

Garbage Collection System Using IOT

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Abstract - The method of connecting the objects or things through wireless connectivity, Internet called Internet of Things. Nowadays a variety of tasks are based on IOT. Cities in the world are becoming smarter by implementing the things around using IOT. This is a new trend in technology. One of the objectives of smart cities is keeping the environment clean and neat. This aim is not fulfilled without the garbage bin management system. Hence the paper "IOT Based Intelligent Bin for Smart Cities" has been developed. Bin management is one of the major applications of IOT. Here sensors are connected to the all the bins at different areas. It senses the level of garbage in bin. When it reaches threshold a message is sent via GSM to the concerned person to clean it as soon as possible.

Index Terms:— GPS, Ultrasonic Sensor, GSM, Microcontroller

I. INTRODUCTION

Garbage management is that the assorting, transporting garbage, processing, reusing or eliminating and monitoring garbage materials. Garbage management is very crucial and it has become one of the major issues due to high population density. To reduce the impact of garbage, Municipal Corporation has developed an efficient garbage management system. In India, waste generated per capital ranges from 200g to 500g. Many organizations have estimated that in India 1.3 to 1.5 pounds of waste is generated per a person. It is even estimated that 47 million tons of waste is Generated in the year 2001. In the recent 2 years this has increased to 95 million tons. The efficiency of collecting the garbage is poor in Indian cities compared to other countries. Thus, Indian Government is struggling to manage the garbage. Issues with respect to the disposal has become challenging with growth in population. Poor garbage collection and improper transportation facilities are answerable for the earnings of garbage at all spots and points of the city. Due to these unavailable facilities, municipal garbage management is getting critical. Improper garbage management further leads to incurable diseases to living organisms. Thus to avoid waste overflow "Garbage Management using IOT" has been proposed.

II. RELATED WORK:

^[1]"Top-k Query based Dynamic Scheduling for IoT-enabled Smart City Waste Collection", Theodoros Anagnostopoulos¹, Arkady Zaslavsky², Alexey

Medvedev³, Sergei Khoruzhnicov⁴, proposed that ZigBee, GSM (Global System for Mobile Communication) and ARM7 is used to form the Integrated system to monitor the waste bins remotely. The sensors are placed in the common garbage bins placed at the public places. When the garbage reaches the level of the sensor, then that indication will be given to ARM 7 Controller. The controller will give indication to the driver of garbage collection truck as to which garbage bin is completely filled and needs urgent attention. ARM 7 will give indication by sending SMS using GSM technology.

^[2] "Waste Bin Monitoring System Using Integrated Technologies", Kanchan Mahajan¹, Prof. J.S. Chitode², proposed that they came to a point it is important to understand the societal concerns over the increased rate of resource consumption and waste production and therefore the policy makers have encouraged recycling and reuse strategies to reduce the demand for raw materials and to decrease the quantity of waste going to landfill.

^[3] "Measuring and explaining the cost efficiency of municipal solid waste collection and processing services", Nicky Rogge, Simon De Jaeger it is being proposed in this paper that introduction of an integrated system combined with an integrated system of Radio Frequency Identification, Global Position System, General Packet Radio Service, Geographic Information System and web camera will solve the problem of solid waste. They also analyzed the actual performance of the system.

^[4]“Improvement Of Solid Waste Collection By Using Optimization Technique”, Mr. Amar A. Katkar the objective of study was to determine the characterization of the waste and the current system of management activities. The paper highlights an overview of the current municipal solid waste management (MSWM) system of Municipality and it concludes with a few suggestions, which may be beneficial to the authorities to work towards further improvement of the current management systems.

^[5]“IoT Based Intelligent Bin for Smart Cities”, Meghana K. C., Dr. K R Nataraj proposed the system that describes the level of garbage in the dustbins is detected with the help of Sensor systems, and communicated to the authorized control room through GSM system. 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

^[6]“IoT Based Waste Management for Smart City”, Prakash Prabu V it describes the application of our model of “Smart Bin” in managing the waste collection system of an entire city. The network of sensors enabled smart bins connected through the cellular network generates a large amount of data, which is further analyzed and visualized at real time to gain insights about the status of waste around the city. This paper also aims at encouraging further research in the topic of waste management.

III. PROBLEM STATEMENT:

As we have seen number of times the dustbins are getting overflowed and concern person don't get the information within a time and due to which unsanitary condition formed in the surroundings at the same time bad smell spread out due to waste, bad look of the city which paves the way of air pollution and to some harmful diseases around the locality which is easily spreadable.

IV. OBJECTIVE:

To achieve a clean system for creating smart cities. And find the best route for collecting solid waste in city. Also Reduce the fuel cost by find the shortest route.

V. PROPOSED METHODOLOGY:

For detecting the garbage, many sensors like weight sensors, Ultrasonic sensors, etc. can be used.

Weight sensor is the one which gives the information about the weight of garbage. But using this is not efficient because it doesn't identify the level of waste in the bin. Hence ultrasonic sensor is used which is a multipurpose sensor, which can detect the level of garbage. Ultrasonic sensor allow for the reliable detection and measurement of objects. They send pulsed ultrasonic waves of a certain frequency and determine the objects distance from the duration of the ultrasound that it reflects.



Fig 1. Ultrasonic sensor

Wireless communication can be achieved using many devices. Those devices are Sigsbee, GSM, etc. In this project GSM is used. Sigsbee can also be used but the disadvantage with it is its short range, less complexity and the speed of data is less. Hence compared to Sigsbee, GSM has more advantage because it is simple to use and cost is less. GSM modem is a unique type of wireless modem, accepts a SIM card and it operates similar to mobile phone with its own specific mobile number. GSM modem mainly consists of antenna for wireless communication, SIM holder, communication port, ON or OFF switches and power supply. A GSM modem is connected to the computer via serial or USB cable. The advantage of connecting is it provides mobile network to the computer to transfer and exchange information with modems. Meanwhile it provides mobile internet connectivity and also used for forwarding the SMS and MMS messages.

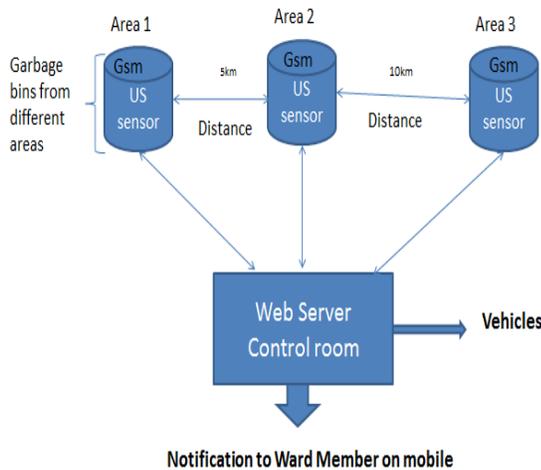


Fig 2. Block Diagram

The block diagram shows the different component used in the smart dustbin system ultrasonic sensor, @80mega32 microcontroller, Gsm, Gps are used. The project module is divided into two parts transmitter section and receiver section as,

A. Transmitter sections

The Figure shows the block diagram of transmitter section. Level detector consists of ultrasonic sensor which is used to detect the level of the garbage in the dustbin. The output of level detector is given to microcontroller. When the dustbin is filled up to the highest level, the output of ultrasonic sensor receiver becomes active low. This output is given to microcontroller to send the message to the Control room via GSM module as shown in figure

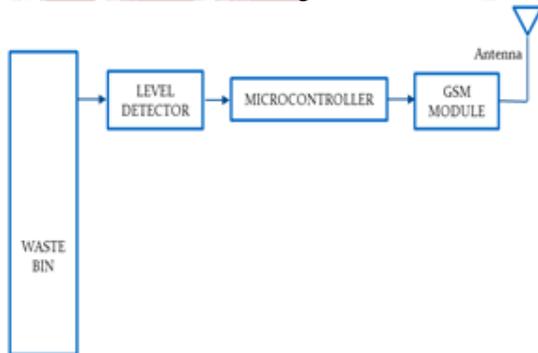


Fig 3. Transmitter Section

B. Receiver section

The figure shows the block diagram of receiver section. At receiver, control room is present where all the activities are manage. The number of the control room is

depends on the dustbins present in the area. The person sitting in the control room monitors the entire system. A GSM Module is connected to the computer of the control room through microcontroller. The entire system is monitor by the person sitting in the control room. The same GSM Module is used to send the message to the contractor for cleaning the dustbin. This room to display the status of the garbage level in the dust bin as shown in figure

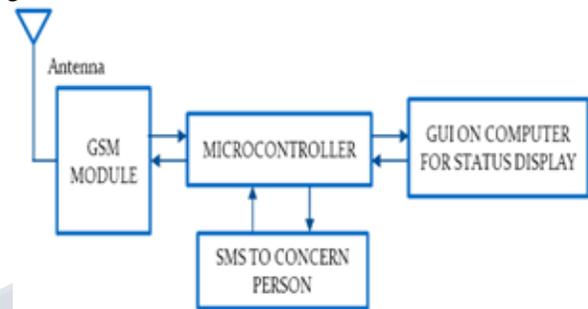


Fig 4. Receiver Section

VI. IMPLEMENTATION:

The sensor is placed in the garbage bin at a max level if that level is crossed by the garbage in the bin, then sensor will sense that and will communicate to microcontroller through GSM. When the garbage box becomes full, the ultrasonic sensor to its lid will detect the level and send a command through GSM. The GSM receiver will always receive the command and show the condition of garbage box will display on computer. The message would be that the garbage bin 1 in particular area is filled completely. Please collect it. At the same time a same message will be send to a drivers mobile that particular garbage bin is completely full through short message service.

VII. CONCLUSION:

This paper shows the implementation of smart garbage management system using GPS, ultrasonic sensor, microcontroller and GSM module. This system 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 and keeps environment clean. It reduces the total number

of trips of garbage collection vehicle and hence, reduces the overall expenditure associated with the garbage collection. It ultimately helps to keep cleanliness in the society. Therefore, the smart garbage management system makes the garbage collection more efficient.

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