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# GARBAGE BIN MONITORING SYSTEM USING IoT

Chayadevi S*, Keerthana M S*, Nimishamba*,Vidyashree C*, Dr. S Meenakshi Sundaram#
*Student*, HOD & Professor#*
*Department of Computer Science and Engineering,*
*GSSS Institute of Engineering and Technology for Women, Mysuru, India*

***Abstract — In our daily life, we see the pictures of garbage bins being overfull and all the garbage spills out resulting in increases number of diseases as large number of insects and mosquitoes breed on it. The main objective of this paper is adequate waste removal and management facilities to improve the health and wellbeing of the city's population. The objective garbage bin monitoring is to determine the garbage level in dustbin with sensors and notify the controlling authority through wireless communication module. Hence our problem statement is to design a System which collecting the garbage from a particular area. We propose a system for the proper management of waste disposal. With the advance in technology we use the Internet of Things (IOT) with Ardiuno. By this we are providing s clean solution for the waste disposal in an efficient manner.***
***Keywords:GSM,IOT,sensors,Ardiuno,GPS***

## I. INTRODUCTION

As the population is increasing day by day, the environment should be clean and hygienic. In most of the cities the overflowed garbage bins are creating an unhygienic environment. This will further lead to the arise of different types of unnamed diseases. This will degrade the standard of living. To overcome these situations an efficient garbage bin monitoring method has been developed. As the scope of IoT is developing day by day effective methods can be found out easily. Various designs were proposed and have advantages as well as disadvantages. This paper is a survey based on Garbage bin monitoring system in Cities using IoT. Improper management of waste affects quality life of the citizens. Threshold value set helps to determine the garbage full condition and informs the concerned authorities to initiate the cleaning operations. The application used to locate the bin reduces the time required for performing the cleaning process.

The implementation of smart garbage management system using sensors, microcontrollers and GSM module assures the cleaning of dustbins soon when the garbage level reaches its maximum. If the dustbin is not cleaned in specific time, then the record is sent to the higher authority who can take appropriate action against the concerned contractor. This system also helps to monitor the fake reports and hence can reduce the corruption in the overall management system.

Internet and its applications have become an integral part of today's human lifestyle. It has become an essential tool in every aspect. Due to the tremendous demand and necessity, researchers went beyond connecting just computers into the web. These researches led to the birth of a sensational gizmo, Internet of Things (IoT). Communication over the internet has grown from user - user interaction to device – device interactions these days.

This reduces the total number of trips of garbage collection vehicle and hence reduces the overall expenditure associated with the garbage collection. It ultimate helps to keep cleanness in the society. Smart collection bin works with the sensors will show us the various levels of garbage in the dustbins and also the weight sensor gets activated to send its output ahead when its threshold level is crossed. If dustbins are not cleaned in time, the details will be forwarded to higher authority. Different implementation methods are explained in the remaining parts.

## II. SYSTEM MODEL

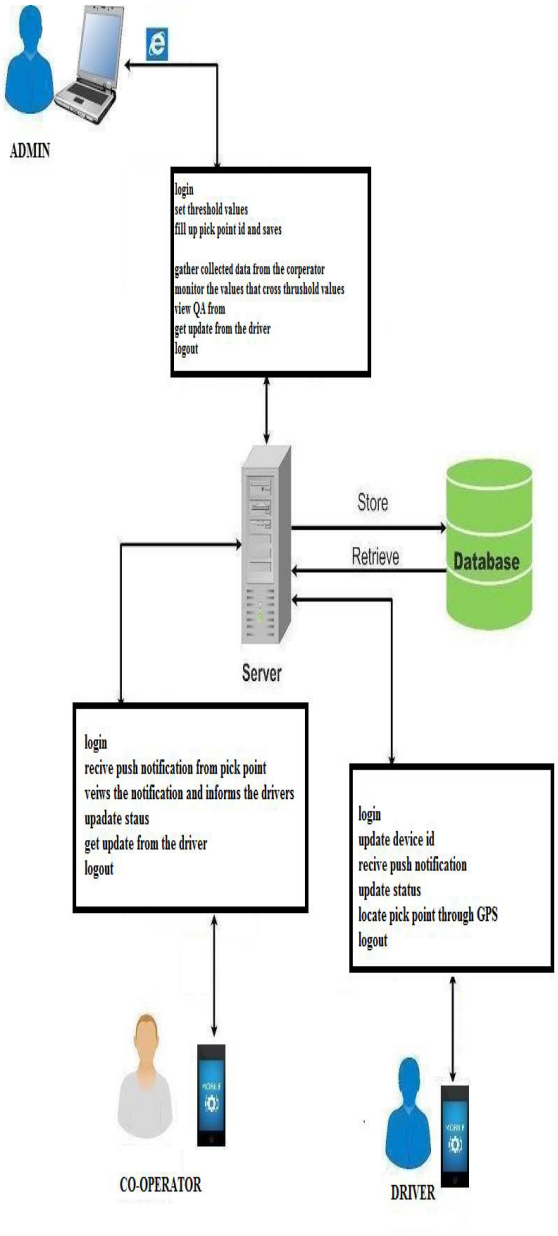



Fig.2.1 Architecture of garbage bin monitoring

ADMIN

The admin should login with valid credentials such as ID and password. Admin should set the threshold values for the methane sensor and the pressure sensor. The admin should fill up the details of the pickup points with GPS tracking from the data obtained by longitudinal and latitude data. The push notification obtained in the Co-operator's phone should be updated to the admin. The admin should monitor the values that cross the threshold. The admin should clear the entry logs that have been done by the driver and the co-operator.

CO-OPERATOR

Receive a push notification from the pickup point from where the driver reaches. As soon as the co-operator receives the push notification he updates it to the driver with the pickup point location. The update the task completion to the admin gets the update from the driver of the completion of the task.

DRIVER

The device of the driver should be recognized by the admin by receiving an email of the device id and its details. Receive a push notification with respect to the pick point. The pickup point is measure with longitudinal and latitude measurement and locates the pick point with the help of GPS.

## III. PREVIOUS WORK

**Vikrant Bhoren.al (March 2015):**-Smart Garbage Management in Smart Cities using IoT proposed a method as follows. The level of garbage in the dustbins is detected with the help of ultrasonic sensors system, and communicated to the authorized control room through GSM system. Ardiuno microcontroller is used to interface the sensor system with GSM system. A GUI is also developed to monitor the desired information related to the garbage for different selected locations. This will help to manage the garbage collection efficiently. Level detector consists of IR sensors which is used to detect the level of the garbage in the dustbin. The output of level detector is given to microcontroller. Four IR sensors are used to indicate the different levels of the amount of the garbage collected in the dustbin which is placed in public area.

**Ruhin Mary Sajien.al(2016)** :-Wi-Fi module , weight sensor for detection of amount of garbage in dustbin. It will only detect the weight of waste, The data from the bins are processed in the DSS and if it is correct it is sent to

organizers of waste collection in this particular place and to the road police The implementation of smart garbage management system using sensors, microcontrollers and GSM module assures the cleaning of dustbins soon when the garbage level reaches its maximum This reduce the total number of trips of garbage collection vehicle and hence reduce the overall expenditure associated with the garbage collection. It ultimate helps to keep cleanness in the society. The main issue is that waste collection does not include innovation that IoT can provide. Models do not use real time information of the waste collection, although some approaches use advanced scheduling and routing via exploiting modern ICT algorithms.

**Dries Buytaerten.al (2016):-** The live/time function is used to select FCPs and to compute the FCP, An Appel-style generational copying collector divides the heap into two generations, a variable-size nursery and a mature generation. The approach presented in this paper to decide when and how to collect, is called garbage collection hints (GCH) and works as follows. GCH first determines favorable collection points (FCPs) for a given application through o ffline profiling While garbage collection offers many benefits, the time spent reclaiming memory can account for a significant portion of the total execution time We now discuss previously proposed GC strategies that are somehow related to GCH, i.e. all these approaches implement a mechanism to decide when or how to collect.

**S.S. Navghaneen.al(May 2016):-** A dustbin is interfaced with microcontroller based system having IR wireless systems along with central system showing current status of garbage, on mobile web browser with html page by Wi-Fi. Hence the status will be updated on to the html page. There by to reduce human resources and efforts along with the enhancement of a smart city vision. Considering the need of modern technology, the smart garbage bin can expensive but considering the amount of dustbin needed in India, there for they used based sensors to reduce its cost and also make it efficient in applications. And at the sender side they used only a Wi-Fi module to send and receive data. It will only detect the weight of waste; not how much level it is of. The message can be sent directly to the cleaning vehicle instead of the contractor's office.

**Monika K en.al(2016):-** Smart bin is built on Ardiuno board platform. It is interfaced with a GSM modem (SIM 900A) and the bin is equipped with Ultrasonic sensor (HC-SR04). THE SYSTEM ULTRASONIC SENSOR Smart bin is built on Ardiuno board platform. It is interfaced with a GSM modem (SIM 900A) and the bin is equipped with Ultrasonic sensor (HC-SR04). ULTRASONIC SENSOR The ultrasonic sensor has two pins: Trigger and Echo, which are used for calculating the distance of the object by generating sound waves and thus calculating the time duration of the echo that is generate .The extent of pollution caused by the existing dustbins was calculated using spatial analyst functions of GIS. It is found that all the dustbins are burnt with wastes and causing pollution to the environment.

**P M.Palkaren.al(2017):-** It senses the weight of garbage can. It is interfaced with microcontroller through ADC. Then microcontroller which is interfaced with GSM module sends a message to the server .The sent messages contains the slave id of the garbage bin. As we have seen number of times the dustbins are getting overflows and concern person don't get the information within a time and due to which unsanitary condition formed in the surroundings. Create the way for air pollution and to some harmful diseases around the locality which is easily spreadable.

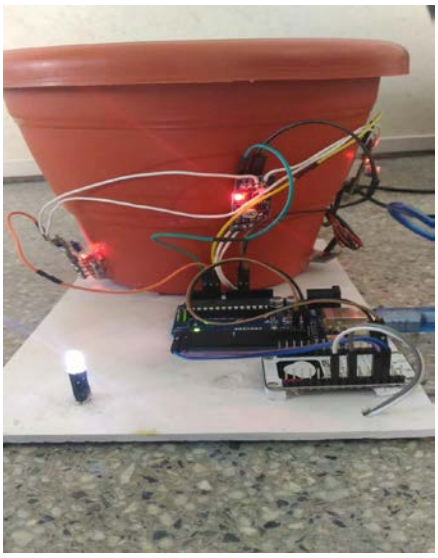
**Asifa Indi1 en.al(2017):-** In authors integrated geographical information system (GIS) to optimize collection to use as Smart Trash System embodies an electronic device known as Smart Trash Bin Implementation of this project helps in avoiding overflow of garbage from the container in residential area which is previously either loaded manually or with the help of loaders The concept of integrated analytics and electronics is used in order to create optimal changes in the conventional methodology of waste collection with the large amount of data that is being produced by the smart bin networks which is further analyzed and visualized at real time to gain insights about the status of waste around the city.

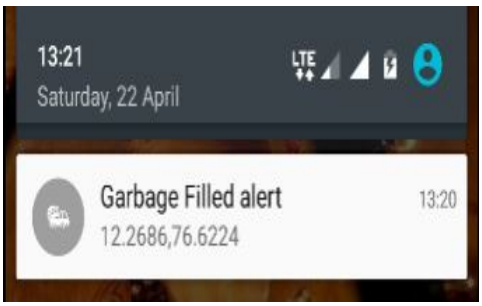
**Sonal Chakole Priyaen.al(2017):-** AT89S52 microcontroller is used to interface the sensor system with GSM system. Sensors are use to monitor the desired information related to the garbage for different selected locations. This will help to manage the garbage collection efficiently. An efficient waste management for uphold a safe and green environment as there are rising all kinds of waste disposal An efficient waste management for uphold a safe and green environment as there are rising all kinds of waste disposal . An efficient waste management for uphold a safe and green environment as there are rising all kinds of waste disposal. The buzzer subsystem produces an audible tone when powered.

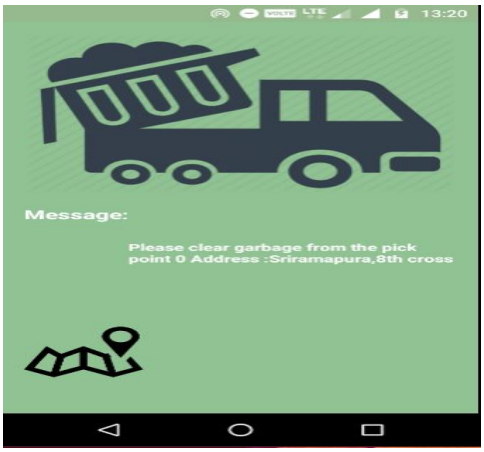
## IV.PROPOSED METHODOLOGY

We propose a system for the proper management of waste disposal. With the advance in technology we use the Internet of Things (IOT) with Ardunnio. The waste collecting tank is developed with three sensors- methane sensor, weight sensor and sensitivity. These three sensors are used for the sensing of different things. Sensitivity sensor will sense the presence of water in the tanks. The weight sensor will sense the weight of the waste. The methane sensor will sense the presence of methane.

In each area, the residential wastes are collected from each house and stored in these dumping tanks. When the waste gets accumulated and reaches the set level, the weight sensor will sense and send an alert to the municipal corporation about the tank is full and needs to be emptied soon. The sensitivity sensor sense the liquid or water inside the tank and methane sensor will sense for methane gas. When wastes are dumped for some time, it starts to decompose and soon it starts to release methane gas. Thus the presence of methane gas illustrates the wastes are getting decomposed and soon have to be shifted from residential place to waste treatment or dump yard. These sensors will be connected to Internet of Things in Ardunnio. Admin will be able to configure the settings of the sensors and their values. This will indeed send push notification to the android mobile of municipal corporation staff. For the convenience of the municipal corporation driver, we use GPS which sends the tank location with coordinates, which is very useful in finding the filled tank. There is almost 24 hours time for the corporation to empty these filled tanks. After 24 hours, notification will be sent to the main corporator in charge. Any further actions are not taken, and then this will be posted as social news in a website. All details about the filled tank will be uploaded where common people can read the news about the society.






## V. EXPERIMENTAL RESULTS

The main scope of this project is adequate waste removal and management facilities to improve the health and wellbeing of the city's population. We aim to provide a clean solution for the waste disposal in an efficient manner. The GPS will give the exact location of the garbage collector tank and describes its condition. The notifications cannot be neglected or entire details will be post to the social media.


Fig.5.1 snapshots of experimental results

## VI. CONCLUSION

Urbanization is at its rapid growth stage around the world, as more number of people desire to live in the city lights with more opportunities for growth and success. Cities are expanding like never before to accommodate this growth and in this process the concept of smart cities came into action. The parameters like cleanliness and hygiene are the topic of concern in these smart cities and concrete measures should be taken for that. Also, the growth should go hand in hand with the green environment and research should be further done on such technology. Our work is a small but efficient step towards cleanliness and we believe that this paper would encourage people to do good work on the similar topics. We have successfully made and tested the model of our smart bin so we believe with encouragement from the side of government we can successfully transform this model into product.

As the level of garbage in the bins crossed the threshold, it will be informed to the corresponding authority, if it was found ignored then the details will be forwarded to the higher authority to take necessary actions. Thus a hygiene and clean environment can be provided.

This also makes use of GPS technology in Android application to alert the nearest employee and hence reducing the time for the dustbin cleaning process.

This Smart Dustbin can contribute a lot towards clean and hygienic environment in building a smart city. In past few years, the growth of cities is rapidly going high. And in coming few years the cities would become developed and smart one. But, the smart city is incomplete without a smart garbage management system

From this paper, we believe that people get encouraged to build some other systems using different techniques and help nation to become diseases free. Also we believe, encouragement from the side of government can transform the prototype into a product.

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