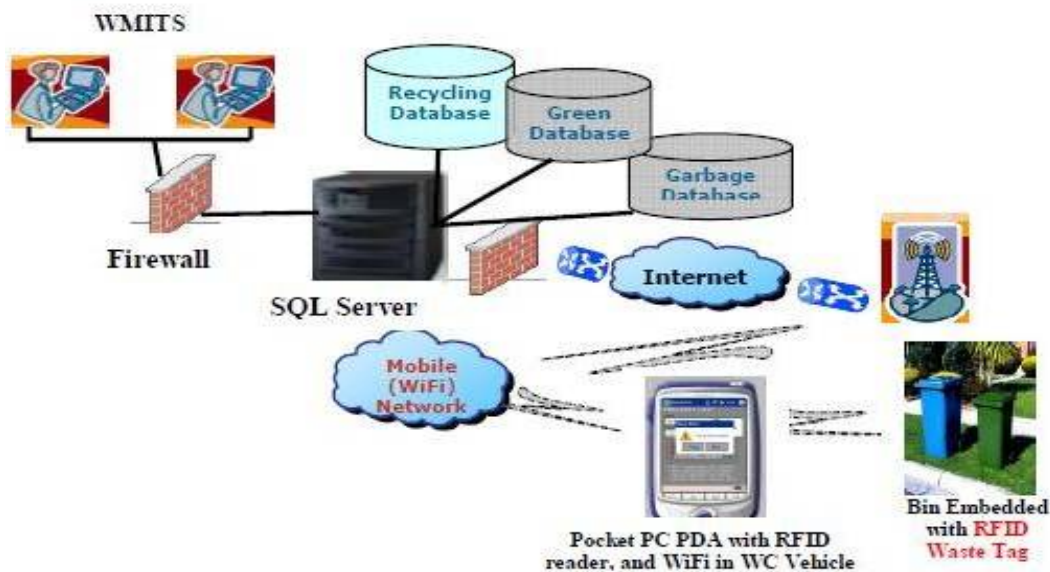
Internet of things is constantly giving different solution to the problems faced by man in current day. Solid waste management is an integral part of smart city. The process of tracking, collecting, and managing could be monitored by providing complete IOT based system. One of the approaches to provide solution to improve the reliability and

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efficiency of the system is LoRa technology. LoRa technology is used for long data communication, when compared to Wi-fi or Bluetooth. Here the sensors are used to collect the data from the dustbin and is sent to the gateway through LoRa technology. The data from gateway is collected and is stored in the cloud over the Internet using the MQTT (message queue telemetry transport). Solid waste management can be divided into segregation, collection and transportation. The working of proposed system architecture address segregation of solid waste that can be done at the initial level. Citizen can segregate the waste according to wet waste (biodegradable) and dry waste (plastic, glass, papers) and dump the garbage in the dustbin placed at different location respectively. Here the IR sensors are used to detect the level of the waste collected. And a gas sensor is used to detect the hazardous gases. LED lights are used for notifications. The sensors and actuator are embedded on microcontroller that collects the sensor data and sends it to the gateway through LoRa transceiver module. The gateway collects the various sensor data from garbage bin placed at different location. Here data is locally processed, and these data are sent to cloud over TCP/IP using MQTT protocol. MQTT protocol collects the data and NoSQL database stores those data. Rule engines are used for analytics and display the collected data on dashboard. By Google Maps and suitable algorithm the trucks can be alerted to collect waste in required location. Report is generated using data analytics and admin panel the concerned authority can monitor the entire process [8]. One of the main problems faced in today's world is waste management system, due to underlying and overflow of wastes from the dustbin result in bad smell and harmful gases causing various diseases which in turn affects our green environment. To overcome the above issue a smart intelligent garbage alert system for garbage was developed. RFID (radio frequency identification) is a technique that is used for verifying and identifying the process which helps the garbage alert system by providing automatic identification of filled garbage in the bin and sends message to clear the garbage. E-monitoring performs remote monitoring to clear the wastes, therefore it reduces the manual work. An android app receives notifications through Wi-Fi/GSM.

- E-monitoring System In traditional approach, whenever the garbage bin is filled the wastes are cleared but they are not periodically removed. Whereas in conventional method, there is use of RFID technology which will overcome the above-mentioned issue.

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- E-monitoring system consists of two parts: 1. Embedded system 2. Web based software system interface 1. Embedded system It comprises of RFID reader, microcontroller, liquid crystal central (LCD) and GPRS/GPSM. 2. Web based software system It consists of GPSM, a central server, database server and webserver. The aim of this system is to develop a better monitoring system for proper municipal solid waste.

- Smart dustbin If the wastes are not disposed properly it leads to air and soil pollution. The harmful gases and the bad smell will adversely affect human beings. To overcome this a smart dustbin was designed. The objective is to overcome improper waste management.

- Design of dustbin the smart dustbin consists of piston, compression plate, lid of opening and leaf switch. The piston moves back and forth in vertical direction. Compression plate is used to compress the waste. Dustbin opening is closed by lid. Leaf switch could be placed upside down using hole on the plate.

- Arduino UNO It is a microcontroller board consisting of 14 digital I/O by connecting battery task can be achieved.

- Ultrasonic sensor HC-SR04 It offers a 2cm – 400cm non-contact measurement function. It converts electrical energy into sound to send pulse. In RFID technology the combination of antenna and microphone are attached on RFID tag it is a small device that stores and sends the data to RFID reader that receives electrical energy after getting transformed from radio frequency.

- System implementation the system is designed to avoid the overflowing of wastes from dustbin by transmitting the alerts to microcontroller. it uses RFID technology to identify and verify process. The function of each parts of the system are enunciated earlier. The block diagram is shown below

## III. CONCLUSION

In the entire world, waste management is a major challenging one. If it is not properly disposed or cleaned which will cause severe diseases and spoil the green environment. There is need of new mechanism to properly dispose the waste. Here a working prototype of the proposed system was successfully created and implemented using technologies. An embedded alert system is used for the proper monitoring and maintenance of the garbage bin. This system alerts for regular clearance of garbage dumped. Thus, this system can provide solution for disease free country and green environment. In this paper we have described multi-layer waste management system architecture for design of a RFID; sensor based real-time automatic WIWSBIS. We have shown the application and implementation of smart garbage monitoring system. Using WIWSBIS, waste management service providers (e.g., municipalities, waste collectors) have a chance to track a waste identity (i.e., customer), weight, missing/stolen bins quickly and accurately without human intervention. This system also helps service providers to automate customer invoices, enhance cost savings and improve security. In this present world, waste management is becoming a challenging task. If it is not properly disposed or cleaned which will causes lot of diseases and spoil the green environment. There is need of new mechanism to properly dispose the waste. Sensors have been used to indicate if the bins are filled or empty. When the bins are filled the truck, driver receives a message to clean the bin. So, an android application is developed through which the user can find a bin near him to throw the trash.

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