IoT Based Waste Management and Monitoring in Smart Cities

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Abstract : - **As the days progress, the is growth of population simultaneously. This affects the environment on a negative way. The overflowed garbage turns out the city unclean. This results in spread of various ailments. It may highly affect the way of living. To get rid off this problem , the government has implemented smart waste management techniques. Due to development in IoT, effective means this found easily. Various plans are proposed to overcome such problem of waste management. This article is a report based on smart garbage management in urban areas by using IoT technique. It includes various ideas that can be followed regularly. My project involve garbage management ideas contains RFID reader for identifying the person, DC motor with mechanical shaft for reduced the level of garbage, ultrasonic sensor connected to the garbage tank at upper position for detect the level of garbage position when garbage tank is full ultrasonic sensor send the signal to the control unit at the same time dc motor is on the electronic shaft is connected to the dc motor this shaft is used to reduced the level of garbage. Each person in the society have a RFID card. Every time when a person dumps his garbage in garbage tank of garbage location1, the RFID reader scan the card and identify the person at the same time point is added in his account. After successful accumulation of particular points a reward is awarded to him. This will encourage people to drop their garbage in garbage tank only.**

Keywords: Waste Monitoring and Management, Ultrasonic Sensors, raspberry pi, RFID reader, RFID card, LCD display, Mechanical Shaft with dc motor, Alarm, IoT.

I. INTRODUCTION

Due to ever increasing population, there is a mess in the city areas. It is all because of lack of cooperation and limited funding for welfare of the people. Due to disorganization of city governments, the city has turned into a waste ground. The overflowing garbage bins is becoming a global problem day by day. The authorities are ignoring and hence creating problems for future generations. The government should look into it as soon as possible.

The internet and its services have become vital in today's world. Its has proved itself important in every field. It has gained a lot of demand today. So people are running behind it. Science has also contributed a lot on this field. These researches lead to gizmo an IoT communication techniques all over. IoT techniques are found a long way back but its still in it's developing stage. This technique can work to overcome the problem of waste management

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The remaining part of the paper is organized as follows. In Section II survey of all methods will be described in detail. The proposed system and the paper concludes with a brief summary in section III.

II. LITERATURE SURVEY

The ways to manage garbage in cities has to be implemented as soon as possible. Various proposals have been out and also brought into picture. But some of them cannot be said as efficient. So a report has been published which shows signs of a smart and a clean city.

The paper [1] proposed an latest judgment backing system for basic waste management in urban areas. A standard for data giving between vehicle drivers in order to perform efficient waste management and dynamic route merger is decide by the system. The CCTV cameras are integrated for capturing the ambiguous areas and provide evidence to the concerned authorities. Providing high quality service to the citizens is the aim of this system. The two main aim of the system is to provide software as a service to customers. Mainly, these clients are individual companies that are involved in waste accumulation, dominate waste trucks, organize work of drivers, get contracts from municipalities and send garbage for recycling administration or city dumps. Second main destiantion is design a system, which create achievable mutually usable connection between all the stakeholders and apply solid waste in smart city. This article has been put for effective waste management in smart cities.

   The paper [2] Smart Garbage Management in Smart Cities using IoT planned a approach as follows. The level of garbage is catch by using ultrasonic sensors system, and sending the result to the main control room through GSM system. Here arduino micro-controller is used. A GUI is also developed to watch the expected information related to the garbage for different selected locations. This will help to administer the garbage collection efficiently. Level locator consists of IR sensors which is used to

catch the level of the garbage in the dustbin. The output of level collector is given to micro-controller. Four IR sensors are used to indicate the various levels of the amount of the garbage absorb in the garbage tank which is located in public area. When the garbage tank is reaches the maximum level, the output of fourth IR acceptor becomes active low. This output is disposed to micro-controller to give the signal to the authority room over GSM module. At accepting, authority room is available where all the process are advising. This system satisfy the washing of garbage tank soon when the dust level reach its maximum. If the dustbin is not washed in specific time then the report is sent to the higher authorization person who can take applicable activity across the concerned contractor. This arrangement also advice to watch the bogus reports and hence can depress the corruption in the overall arrangement. This depress the outing of garbage collection truck and hence reduce the overall consumption related with the garbage collection. It helps to keep freshness in the city and society. Therefore, this arrangement makes the garbage collection more efficient.

Another method for garbage management is introduced [3] as follows. A garbage pits is connected with micro-controller base design having a IR sensor with central controller on mobile web page with the help of Wi-Fi. Hence the status of the position of the garbage tank is showed on web-page on mobile phone. Whole process is done by minimizing the human resources as well as efforts with achieving the vision of smart city. Administering the requirement of latest technology, the smart garbage pits can high cost but consider the cost of dustbin needed in India, there for they used based sensors to reduce its cost and also made it effective in applications. And at the transmitter side they used only a Wi-Fi module to send as well as receive the signal. But with the use of weight sensor for detecting the amount of garbage in garbage tank. Only the weight of garbage tank is detect level is not detect. The cleaning vehicle receives the message instead of administrator office in this way garbage tank is managed.

 A survey presented in [4] reviews the article completed on waste collection in developing countries as well as developing cities from year 2005 to year 2011 and administration of challenges for developing countries in waste contribution sphere. The research outline on administrator of the stakeholders behavior and changing of different influential factors defining their action in waste collection process. The system in the article was checked on real analysis of real time data. Determination system method for solid waste contribution in developing cities is available. This research is also compare with the history and the current practices, available from 1960s to 2013. The result of the survey we conclude that developing and implementing solid waste collection method in developing cities and developing countries are the greater value. In this survey the main problem is that the IoT provide innovation is not available in the waste collection. But some methods use advance scheduling as well as routing of modern algorithm of IoT. Here information about the waste collection is not uses real time.

A GIS transportation model that is Geographical Information System model used for solid garbage contribution that describes ideas for waste collection storage of waste as well as disposal of waste has been shown in [5] for the city in India. This is a transportation model. For the Eastern Finland proposed model by enhanced routing as well as scheduling garbage collection, the variable uses of guidance neighboring threshold action. The signal or value of data from the pits are sending for further use in the DSS and if it is right it is proceed to administration of waste collection in this specific place and to the police of road. The driver of truck doesn't waiting or wasting the time, he goes to the another location and the route is repeatedly recounted. In this method when problems in this is solved then system recounting the route for that truck which is available and the garbage from the open pits or the open garbage tank is collected. It is also combining with the one of dynamic routing algorithm to increase the efficiency of the waste or garbage collection.

Another method [6] is that, Once the waste reaches the maximum level ultrasonic sensor will ON the GSM modem which will alert continuously the required admin until the garbage in the garbage tank is suppress. Once the dustbin is squashed, people in the society can reusing the dustbin. At regular time of intervals garbage tank will be suppress. in In this article , GSM 900A modem is used to send the messages of level of garbage tank . It involves a GSM modem with connected serial port RS-232, USB also connected, so that it also can easily connected to the other devices. The ultrasonic sensor is use to checked the level of garbage filled at different time intervals. Here three sensors are using at various level of garbage tank. One sensor is place at surface level. This methods has various features like it is durable, it is also affordable, here also prevention against damage and prevention against maintenance issues. But tis system require a more amount of machines as well a labors.

In paper [7] Infrared sensor i.e. IR sensor is used which is a multiple application sensor, which can detect the position or level of garbage. Light is emits by a IR sensor , the light is invisible light to naked eye but only the electronic components available in the system can detect the invisible light. It involves transmitter as well as receiver of IR sensor. The National Instruments myRIO-1900 is used for detection of IR sensor output. IR sensor is input and or output device which is reconfigurable as well as portable. The connector between the NI myRIO-1900 and host of the computer is deals with an USB. It has two connectors that is A and B that deals as an expansion port and a connector C that deals as a mini-system port, they carry the signals and these signals are distinguished by different connector names. Different sensors use for Sensing the level of the pits. The GUI gives the output of what level of dustbin is filled. It gives the information related to the level of garbage is full or empty. When the level in a bin is reached the max threshold level, the LED available at the place of the pits starts blink. When the blinking LED is cached, a display shows the location of the pits, status related to level of the pits, data as well as time when the pits gets totally filled,

through mobile number and the text message is send to the person who is concerned for this task. But this system does not ensure whether garbage is cleaned or not cleaned. The cost of transportation is another issue.

Another important solution was proposed in [8], there are multiple garbage tank are available and located throughout the city or the area, these garbage tank are provided with low cost embedded device which is use for tracking the level of the garbage pits or garbage tank and a unique ID will be send for every dust-pits in the city so that it is easy to identify which garbage pits is full and which garbage tank is empty. The project system is subcategories into two parts Transmitter section and the receiver section. 8051 micro-controllers is used at the transmitter section, The RF Transmitter and different sensors these are connected to the garbage tank Where sensor is used to detection of the level in the pits showing the pits are empty or filled. The different sensors are use for sensing the parameter which are available in the garbage tank and sends the message or the data signal to the 8051 micro-controller, Power Supply, +9V Battery operated power supply is given to the 8051.
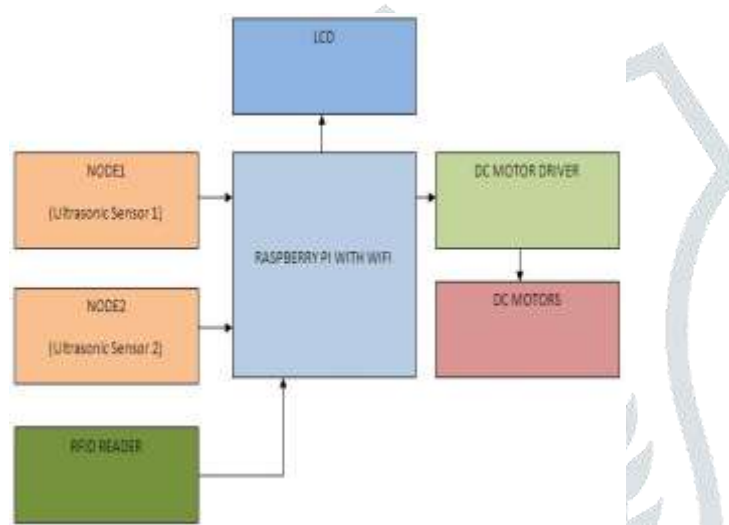
III. PROPOSED SYSTEM

Fig.1. System block diagram

The block diagram for proposed system is as shown in Fig. 1. The main aim of this system is to manage garbage in different areas or locations in the city. This system uses RFID reader for identifying the person, DC motor with mechanical shaft for reduced the level of garbage, ultrasonic sensors for detecting level of garbage in garbage tank, After detecting level of garbage in garbage tank motor will automatically ON to manage garbage in tank. In the proposed system we are monitoring level garbage present at two locations. One controller with two ultrasonic sensors are connected to the garbage tank or bin. Two ultrasonic sensors show the two nodes means two different locations. Every time when a person dumps his garbage in garbage tank of garbage location1, the RFID reader scan the card and identify the person at the same time point is added in his account. After successful accumulation of particular points a reward is awarded to him. This will encourage people to drop their garbage in garbage tank only.

IV. CONCLUSION

This survey has been conducted to turn the city into a clean and hygienic one. As the level of trash in the bins will cross its limits, it will be informed to the concerned authority. It this does not happen then the higher authorities will come into force and take action. Hence we will find a clean and best city ever. This article will help us understand the progress of the city.

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