

Smart Garbage Collection System Using IoT

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ABSTRACT: Internet of Things (IoT) is the network of various devices which are connected various sensors, actuators and can exchange data. Solid waste management is the process of collecting the waste from various dustbins located in cities and process the waste. Collecting the waste from dustbins located in cities by efficient way reduces the cost required solid waste management system. The organization/authority which is responsible for collection of waste should know the exact level of garbage along with its location to take proper action. The main motto of this project is that the user can monitor all dustbin located in cities. The user will get to know location of dustbin along with level of garbage. He can monitor all dustbin using central website and take proper action according to situation for example details about level of garbage in dustbin, location of dustbin, if any dustbin get full the sending the vehicle for cleaning of dustbin. By using this system the overflowing of dustbins are get avoided. The dustbins in this system are equipped with ultrasonic sensor, Wi-Fi module and Arduino board together it is called as Smart Bin. Smart Bin can send data to central server from which all operations related waste collection process are monitored. In future the data stored in central server is used to make an android application which is used to get the location of nearest empty Smart Bin.

Keywords: Internet of Things (IoT), Smart Bin, Arduino, Ultrasonic Sensor, Wi-Fi Module

I INTRODUCTION

Nowadays due to high hygienic standards collecting and maintain the municipal waste management system is important task. Use of traditional waste collection system result in inefficient and time and money spending system. In traditional waste management system in garbage collecting authority doesn't know about the level of garbage in dustbin, if the dust bins gets full by garbage then it gets overflowed this leads to unhygienic conditions in cities. To reduce this problem in our system Smart Bin are used. Smart Bin are equipped with ultrasonic sensors, Wi-Fi module and Arduino board. Ultrasonic sensors are used sense level of garbage in Smart Bin. Level of garbage is send to central server after some time interval. This data is displayed on website by using map. The information on website is updated after specific time

interval. If any Smart Bin gets full then user can generate the cleaning signal. The communication between Smart Bin and website is done by using Wi-Fi Module. For accessing this system you will need to provide internet connection to the Smart Bin and server. By using this system we can reduce cost spend for garbage collection and able to monitor all activities in cities by sitting at one place which reduces the efforts of users.

II LITERATURE SURVEY

In paper [1] author provides the solution for categorizing the dry and wet waste. The system is also able to calculate arrival time of cleaning vehicle.

In paper [2] author provides solution for overflowed dust bins when dust bins are filled above threshold limit they sends the information to authority.

In paper [3] system monitors the garbage bins and informs about the level of garbage collected in the garbage bins via a web page. Ultrasonic sensors are used to find the level of garbage in dustbin. In this system dustbins contain an Arduino Uno board, GSM modem and Ultrasonic sensor.

In [4] the system consist of four Infra-red sensor fixed on top of the dustbin. Infra-red sensors are connected to a Raspberry Pi board. The system contains a Wi-Fi Module and GSM Module which is connected to the Internet. When the dustbin gets full, it send signal to system. The system is Web Application that handles all signals from the bins and puts up their locations on a map. Then system calculates the collection plan and provides a shorted route for collection of garbage in bins.

In [5] system will detect the level of garbage in dust bin and send the signal to the truck to driver by SMS by using GPRS module.

III SYSTEM DESCRIPTION

A. Design Considerations:

- The Smart Bins are connected to the power supply or Rechargeable batteries or solar panel connected batteries.
- Smart Bin are connected to the internet which is working 24X7.

B. Description of the System:

Aim of the proposed system is to identify and monitor all Smart Bins in city to avoid the problem of unnecessary tips for cleaning, Identify which bins are overflowed with their location, In future by using Smart Bin android application the user will able to get the routs towards nearest empty Smart Bin. In proposed system the Smart Bins are used instead of regular dustbin. Smart Bin contains Ultrasonic sensor, Wi-Fi module and Arduino. We can connect multiple ultrasonic sensor to Smart Bin according to its size. The ultrasonic sensor is used to measure level of garbage in Smart Bin. With the help of Wi-Fi module Smart Bin is connected to the internet. Once Smart Bin get connected to internet then it send level of garbage in bin to the bin after specific time interval. If the level of waste in Smart Bin is reached beyond some threshold limit the alert signal is send to web server. The central web server contains various facilities for example adding new user, adding new Smart Bin, monitoring all Smart Bin in city etc. If any Smart Bin gets full the server admin sends vehicle for cleaning of Smart Bin. The load of cleaning of all Smart Bin is equally distributed among all existing user. The central web server is connected to the database. All action performed by server admin are recorded in database so we can track each operation uniquely.

IV PSEUDO CODE

Pseudo Code for Smart Bin

- Step 1: Turn on the Smart Bin.
- Step 2: Smart Bin calculates level of garbage in Smart Bin and sends to the web server.
- Step 3: if (level of garbage > Threshold level of garbage)
 Send the alert signal to website.
 else
 go to step 2.

- end
- Pseudo Code for Smart Bin
- Step 1: Verify the admin credential.
- Step 2: Show Status of Smart Bins.
- Step 3: If Add new user is Clicked
 if (user details are valid)
 Add user in database and go to step 2.
 else
 User not add in database and go to step 2
 end
- Step 4: If Add Smart Bin is Clicked
 if (user details are valid)
 Add Smart Bin in database and go to step 2.
 else
 Smart Bin not add in database and go to step 2
 end
- Step 5: If Show Available Smart Bin is Clicked
 if (Smart Bins Are available)
 Show Smart bins and go to step 2.
 else
 go to step 2.
 end
- Step 6: If Show Available Users is Clicked
 if (Users Are available)
 Show Available users and go to step 2.
 else
 go to step 2.
 end
- Step 7: If update facility is clicked then update values and go to step 2.
- Step 8: If Logout is clicked then go to step 1.

V RESULTS

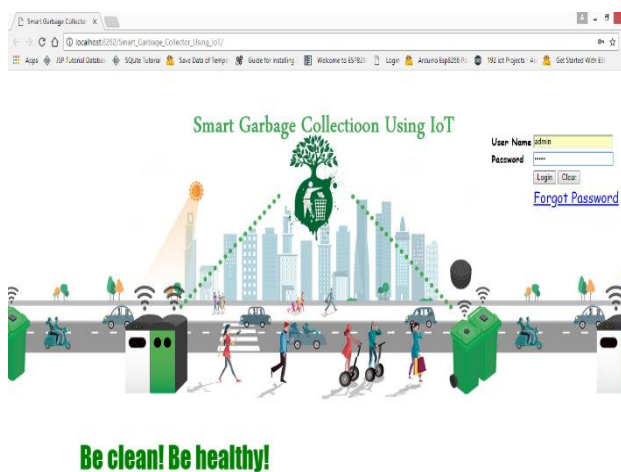


Figure 1: Login page

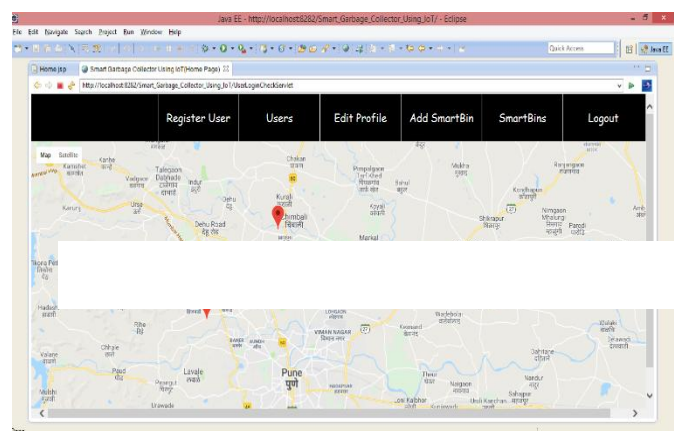


Figure 2: View Smart Bin Status

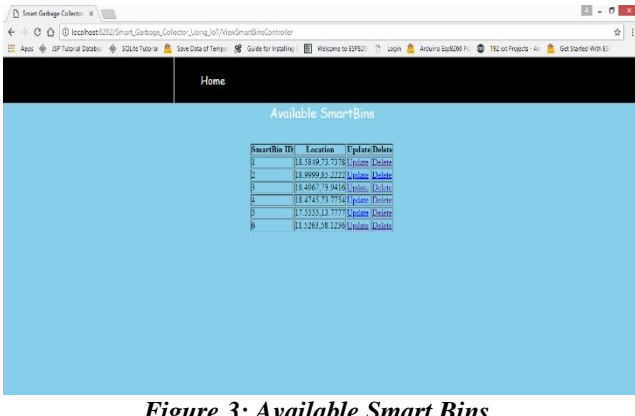


Figure 3: Available Smart Bins

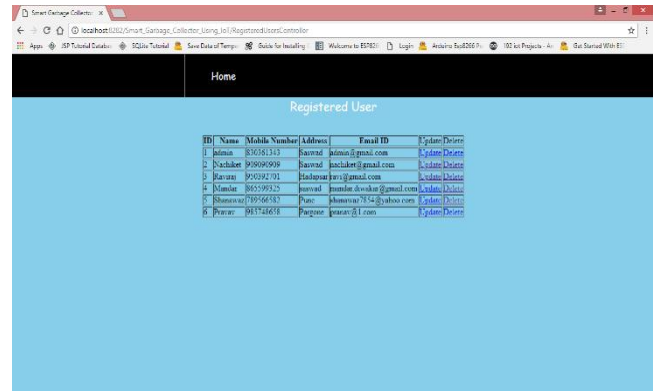


Figure 4: Available Users

VI CONCLUSION AND FUTURE WORK

Monitoring the fullness of bins through the use of sensors, it is possible to achieve a more efficient system than the current existing. Our system mainly concentrates on Monitoring the waste management, providing a smart technology for waste system, avoiding human intervention, reducing human time and effort and which results in healthy and waste ridden environment. The System can be implemented for smart cities where the residents would be busy enough with their hectic schedule and wouldn't have enough time for managing waste. The bins can be implemented in a city if desired where there would be a large bin that can have the capacity to accumulate the waste of solid type for a single apartment. The cost could be distributed among the residents leading to cheaper service provision. We can create an android application which can show the path to user till nearest empty dust bin and for dust bin cleaner it will show the path till next Smart Bin which need to be cleaned. We can also use GPS module in smart bin by which we can get real time location of moving Smart Bins.

REFERENCES

1. Bharadwaj B, M Kumudha, Gowri Chandra N, Chaithra G, AUTOMATION OF SMART WASTE MANAGEMENT USING IoT TO SUPPORT “SWACHH BHARAT ABHIYAN” – A PRACTICAL APPROACH, 2017 IEEE
2. Parkash, Prabu V, IoT Based Waste Management for Smart City, 15680/IJIRCCE.2016.
3. Palaghat Yaswanth Sai, IoT Smart Garbage Monitoring System in Cities-An Effective Way to Promote Smart City, 2016, IJARCSSE
4. Abhimanyu Singh, Pankhuri Aggarwal, Rahul Arora, IoT based Waste Collection System using Infrared Sensors, 2016 IEEE.
5. Shilan Abdullah Hassan Noor Ghazi M. Jameel Boran Şekeröğlü, Smart Solid Waste Monitoring and Collection System , 2016, IJARCSSE