International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 09 | Sep 2020 www.irjet.net p-ISSN: 2395-0072

SMART CITY WASTE MANAGEMENT SYSTEM USING IOT

Jeet Shah[1], Abhijeet Patil[2], Prasad Nanavare[3], Vineet Patidar[4], Prof. H. A. Bhute[5]

[1-5]Dept. of Computer Engineering, SAE Kondhwa, Savitribai Phule Pune University, Maharashtra, India.

Abstract: As the population of world is increasing day by day, the environment should be clean and hygienic for our better life leads. Waste management is one of the primary problem that the world faces irrespective of the case of developed or developing country. In most of the cities the overflowed garbage bins are creating an obnoxious smell and making an unhygienic environment. And this is leading to the rapid growth of bacteria and viruses which are causing different types of diseases. To overcome these situations efficient garbage collection systems are getting developed based on IOT. In this paper, we inspire and propose an Internet of Things (IOT) using Garbage Monitoring And Waste Management System For Smart Cities. The main purpose of project is to develop the system which uses the information collected from sensors to manage the collected waste. In proposed system the each Smart City Waste Col- lection which are located in several areas of city are connected to Internet wirelessly, they equipped with sensors which collects the data about level of collected waste in Smart City Waste Collection. Then Smart City Waste Collection sends this informa-tion to central web portal using WIFI module. If the Waste Collector is filled up to its threshold value then the message is displayed on web portal and the responsible authority take proper action and it will shows the all information on to the Smart Bin Application on the users mobile phone.

Keywords: Smart city, waste management, iot, ultrasonic sensor, node mcu ,android, etc

Introduction:

Today waste is a problem on which huge sums of money is spent each year for its collection and segregation process. India particularly generates approximately 133 760 tons of MSW per day, of which approximately 91 152 tones is collected, and a huge sum of money is spent on collection. World waste production is expected to be approximately 27 billion tons per year by 2050, one-third of which will come from Asia, with major contributions from China and India. Waste generation in ur- ban areas of India will be 0.7 kg per person per day in 2025, approximately four to six times higher than in 1999.

Mostly Environmental pollution may be owing to the Municipal Solid Left- overs (MSL). A Proper maintenance becomes mandatory for an efficient and effective removal of the generated Municipal Solid Leftover. The key issue in the waste management is that the garbage bin at public places gets overflowed well in advance before the commencement of the next cleaning process.

In present scenario of digitalizing world everything in our surroundings have been equipped with modern technology and internet to ease our work and gain more efficiency. But the systems existing today for waste management are the same as they were before in most of the countries.

Currently, for collection of waste in some countries, we have door to door collection systems that require a lot of efforts and money. A waste collector has to visit everybody's place, knocking the doors, and has to wait till each resident brings the waste to them. Moreover, residents have to be available in order to get their waste collected at that particular time which brings in a major disadvantage of this system. Also in some countries, systems do exist in which waste is collected from the trash bins of each colony, but this system also brings a disadvantage that many a times dustbins are overfilled and waste isn't collected from it. This also makes dustbins, a place facilitating bacterial growth, feeding animals and a breeding place for insects. Also at times it happens that dustbin collection is done in prior resulting in waste of fuel and increasing costs of waste collection. So, at each step a lot of fuel and money is invested unnecessary for the process.

Literature Survey:

[1] Ashiya Malak, Pallavi Bhoyar, "Garbage Collection System Using IOT- A Review", 2017.

In the present day scenario, many times we see that the garbage bins or Dust bin are placed at public places in the cities are overflowing due to increase in the waste every day. It creates unhygienic condition for the people and creates bad smell around the surroundings this leads in spreading some deadly diseases & human illness; to avoid such a situation we are planning to design "IOT Based Waste Management for Smart Cities". In this proposed System 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 dust bin in the city so that it is easy to identify which garbage bin is full. When the level reaches the threshold limit, the device 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.

[2] Prof. Indu Anoop, Ayush Jain, "IOT based Smart Waste Management", 2017.

Many times, in our city we see that the garbage bins or dustbins placed at public places are overloaded. It creates unhygienic conditions for people as well as ugliness to that place leaving bad smell. To avoid such situations the proposed project will be implemented for efficient waste management using IOT. These dustbins are interfaced with Arduino based system having ultra- sonic wireless systems along with central system showing current status of garbage, on mobile web application with Android app by Wi-Fi. Hence the status will be updated on to the App. Major part of the proposed project de pends upon the working of the Wi-Fi module; essential for its implementation. The main aim of this project is to reduce human resources and efforts along with the enhancement of a smart city vision

[3] Raffaele Carli, Mariagrazia Dotoli "Measuring and Managing the Smart- ness of Cities: a Framework for Classifying Performance Indicators", 2013.

Due to the continuous increase of the world population living in cities, it is crucial to identify strategic plans and perform associated actions to make cities smarter, i.e., more operationally efficient, socially friendly, and environmentally sustainable, in a cost effective manner. To achieve these goals, emerging smart cities need to be optimally and intelligently measured, moni- tored, and managed. In this context the paper proposes the development of a framework for classifying performance indicators of a smart city. It is based on two dimensions: the degree of objectivity of observed variables and the level of technological advancement for data collection. The paper shows an application of the presented framework to the case of the Bari municipality (Italy).

[4] M. Fazio, M. Paone "Heterogeneous Sensors Become Homogeneous Things in Smart Cities".

Smart Cities offer a new approach for optimizing services, reducing costs, simplifying the management of Future Cities, enabling new services for citizens. In the Future Internet initiatives, Sensors Networks assume even more a crucial role, especially for making smarter cities. Sensors, becoming smart, will represent the peripheral elements of a complex future ICT world. How- ever, due to the specific application field, smart sensors are very heterogeneous in terms of communication technologies, sensing features and elaboration ca- pabilities. To overcome issues due to the high heterogeneity in this paper we present a new architecture able to make a dual abstraction of complex sensing infrastructures along with data they collect. An important key of this work is to provide a service at worldwide level that is scalable and flexible. The architecture implementation is based on Sensor Web Enablement standard specifi- cations and makes use of the Contiki Operating System for accomplishing the Internet of Things.

[5] Samir Atkar, Abhishek Aryan, "Garbage Collection System Using IOT", 2017.

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 ob- jectives 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 man- agement 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

Literature Survey Analysis:

The work done up to now is in some proposed systems, the proposed work is to detect the threshold values of dustbin and accordingly send a sms to driver, also some proposed systems are using android application to find nearby dustbins, but the limitations of these systems is such that there is no any means to inform the government about the dustbin status , so that government also should know the ground level status of this smart systems , also the tendency of people is such that they will require some motivation to use such systems, so we are providing one android based wallet system , also citizen will be provided with one smart card which when scanned ,one credit point will be updated to the wallet , its future scope or it depends on the government that what government will provide to the citizen with more credit points. But due to this wallet people will use the system frequently and it can be spread on large scale by people itself which will help in making our city clean and healthy. Also we have developed a web based application for admin where admin can see

the map and status of dustbins, those dustbins which are empty will appear in green color while those filled will appear red and partially filled will appear in yellow, so that government(admin) can also monitor that how our system works at ground level and can take necessary action. Also driver will have one android application to track the dustbins which are filled. So our proposed system will be definitely useful to make our city clean and healthy which will facilitates to promote common man to use the system and government to monitor the system.

Detailed Methodology:

The system will be developed using using java as a programming language. Front end will be JSP, servlet will be back end , the database used is mysql. Javascript is used for client side validation. Server will be apache tomcat or glassfish. Netbeans IDE is used for project development. Android studio will be used to debvelop android based application.

System will consists of following modules:

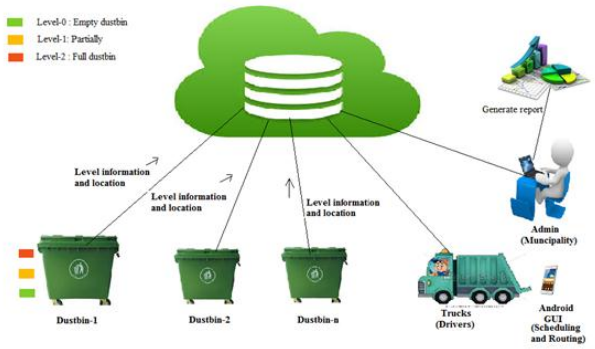
Hardware Module

Android Application

Web Application

Hardware consists of node mcu, ultrasonic sensor, rfid reader, rfid tag. Ultrasonic sensor will tell us the information about the dustbin, either it is empty, half filled or full. This status will be sent to the java servlet via wireless LAN, the servlet will get this status and save into the database and accordingly it will update the map of the web application. Also the responsibility of servlet is to send an SMS with the location of the dustbin to driver which is already updated at the time adding new dustbin by admin through web interface. Admin while adding new dustbin will add the location ie latitude and longitude of the dustbin, which will referred by the servlet. The android application will also connect to the server through WLAN using device ip address. In this way all the modulus will communicate each other through WLAN. In future if the web application is hosted, we can use WAN instead of LAN ie internet

Proposed System:



Experimental Results:

Fig: Admin Login

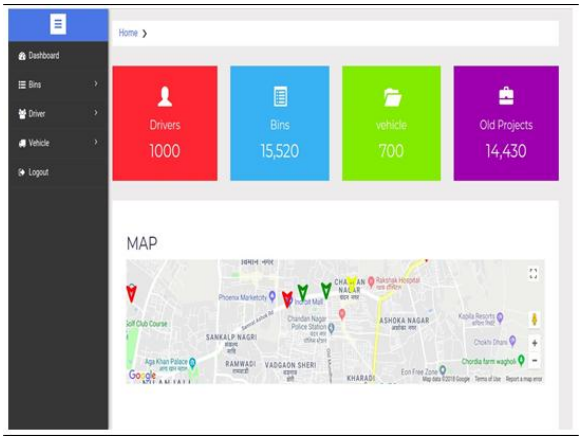


Fig: Admin Home Page

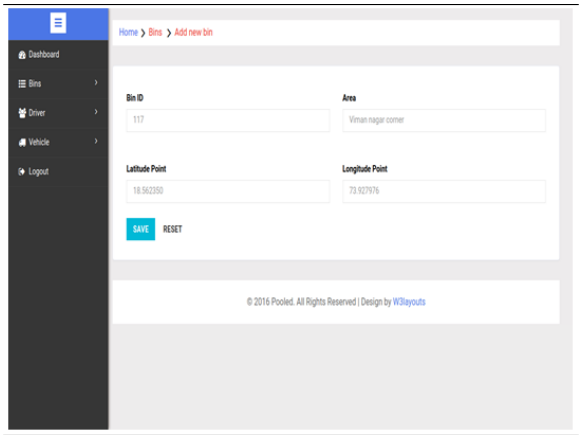


Fig: Add Bin

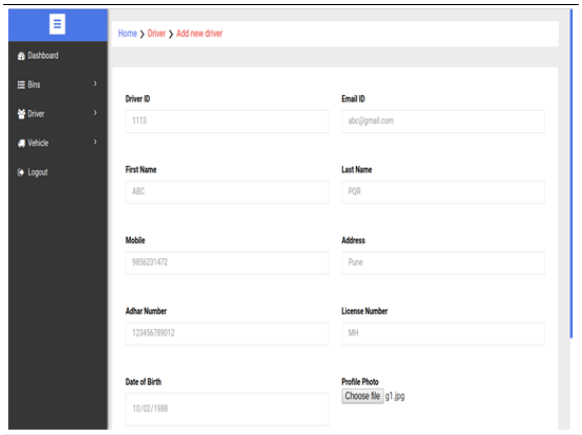


Fig: Add Driver

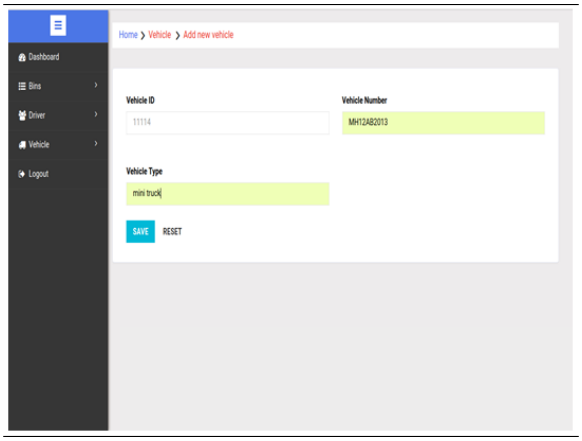


Fig: Add Vehicle

Advantages:

1 Helpful to keep city clean and healthy

2 User Friendly

3 IOT based

4 Remote monitoring is possible

Conclusion:

Thus we have implemented an iot based waste management system for smart city under Digital India. This system will in real manner make our country clean and healthy .Proposed system will promote Digital India, Smart City and Swacha Bharat mission of Government of India.

References:

1. Jeet Shah ,Abhijeet Patil, Prasad Nanavare, Vineet Patidar, Prof. H. A. Bhute, "SMART CITY WASTE MANAGEMENT SYSTEM USING IOT",2020

2. Ashiya Malak, Pallavi Bhoyar, "Garbage Collection System Using IOT- A Review", 2017.

3. Prof. Indu Anoop, Ayush Jain, "IOT based Smart Waste Management", 2017.

4.Raffaele Carli, Mariagrazia Dotoli "Measuring and Managing the Smartness of Cities: a Framework for Classifying Performance Indicators", 2013.

5. M. Fazio, M. Paone "Heterogeneous Sensors Become Homogeneous Things in Smart Cities".

6. Samir Atkar, Abhishek Aryan, "Garbage Collection System Using IOT", 2017.

7. Chitra Balakrishna, "Enabling Technologies for Smart City Services and Applications", 2012.

8. Theodoros Anagnostopoulos, "Assessing Dynamic Models for High Priority Waste Collection in Smart Cities", 2015.

9. Danilo Silva, Felipe Ferraz, "Smart City Applications TestBed", 2015.

10. Akshay Bandal, Pranay Nate, Rohan Manakar, Rahul Powar "Smart Wi-Fi Dustbin System," 2016.

11. Fachmin Folianto, "Smart-Bin: Smart Waste Management System", 2015