International Journal of Computer Science and Engineering Communications
Volume.4, Issue.5 (2016): Page.1453-1458
www.scientistlink.com/ijcsec

Reward Based Intelligent Garbage System Using IoT

Dhananjay Dogra[1], Karthik.R[2], Vinodh Sekar.R[3]
[1,2,3] *UG Scholar,*
Department of Computer Science,
Velammal Institute of Technology. Chennai, India
[1]*dogra.dd@gmail.com,* [2]*karoravi@gmail.com,* [3]*vinodhsekar161197@gmail.com*

Abstract: *Clean and healthy environment is the need of the hour where overflowing garbage bins have been a cause of concern for the residents of the developing countries. With increase in population, the cleanliness with respect to garbage management is degrading tremendously. Open and overflowing containers prove to be a breeding ground for germs. Traditionally municipal corporations operate on weekly routes to pick up trash only on some of the designated days of the week, regardless of whether the containers are full or not. As a result of rapid growth of technology, life of mankind has got automated. One of the major contributors to this automation is Internet of Things, also known as IoT. This idea is based on the mutual working of IoT and cloud server. Sensors installed under the lid of the trash cans compute the distance between the lid of the can and the garbage level. Using this data when the trash level reaches 85% of the total capacity, a message from the trash can, will be sent to the servers notifying them that the trash can is full. Then the municipal corporations can send vehicles only to those areas where the trash can is full, thereby saving time as well as fuel due to optimized route for garbage collection instead of visiting all the blocks to check each trash can individually. There is no need to install new trash cans for this purpose; instead this technology can be implemented into the already existing trash cans to bring down the capital investment. Thus a smart and cost effective equipment like this would be beneficial in the long run.*

Keywords: *Sensors, Automation, IoT, optimized, investment, cost effective*

1. INTRODUCTION

The Internet of Things (IOT) is a concept in which surrounding objects are connected through wired and wireless networks without user intervention. In the field of Internet of Things, the objects communicate and exchange information to provide advanced intelligent services for users. Owing to the recent advances in mobile devices equipped with various sensors and communication modules, together with communication network technologies such as Wi-Fi and LTE, the Internet of Things has gained considerable academic interests. In recent times, due to rapid population growth, disorganization of city governments, a lack of public awareness and limited funding for programs waste management, garbage disposal has become a huge cause of concern in the world. A voluminous amount of waste generated is disposed by means which has an adverse effect on the environment. The Central Public Health and Environment Engineering Organization (CPHEEO) have estimated that waste generation in India as much as 1.3 pounds per person per day [2]. This figure is relatively low, compared to the 4.6 pounds of waste generated per person per day in the United State (U.S.). But the U.S. population was close to 307 million in July 2009, whereas India's population was 1.2 billion. These statistics mean that India could be generating as much as 27 million more tons of waste than the U.S. per year [6]. The common method of disposal of waste or garbage is unplanned and uncontrolled openly being dumped on the roads or overflowing in the garbage cans etc. This practice is unhygienic and harmful to human, plant, and animal life.This unhygienic method of dumping garbage can generate liquid leachate which in turn may contaminate surface and ground water; thus harbouring disease vectors spreading harmful diseases and degrading aesthetic value of neutral environment. The concurrent effects of a fast growing nation, its large, dense population, and pressing demand for urban environmental protection is creating a challenging framework for waste management. The complexity of context and procedures is indeed a primary concern for local municipal authorities as the collection of garbage, transportation and processing of residential waste, today. Herein we are with a project where human and electronic brains will be working together along

with internet of things to automatically sense the level of garbage in the garbage can. The process is that, an ID will be given to each garbage can with microcontroller chip, as soon as the garbage can will brim up, the regional server (form where all the garbage collection vehicles are allotted.) will receive a notification to empty the garbage can. The Project will also help people to win reward points based on the garbage weight disposed off in the garbage can, through weight sensor in the garbage can.

2. LITERATURE REVIEW

The garbage system what we have today is a system which provides job for more than millions of people around the world. This prevailing system which has evolved much from road side garbage dumping system, where people used to dump their garbage on the road side which also creates a buzz among the society due to difference of opinions and the ill effects of it, to a little civilised roadside garbage bin dumping system in which people are advised to put their garbage only in the garbage bin kept at the side of a road. The largest cost in waste management is the physical garbage collection from residential and commercial customers, says Brian Sheridan, Ph.D., Director of Odour Monitoring Ireland, a provider of analytic and process engineering services. Also in this system the garbage collection is done on a periodic basis. A garbage truck comes on particular days in a week and collects the garbage in the area and goes to the landfill. In some cases the garbage from a bin is not collected if the truck is already full with collection from the previous garbage bins. Like this after having some experiences with the current prevailing system we now are able to site out some of the defects underlying within it. Some of them are;

a. We cannot control the amount of garbage that people put into the garbage bin, even though the garbage can is full, people keep on putting their garbage in it thus leaving the can to overflow.

b. In the current system the garbage collection vehicle is often a big truck and it goes to all the garbage bins in the area for pickup even though they are not filled just to complete their duty.

c. The garbage pickup is a routine in certain areas where they come only once in a week. If there is an event or a function held in that area, the garbage bins are more likely to get filled within a day. As the garbage collection vehicle comes once in a week, the garbage bin at that place would keep on overflowing with garbage leading to stinking smell and unhealthy environment.

d. The garbage pick trucks have to go on a complete tour to all the garbage bins even though they are not full thus, wasting time and fuel.

e. With current garbage bin system people are reluctant to put the waste in in the bin and they land up leaving it on the road which leads to same practice for everyone.

Figure 1: Unoptimized Route

3. PROPOSED SYSTEM

The aim of our proposed system is to make our environment hygienic and clean by encouraging the people to put the garbage in the bins as well as reduce the consumption of the fuel used for transportation of trash. The intelligent garbage bin works on the emerging futuristic technology known as Internet of Things (IoT). In the proposed system the principle of internet of things will be used to link each garbage bin to a regional server in a society. The people will have to put their garbage through the flap door provided at the front of the garbage bin. The lid will be locked and the sensor circuit will be resting beneath the lid, will be well protected by water and other hazards.

When a person dumps trash into the garbage bin the distance between the garbage pile and the top lid is calculated using an ultrasonic distance sensor and the information is transmitted to the server via a microcontroller which is also fixed beneath the lid of the garbage bin. If the garbage bin is 85% full then a warning will be sent to the server and the officials are notified of the status and sent to that particular garbage bin for collection. Hence the garbage is not piled up and the vehicles are assigned as per the number of pickup locations and quantity, hence fuel is also saved. The next part of the system is, to encourage people to dump their garbage only in the garbage bin; we are introducing the Reward Based System. It is the tendency of the people to ask a common question "what is in there for me?" or "how will it be useful if I follow it?" When we address this issue people automatically follow our proposed way. According to our idea to make it simple we give rewards (points) for their garbage deposited in the garbage bin. The reward System is based upon the amount or weight of garbage they are depositing in the garbage bin which can be calculated by the weight sensor at the bottom of the garbage bin. People have to register online. In the registration process, the details of people are received as well as they would be selecting the dustbins closest to them using the GPS service. After registering successfully, people would get a smart card whose ID is linked with the garbage bin selected during the registration process. Users have to flash the smart card (RFID CARD) on the card reader on the garbage bin to access their account for garbage deposition. Hence by this way we can assign the same identification code for a person living in area 1 and also to a person living in area 2, as their ID's are linked only to the garbage bins selected by them. According to the weight of the garbage deposited, the respective points are credited to the online "REBIGS" wallet which is linked to a firm like" PAYTM" or "FREECHARGE" where people can exchange their points for discount coupons and other products too. The report containing the amount of garbage deposited and the points earned is sent as an sms to the mobile phone on a weekly basis directly from the internet server. One more advantage of this proposed system is that the garbage bins which are already in use need not be replaced, but can be modified. Hence the cost does not increase and at the same time, time is also saved.

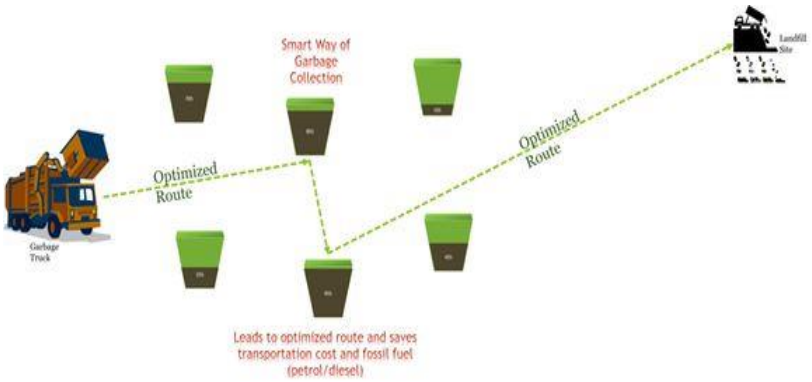

Figure 2: Optimized Route

4. IMPLEMENTATION

- Basic working

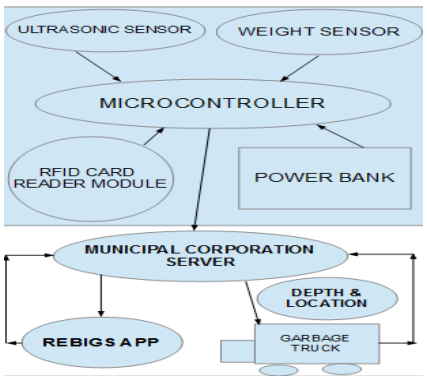

Figure 3: Block Diagram

The intelligent garbage bin works with the help of couple of sensors combined with a microcontroller which work in correlation with each other to get the desired result. Whenever a person puts garbage in the bin the ultrasonic sensors present at the top of the bid (beneath the lid) measures the height of the garbage. When the height of the garbage reaches 85% of the total height, the sensor triggers the microcontroller, which in turn sends a notification to the server (maintained by the municipal corporation) indicating that the particular bin is going to be full up to the brim. The location of each bin via the coordinates is sent along with the notification to the server. Thus the corporation can assign a vehicle closest to the location of the garbage bin. Also a GPS system installed in the vehicle would give the shortest possible route to the driver for the pickup to be conducted. This will not only save time, it would also reduce the fuel consumption of the vehicles used to conduct pickups. The entire setup inside the bin is connected and is powered by a power bank of higher capacity which can be recharged and replaced every 3 weeks by personnel of the municipal corporation. All these components are fixed inside the trash can under the closing lid such that they are not damaged by weather or people. People can register themselves on the REBIGS website or the Mobile Application and get a smart card with a randomly generated unique identification number. This smart card is also known as RFID card (Radio Frequency IDentification card) which contains electronically stored information (i.e. the unique identification number for that particular user). When the users put garbage into the bin they just have to flash their smart card in front of the Card Reader Module to input the information. The card reader module reads the customer's number and uploads it to the website along with the weight of the garbage deposited, which in turn is calculated by the weight sensor installed at the bottom of the garbage bin. This way the users are encouraged to put the trash only in the trash bins so as to get as many points as possible the points. The points scored by the customer's can be redeemed for gift/discount vouchers on leading e- commerce websites like PAYTM and FREECHARGE.

Figure 4: Weight Calculation

Thus the points allocated to the people would depend on the weight of the garbage they put inside the garbage bin. This would ensure that people try to put more of their garbage in the bin rather than littering it someplace else. This would not only make the environment clean, but also make a common thing like a trash can a little bit advanced.

5. CONCLUSION

Urbanisation is growing at a rapid pace, as more people are willing to live in cities. Hence it is essential for a clean and hygienic environment. Although public services and waste management companies have been around for a long time, they have seen only limited innovation with operational efficiency- until the last few years. Our proposed reward based intelligent garbage based system when implemented on a larger scale and in the long run can get high satisfying outputs. By implementing this system of garbage disposal and collection we can reduce the pollution cost by the stinking garbage that we come across along the road, paving way for a clean environment also not only the world is made clean but also the people are rewarded for their help. This proposal for the management of wastes is efficient and time saving process than the currently employing method in which concerned municipal employee has to look for the filled waste bins manually across different spot in an area/street for checking regularly whether the waste bin is filled or not, which is complex time consuming process. This automation of waste also reduces the human effort and consequently the cost of the whole process [7]. This system can be implemented at any place with ease and within reasonable amount of time.

Our work is small but an efficient step for building of a dream city with a clean and a very healthy environment. With encouragement from the government we believe that our proposed system when implemented will provide high returns and yields.

6. ADVANTAGES

a) People motivated to put their garbage only in the garbage bin.

b) By this way we attain two innovative functions they are, operational efficiency and waste reduction.

c) We can eliminate waste overflow.

d) Time and fuel can be saved due to optimised Route for garbage collection.

e) The monitoring of the waste level in the garbage can could be done remotely with a simple browser or an installed software effectively.

f) As the garbage levels will be monitored by a remotely, the required sized vehicle can be assigned for garbage collection thus making it cost effective.

g) New garbage bins not required, the existing garbage bins can be modified thus again making it cost effective.

h) The reward system will encourage people for their active participation.

REFERENCES

[1] Narayan Sharma, Nirman Singha, Tanmoy Dutta : IJSER Smart Bin Implementation System, Volume 6, Issue 9, September 2015.

[2] Vikarant Bhor, Pankaj Morajkar, Maheshwar Dutta, Dishant Pandya : IJERT Smart Garbage Management System, Volume 4, Issue 3, March 2015.

[3] Gaikwad Prajakta, Jadhav Kalyani, Machale Snehal: IJERT, Volume 4, Issue 3, March 2015.

[4] Jebah Kumar, Abishlin Blessy : IJCSIT, Volume 5, 2014.

[5] Kanchan Mahajan, J.S. Chitode: IJIRSET, Waste Bin Monitoring System Using Integrated Technologies, Volume 3, Issue 7, July 2014.

[6] Marian Look, "Trash Plant: India", earth911 B.

[7] Adil Bashir, Shoaib Amin Banday Ab. Rouf Khan, Mohammad Shafi: IJRITCC, Concept, Design and Implementation of Automatic Waste Management System, Volume 1, Issue 7, July 2013.

[8] Insung Hong, Sunghoi Park, Beomseok Lee, Jaekeun Lee, Daebeom Jeong, and Sehyun Park : The Scientific World Journal, IoT-Based Smart Garbage System for Efficient Food Waste Management, Volume 2014, Article ID 646953.

ABOUT THE AUTHORS

Dhananjay Dogra pursuing bachelor degree in Computer Science and Engineering from Velammal Institute of Technology, Panchetti, Chennai-601204, India.

Karthik R pursuing bachelor degree in Computer Science and Engineering from Velammal Institute of Technology, Panchetti, Chennai-601204, India.

Vinodh Sekar R pursuing bachelor degree in Computer Science and Engineering from Velammal Institute of Technology, Panchetti, Chennai-601204, India.