IoT Based Garbage Management System

Roshni V. Chavhan
UG Student, Department of Electronics & Telecommunication Engineering, Government College of Engineering, Chandrapur, Maharashtra

Dinesh V. Rojatkar
Assistant Professor, Department of Electronics & Telecommunication Engineering, Government College of Engineering, Chandrapur, Maharashtra

ABSTRACT

Since the population is increasing day by day, the environment must be neat and clean. In many cities the overflowed garbage bins are creating an unhygienic environment. This results in various diseases. This reduces the standard of living. To avoid these situations, an efficient smart garbage management method has to be developed. As the scope of IOT is developing, various methods can be found out very easily. Various designs were used as well proposed having advantages and disadvantages too. This paper is a survey that is based on Smart Garbage Management in cities using IoT. This survey helps to keep our environment clean by implementing various smart garbage management techniques.

Keywords: IoT, ultrasonic sensor, System on Chip, garbage management

1. INTRODUCTION

Waste can be classified based upon its contents such as paper, plastic, organic and inorganic waste; based on its hazard potential such as radioactive, flammable, infectious, toxic or non-toxic; based on its origin as industrial, domestic, electronic etc. Whatever the waste may be, solid waste should be managed properly.

Due to increase in population growth, disorganization of city government, limited funding for programs is becoming a severe problem. The garbage bins are mostly seemed to be overflowing due to the carelessness of the authorities. The authorities should take care for this corresponding waste and should

think any method to overcome this. Internet and its applications have become an integral part of human lifestyle. It has become an essential part in each aspect. Due to the tremendous demand and necessity, researchers went connecting to the internet. These researches have led to the birth of a sensational gizmo, Internet of Things (IoT). Communication over the internet has grown up from user-user interaction to device- device interaction. The IoT concepts were proposed years before but it's in the initial stage of commercial deployment. IoT is used to provide a platform for smart garbage management.

The implementation of smart garbage system using sensors, SoC, microcontrollers and GPS module ensures the cleaning of dustbins as soon as the dustbin reaches to its maximum. If the dustbin is not cleaned on time, then the record is directly sent to the higher authority who can take action against the respective contractor. This helps to reduce the number of trips of the vehicle for collecting garbage. It ultimately helps our environment to remain clean and hygienic. Smart collection bins works with the sensors. It also uses Wi-Fi modem for sending data.

II. HARDWARE USED

➤ Ultrasonic Sensor

In this survey, ultrasonic sensor is used to detect the level of garbage. It helps for sending out a high-frequency sound pulse and waits till for the echo of the sound to reflect back. It has two openings on its front, one opening transmits ultrasonic waves and the

other receives them. It is a device which measures the distance to an object by using sound waves.

➢ **Internet of Things**

The term internet of things is developed by Kevin Ashton, who was the director of auto ID centre of MIT in 1999. Internet of things is a new technology which can be communicated via the internet for connecting things. It allows the things to access from internet. So by knowing recent advance devices with various sensors and communication module together with communication network such as Wi-Fi

➢ **System on chip**

System on chip is an integrated circuit that integrates all components on a single chip. This chip is used to reduce the complexity of the circuit as all components are fabricated on a single chip. It is a collection of all components and subcomponents of a system on to a single chip. SoC design allows high performance, good process technology, miniaturization, efficient battery life time and cost sensitiveness.

III. METHODOLOGY

In this project, ultrasonic sensor is used to detect the level of garbage in the dustbin and when the dust bins gets to its maximum the sensors get activated and generates a high signal and this signal which is transmitted through the Wi-Fi module. Then this signal is received by the server. Once the detail is received by the vehicle driver, he moves to the spot and disposes of the waste from the trash bin.
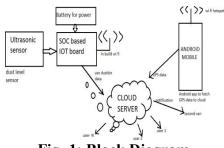

Fig -1: Block Diagram

In this project, Cloud server is used. A cloud server is a logical server that is built, hosted and delivered. A cloud computing platform is used through the internet. Depending upon the input, the information is updated on cloud server using IoT. The main purpose of this survey is to make aware people from disposing solid waste on roads and nearby places.

The public user can access this website and can log in to see the location of the vehicle so that they can dispose their waste as soon the vehicles arrive to the location. The vehicle driver have the login ID and password if they logged on the site then they get the path of the desired location of the dustbin on the Google map.

Advantages:
- Monitors the garbage bins and detects the level of garbage
- The system is time efficient and reliable.
- Keeps the environment neat and hygienic.

Applications:
- This project is helpful in "SWACHH BHARAT ABHIYAN".
- It can also be used in "SMART CITY".

IV. FUTURE SCOPE:
- For future, instead of a person in a vehicle we can make use of a line follower robot which can replace the man power to move the vehicle. This path follower robot will trace out the marked line on contrasting background usually black line on a white surface or vice versa. So using line follower robot technology vehicle moves to the desired location based on the information sent. So this makes the system more reliable and efficient.
- One of the main environmental benefits is reduced CO2 emissions, which is a result of reduced waste from traffic vehicles. It means a more pleasant and safe environment for people living in that area where this system is used.
- This smart waste management system can be used in any cities around the world.

V. RESULTS
In this project, the Wi-Fi module continuously trace the location of the vehicle and sends the signal to the web server and when the user log in to the site , they will get the notification whether the dustbin is full or not. This system can be implemented at any place with ease and with a reasonable amount of time. The implementation costs are also affordable. The use of internet in this survey makes it more efficient and reliable with long distance coverage.

VI. CONCLUSION
This survey has been done to find out the details of smart garbage management system and to collect effective methods which will be useful to keep our environment neat and hygienic. As the garbage

level reach to its maximum, it will be immediately informed to the respective authority. The natural environment requires protection to remain healthy for all inhabitants. To protect and keep our environment hygienic and sustainable environment requires the collective efforts of the people, the authorities and the private sector. Environmental pollution is causing a lot of problem to the humans as well to the animals, driving many animal species to endangerment and even extinction. Thus we have implemented the real time waste management system so that we can easily trace dustbin vehicle as well the location of it and keep the surrounding hygienic. Everyone should remember these three words: REDUCE, REUSE, RECYCLE in order to keep our environment hygienic.

REFERENCES

[1] Vikrant Bhor, Pankaj Morajkar, MaheshwarGurav, Dishant Pandya, ―Smart Garbage Management System, March 2015

[2] S.S. Navghane, M.S. Killedar, Dr.V.M. Rohokale, IoT Based Garbage and Waste Collection Bin‖, May 2016.

[3] Ghose, M.K., Dikshit, A.K., Sharma, S.K. ―A GIS based transportation model for solid waste disposal – A case study on Asansol municipality. Journal of Waste Management‖.

[4] Guerrero, L.A., Maas, G., Hogland, ―W.: Solid waste management challenges for cities in developing countries. Journal of Waste Management ―.

[5] Alexey Medvedev, Petr Fedchenkov, ArkadyZaslavsky, Theodoros, Anagnostopoulos Sergey Khoruzhnikov,‖Waste Management as an IoT-Enabled Service in Smart Cities‖.

[6] Meghana K C, Dr. K R Nataraj,‖ IOT Based Intelligent Bin for Smart Cities‖.

[7] KasliwalManasi H., SuryawanshiSmitkumar B, ―A Novel Approach to Garbage Management Using Internet of Things for Smart Cities‖.

[8] Vishesh Kumar Kurrel,‖ Smart Garbage Collection Bin Overflows Indicator using Internet of Things ―.

[9] Monika K A, Nikitha Rao, Prapulla S B, Shobha G, ―Smart Dustbin-An Efficient Garbage Monitoring System ―.

[10] Parkash, Prabu,‖ IoT Based Waste Management for Smart City.

[11] Basic Feature, ―Solid waste Management Project by MCGM.

[12] Prof. R.M.Sahu, Akshay Godase, Pramod Shinde, Reshma Shinde, "Garbage and Street Light Monitoring System Using Internet of Things" International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering, Issn (Online) 2321 – 2004, Vol. 4, Issue 4, April 2016.

[13] Kanchan Mahajan, Prof.J.S.Chitode, "Waste Bin Monitoring System Using Integrated Technologies", International Journal of Innovative Research in Science, Engineering and Technology (An ISO 3297: 2007 Certified Organization) Vol. 3, Issue 7, July 2014.

[14] Md. Shafiqul Islam, M.A. Hannan, Maher Arebey , Hasan Basri , "An Overview For Solid Waste Bin Monitoring System", Journal of Applied Sciences Research, ISSN 181-544X, vol.5,lssue4, February 2012.

[15] Twinkle sinha, k.mugesh Kumar, p.saisharan, "SMART DUSTBIN", International Journal of Industrial Electronics and Electrical Engineering, ISSN: 2347-6982 Volume-3, Issue-5,May 2015.

[16] Richu Sam Alex, R Narciss Starbell, "Energy Efficient Intelligent Street Lighting System Using ZIGBEE and Sensors", International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 – 8958, Volume-3, Issue-4, April 2014.

[17] Narendra Kumar G., Chandrika Swami, and K. N. Nagadarshini, "Efficient Garbage Disposal Management in Metropolitan", Cities Using VANETs Journal of Clean Energy Technologies, Vol. 2, No. 3, July 2014.

[18] Emily Gertz, Patrick Di Justo,"Environmental Monitoringwith Arduino"Copyright © 2012 Emily Gertz and Patrick Di Justo. All rights reserved. Printed in the United States of America,ISBN: 9781-449-31056-1, January 20, 2012