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IOT Based Smart Garbage Monitoring System

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Abstract: *Waste management is one of the primary problems faced in India irrespective of the case of developed or developing regions. The key issue in the waste management is that the garbage bins at public places gets overflowed well in advance before the commencement of the next cleaning process. It in turn leads to various hazards such as bad odor and ugliness to that place which may be the root cause for the spread of various diseases. Healthy environment is imperative to a healthy and a happy community so this problem needs to be tackled smartly. As the Internet of things (IoT) is giving us unique solutions to everyday problems, we propose a smart garbage alert system for efficient waste monitoring. The proposed system will consist of waste bins that are equipped with ultrasonic sensors ,DHT 11, Gas sensor which are interfaced with Arduino Uno and a Wi-Fi module. The system will collect the waste fill level status and upload the data to database. This data will be used to represent the fill levels of all the bins on the android application. Once a bin gets filled, notification will be sent to the appropriate client based on their location. Based on the number of filled bins an optimized pickup path will be displayed to cover all the filled bins. This system will thus eventually reduce the manual process of verification of the garbage fill levels.*

Keywords: *Smart Devices; Internet of Things , Android , Garbage Monitoring System.*

I. Introduction

A healthy environment is necessary if you want to stay healthy. Though the world is in the stage of upgradation there is yet another problem that has to be dealt with which is "Garbage". In most of the places overflowing of garbage bins takes place. This gives rise to various diseases as large number of insects and mosquitoes breed on it. In India the absence of efficient waste management has led to some serious issues, it is a big challenge faced by most of the regions of India. Hence smart garbage monitoring system is a system which can eradicate the problem or can reduce it to the minimum level.

In this project, we are going to propose a system for the immediate cleaning of the dust bins. As dustbin is considered as a basic need to maintain the level of cleanliness in the city, so it is Very important to clean all the dustbins as soon as they get filled. We will use ultrasonic Sensors for this system. The sensor will be placed on top of bin which will help in sending the information to the office that the level of garbage has reached its maximum level. After this the bin should be emptied as soon as possible. The concept of IOT when used in this field will result in a better environment for the people to live in. No more unsanitary conditions will be formed in the city. With the help of this system minimal number of smart bins can be used Around the whole city and the city will still be much cleaner. There has been an unprecedented growth in the number of devices being connected to the Internet since past few years. All these devices connected to the internet are part of the IOT Infrastructure which can communicate with each other. The IOT network consists of Embedded electronics, sensors and software that allows these devices to send and receive data Among each other. This is why it is beneficial to use such an existing infrastructure for Designing the proposed security system.. If the bin doesn't get emptied on time then the environment becomes unhygienic and Illness could be spread. The proposed system will help in removing all these disadvantages. The real-time information can be gained regarding the level of the dustbin filled on the system Itself. It will also help in reducing the cost as the employees will have to go only at that time when the dustbin is full. The garbage containers transmit signals to indicate that they are over 80% or 90%full and should be emptied. Via the mobile communications network, the signals are sent to a web based software application used by the waste management company. In the software, the capacity of the container is indicated, which is taken as a basis to plan the best route for waste collection garbage trucks travel only to those containers that actually need to be emptied.

A robust ultrasonic sensor is installed in the garbage container and detects the filllevel regardless of what has been deposited inside. The whole system contains ultrasonic sensor, arduino board, DHT 11, gas sensor,wifi module .The sensor is fixed on to the bread board. the connection between the Arduino board and

sensor is made with the help of connecting wires. The working program is fed into the arduino board. The wifi module is also connected to the same arduino board with the help of wires..

II. Literature Survey

Paper[1]: FetulhakAbdurahman, SileshiAweke , Chera Assefa "Automated Garbage Monitoring System Using Arduino"iosr Journal of Computer Engineering (IOSR-JCE) , Volume 20, Issue 1, Ver. I (Jan.-Feb. 2018), PP 64-76

In this paper ,the level of the garbage is detected with the help of ultrasonic sensor and sent to the authorized agency for garbage collection through GSM system. PIR sensor is used to detect the motion of the people coming to the garbage bin with trash while the bin is at full status and block adding of any more garbage to the bin through informing them by speaker. The GSM and the peripheral sensors used are interfaced through the Arduino microcontroller. A GUI is also developed to monitor the desired information related to the garbage bins for different selected locations. Depending on the received messages through the GSM at control room it is displayed on LCD and the authorized person inform the drivers to collect the garbage on time. This will capably help to monitor the garbage collection to make the environment smart, clean and safe.

Paper[2]: Swarna m1, k j anoop2, k kanchana "Iot Based Garbage Box Monitoring System" International Journal of Pure and Applied Mathematics

Volume 119 No. 15 2018, 2713-2723.

In this paper, The new world of system and network model is being done by the increase of various strategies. More over smart strategy are rooted in the surroundings to check and collect exact information.IOT can also be implemented in the field of waste management system. Trash management involves not only the gathering of the trash in the ground but also the transfer and removal to the suitable locations. This article represents a comprehensive and detailed investigation of waste management models. Exclusively, this paper focuses on the execution of smart procedure as a key enabling technology in contemporary trash management system.

Paper[3] :Dr. K. Alice Mary, Perreddy Monica, A. Apsurrunisa, Chathala Sreekanth "IOT Based Garbage Monitoring System" International Journal of Scientific & Engineering Research, Volume 8, Issue 4, April-2017

This paper IOT Based Intelligent Garbage Monitoring system is a newfangled system which will keep the cities clean. This system monitors the garbage bins and informs about the level of garbage collected in the garbage bins via a web page. This system uses two ultrasonic HC-SR04 sensors placed over the bins to track down the garbage level and correlate it with the garbage bins depth. The system makes use of 8051 microcontroller to control every process and Wi-Fi modem for sending data to server. Dustbins are provided with economical implanted components which helps in tracking the level of the garbage bins and an unparallel ID will be provided for every dustbin so that it is easy to find which garbage bin is full. When the level reaches the threshold limit, the device will transmit the level along with the unique ID provided. This data can be retrieved by the person who has authority to access the data from their place with the help of Internet and an immediate action can be made to empty the dustbins.

Paper[4]:Ashima Bajaj and ,Sumanth Reddy "Garbage Monitoring System Using IOT" International Journal of Pure and Applied Mathematics Volume 114 No. 12 2017, 155-161

This paper Garbage Monitoring system using IOT is a very innovative system which will help to keep the cities clean. This system makes use of microcontroller, LCD screen, zigbeemethodology for sending data. Ultra sonicsensors are used to detect the level of garbage collected in the bins. The LCD screen is used to display the level of garbage collected in the bins.

Paper[5]: Parkash, Prabu, "IOT Based Waste Management for Smart City", International Journal of Innovative Research in Computer and Communication Engineering, Vol. 4, Issue 2, February 2016.

In this paper, there are multiple dustbins located throughout the city or the Campus,these dustbins are provided with low cost embedded device which helps in tracking the level of the garbage bins and an unique ID will be provided for every dustbin in the city so that it is easy to identify which garbage bin is full. When the level reaches the threshold limit, thedevice will transmit the level along with the unique ID provided. These details can be accessed by the concern authorities from their place with the help of Internet and an immediate action can be made to clean the dustbins.

Paper[6] :Andrea Zanella, Nicola Bui, Angelo Castellani, Lorenzo Vengelista, and Michele Zorzi,"Internate Of Things for smart cities" IeeeInternate Of Thingsjournal, Vol. 1,No. 1 February 2014.

In this paper , we focus specially to an urban IOT system that, while still being quite a board category, are characterized by their specific application domain. Urban IOTS, in fact , aims at exploiting the most

advanced communication technologies to support added value services for the administration of the city and for the citizens. This paper hence provides a comprehensive survey of the enabling technologies, protocoal, and architecture for an urban IOT.

Paper[7]: Kanchan Mahajan1, Prof.J.S.Chitode "Waste Bin Monitoring System Using

Integrated Technologies"International Journal of Innovation Research in Science, Engineering and Technology Vol. 3, Issue 7, july 2014

In this paper, Zigbee and Global System for Mobile Communication (GSM) are the latest trends and are one of the best combination to be used in the project. Hence,a combination of both of these technologies is used in the project . To give a brief description of the project , 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.

III. Proposed Approach

IOT Based smart garbage monitoring system using ESP8266 is very simple and real time .Basically the process starts from the garbage bin. IR Sensor are fixed on the each level of the garbage bin. Here we are taking the 2 garbage bin . we are providing the unique ID for garbage bin. Also we are selecting the threshold level for alerting purpose. Garbage level sensed by IR sensor. As soon as the garbage in garbage bin crosses the threshold level , the alerting text message will get provided to concerned person or in the municipality office. This message contains the garbage bin ID along with the GPS link. This link will help to find the shortest path of that garbage bin. This is helpful especially for new drivers of that municipality vehicle.The whole system contains ultrasonic sensor, arduino board, DHT 11 ,Gas sensor, ESP8266 WIFI Module, IR Sensor. the connection between the Arduino board and sensor is made with the help of connecting wires.

The working program is fed into the arduino board. The ultrasonic sensor will fix on the top of the garbage bin. The ultrasonic sensor will measure fill level of bin after certain interval. We used DHT 11 Temperature and humidity .it is need to keep track of humidity and temperature readings. Also used gas sensor interact with a gas to measure its concentration. Arduino uno unit will be interfaced with wifi module and ultrasonic ranging sensor. The wifi module will request for fill level after a certain interval of time. The Arduino will sense the fill level using ultrasonic sensor if there is a change in fill level , the data will be forwared to the wifi module then online check if distance is less on garbage bin the bin is full.

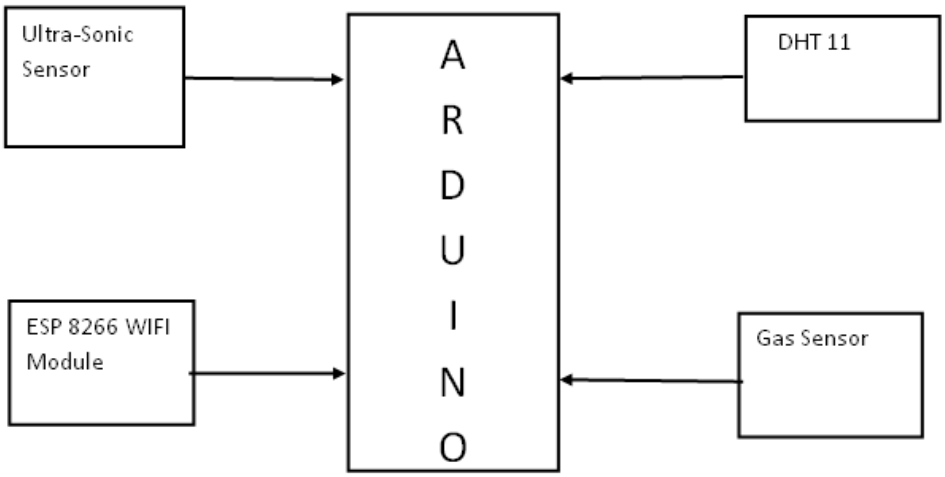


Fig1. Working diagram of garbage monitoring system

FLOW CHART

Figure show the step by step procedure of garbage monitoring syatem as follows.

Step 1: Wifi connect for data transfer to the cloud

Step 2: temperature , humidity , odor, distance will read it analog digital convertor.

Step 3: After that will send it through Wifi sensor.
Step4: online check if distance will less than threshold then bin is full, and if distance will more than threshold then bin is not full.

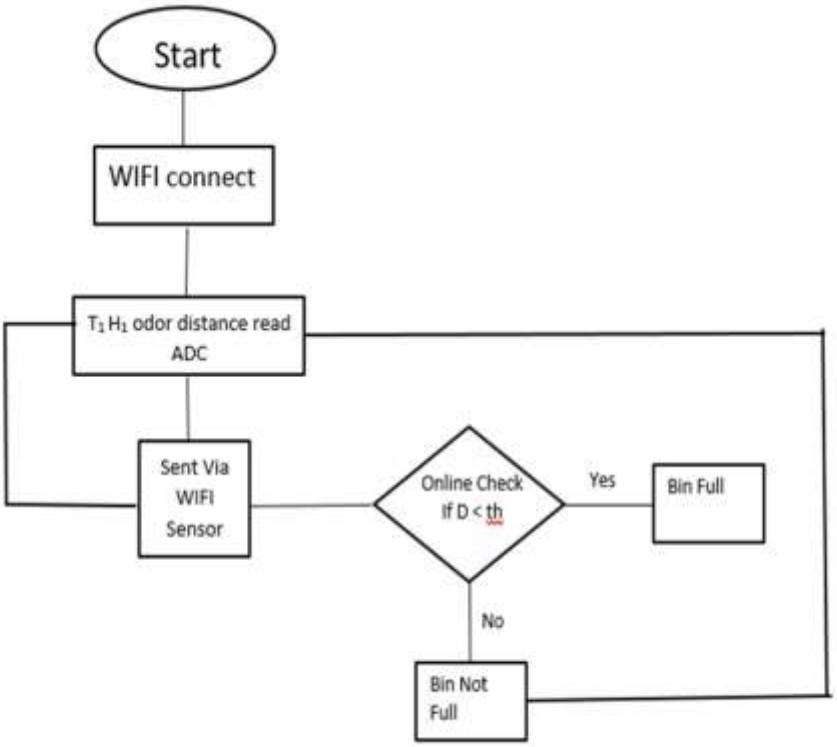
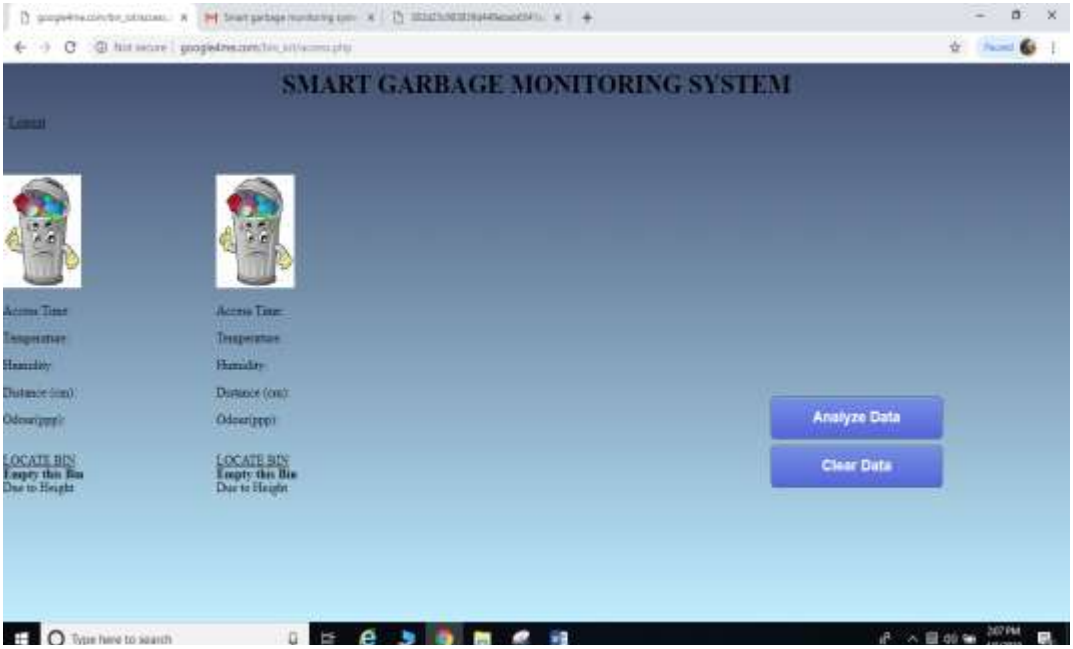


Fig 2. Flow chart of garbage monitoring system

Output



IV. Expected Result

Waste level detection inside the dustbin.Transmit the information wirelessly to concern. The data can be accessed any time and from anywhere. The real time data transmission and access. Avoids the overflow of the dustbin. This IOT beached waste management is very useful for smart cities in diverse aspects. We have seen that, in cities there are dissimilar dustbins located in different areas and dustbins become over flown many times and the concerned people do not get info about this. Our system is designed to crack this issue and will offer complete details of the dustbins located in different areas throughout the city. The allocated authority can access the information from anywhere and anytime to get the details. Accordingly they can revenue the decision on this immediately.

V. Conclusion

In this project, an integrated system of Wi-Fi module, IoT, Arduino ,DHT 11 ,gas sensor, Ultrasonic Sensor is introduced for efficient and economic garbage collection. An Arduino based smart garbage monitoring and alert system is devised which eliminates the need of manual verification process which is prone to human-error and neglect. The system averts the irregular cleaning of the bins by sending alerts to the concerned individuals. The garbage bins in public places get overflowed before the commencement of next cleaning process. This system provides real-time monitoring of fill-levels, hence the pick-ups can be organized to prevent overflowing of the bins. Thus, this system helps to reduce human intervention in garbage monitoring and makes the entire process more efficient.

References

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