

Garbage Automation Using IOT

Nitin Maske¹, Sukeshanee Shinde², Ayesha Mulani³ & Shrutika Musale⁴

¹Department of Computer Science and Engineering, SVERI's College Of Engineering, Pandharpur

²Department of Computer Science and Engineering, SVERI's College Of Engineering, Pandharpur

³Department of Computer Science and Engineering, SVERI's College Of Engineering, Pandharpur

⁴Department of Computer Science and Engineering, SVERI's College Of Engineering, Pandharpur

¹nmmaske@coe.sveri.ac.in,

²sukeshaneesshinde@coep.sveri.ac.in,

³ayeshalmulani@coep.sveri.ac.in,

⁴shrutikasmusale@coep.sveri.ac.in

Abstract: In today's busy people time is a vital issue which can't be managed by noticing each and every phenomenon with our busy and tight schedule. So, now a day's Automatic systems are being preferred to make life simpler and easier in all aspects and in all direction. The number of users of internet has grown so rapidly that it has become a important and necessary part of our daily life. As the population of world is increasing day by day, the environment should be clean for our better and healthy life. In most of the urban areas as well as in rural areas the overflowed garbage bins are creating and making an obnoxious smell and making an unhygienic environment which will affected on surrounding human being. And this is leading to the rapid growth of bacteria and viruses which are causing different types of diseases which will become harmful for all human being. To overcome these situations efficient garbage collection systems are getting developed based on Internet of Things. To make it a grand success Internet of Things is the latest internet technology developed for human being for making life easier our purpose of concern in this project is development of Internet of Things based Garbage Monitoring and Automation System. Various designs have already been proposed, offer and have advantages as well as disadvantages. This paper is a review of Garbage Monitoring and Automation System based on Internet of Things.

Keywords: Ultrasonic Sensor, GPS and GSM module

1. Introduction

This project Garbage Monitoring system based on Internet of Things is a very innovative system which will help to keep the cities clean. This system monitors the garbage dustbins and informs about the level of garbage collected in the garbage bins. For this the system uses ultrasonic sensors placed over the dustbin to detect the level of garbage. The system makes use of microcontroller, Wi-Fi, GPS, GSM module for sending message from a particular area. The system is powered by a 12V transformer. Where as a web page is built to show the status to the user monitoring the level of garbage collected dustbins. The web page gives highlights the garbage collected in color in order to show the level of garbage collected. Thus this system helps to keep the urban area clean by informing about the garbage levels of the bins by providing the message system to a higher authority.

2. Literature Review

The idea of a smart garbage dustbins and systems have been in discussion for quite a long time. The technologies used at disposal to develop this smart system have also evolved, Internet of Things. Each idea seems to be similar but is slightly different at its core and our proposed work is no exception from the same. Through IoT technique designing a

smart garbage collection system which has provision for citizen participation. At hardware level, the smart system is a garbage bin with ultrasonic sensor, a micro-controller and Wi-Fi module for transmission of data, GPS and GSM module.

The worldwide implementation of Internet of Things is possible with a Cloud Centric vision. This work utilize for the future possibilities, key technologies and application that are likely to drive IoT research. But a strong foundation to our work is provided, where the basics and applications of Arduino board is explained for making a smart dustbins. It is quite interesting. As we would discuss further, the urban areas participation part of our system is quite influenced by their work.

3. Problem Statement

To detect the garbage level using ultrasonic sensor and when it reaches to threshold level send the alarm to municipal corporation authority to collect the garbage.

4. Objective

The primary objective of the garbage automation system to overcome the drawbacks of the existing and some advantages of new system is as follows:

1. Alertness:

To give message to municipality after overflow dustbin.

2. Accuracy:

The modern system is more useful as compared to old system and take accurate readings.

5. Scope

It will inform the status of each dustbin in real time so that concerned authority can send the waste collection vehicle only when the dustbin is overflow. By implementing this system resource optimization, cost reduction, effective usage of smart garbage collector can be done.

6. Proposed Methodology

(1) Data Flow Diagram:

1.1. Data flow diagram level-0:

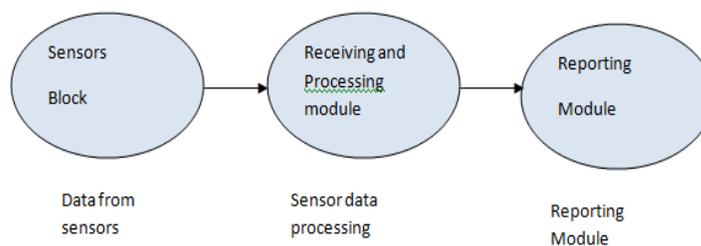


Fig 1.1: Data Flow Diagram Level-0

The above diagram shows the data flow diagram of Garbage automation. It mainly consists of various gases unit, configuration, data aggregation and processing

unit, storing the data in database with displaying unit and SMS unit. The first part which is the variety gases unit which comprises of various gases like methane, carbon monoxide, carbon dioxide and temperature. The processing unit mainly consists of Arduino board. The SMS unit mainly consists of GSM module to send SMS to the authority.

1. 2. Data flow diagram level-1:

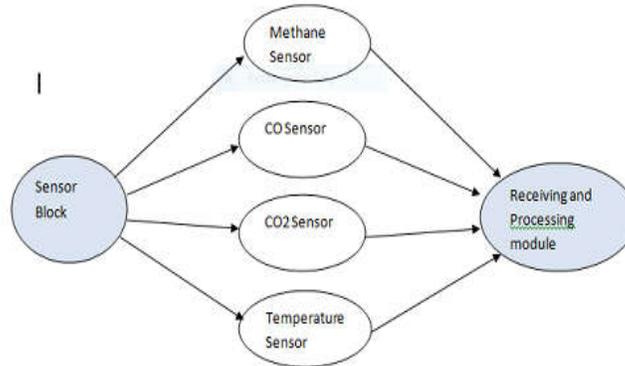


Fig 1.2: DFD Diagram Level-1

The above figure represents the data flow diagram of sensors level1, which mainly comprises of various sensors like methane sensors, carbon monoxide sensors, carbon dioxide sensor and temperature sensor.

(2) Sequence Diagram:

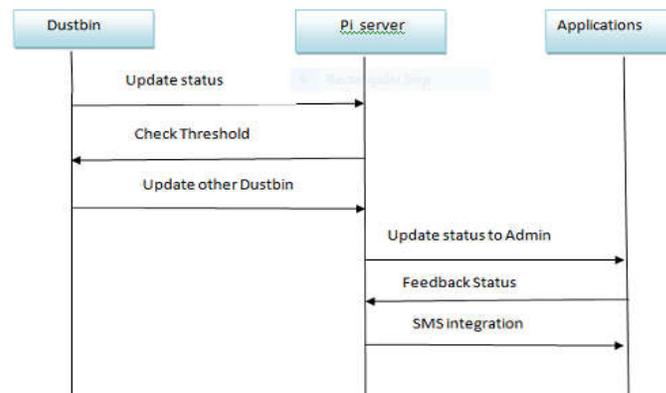
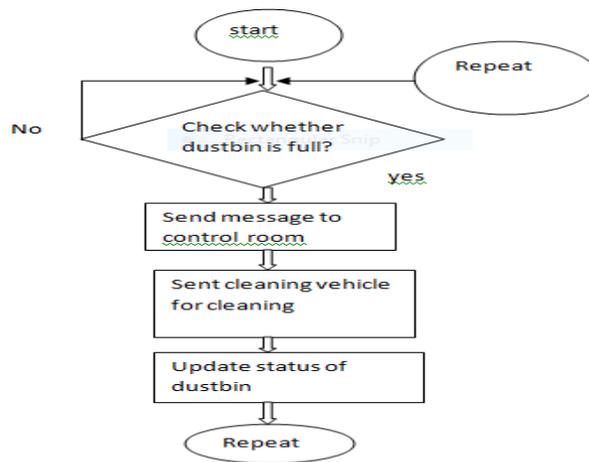


Fig 2: Sequence Diagram

Firstly, the system was invented to find the threshold value of waste using Arduino, connecting wires and sensors. The sensor senses the level of the garbage and the signal is given to the Arduino. It will update the status of bin. The updated status send to the Higher authority.

(3) Flow chart:**Fig 3: Flow chart**

First of all the sensor will check where the dustbin is full or not. If it is fully filled then it will automatically send the message to the authorized person. Then that person will send cleaning vehicle for cleaning and update the status of dustbin and this process will repeat again.

7. Proposed System**(1). Arduino Kit:****Fig 7.1: Arduino Kit**

Arduino board can be connected by using the USB cable to your computer. Arduino boards can be charged directly from the AC mains power supply by making a connection with Barrel Jack. The primary work of the voltage regulator is to control the voltage given to the Arduino board and stabilize the DC voltages by the processor and other elements.

(2). Ultrasonic Sensor:



Fig 7.2: Ultrasonic Sensor

The use of Ultrasonic Sensor is to measure the distance with high accuracy. It starts measuring a distance from 2cm to 400cm or from 1 inch to 13 feet. It emits an ultrasound wave at the frequency of 40KHz in the air. You can calculate the distance. Distance can be measured by equation 1.

$$\text{Distance} = \text{Time} * \text{sound speed} / 2. \dots(1)$$

Where Time = the time between an ultrasonic wave is received and transmitted. It has four pins. Two are VCC and GND which will be connected to the 5V and the GND of the Arduino Kit and the other two pins are Trig and Echo pins connected to any digital pins of the Arduino kit. The use of these pins- trig pin will send the signal and the Echo pin will be used to receive the signal.

(3). Smart Dustbin:



Fig 7.3: Smart Dustbin

Garbage bins are small plastic containers that are used to store waste on a temporary basis. They are often used in houses, offices, streets, parks etc. to collect the waste. In some places, waste is a serious offence and hence Public garbage Containers are the only way to dispose small waste. Usually, it is a common practice to use separate dustbins for collecting wet or dry, recyclable or non-recyclable Garbage. In this project, I have designed a simple system called Smart garbage collector using Arduino, Ultrasonic Sensor and Servo Motor, where the lid of the dustbin will automatically open itself upon detection of human hand.

8. Conclusion

We built an efficient garbage automation system which can be used to automate the level of garbage in the dustbin. This data can be further used to plan garbage automation trips

more efficiently, totally reducing overflowing dustbins and helping have better public sanitation.

Acknowledgement

We are pleased to acknowledge Dr. B. C. Melinamath for her invaluable guidance during the course of this project work. We extend our sincere thanks to Mr. N. M. Maske who continuously helped us throughout the project and without his motivation, this project would have been an uphill task. We are also grateful to other members of the CSE faculty members and technical staff who co-operated with us regarding some issues. Last but not the least, Mr. G. G. Patil supervisor of Project Lab and Mr. S. M. Shinde sir supervisor of CC Lab as the case may be for project sessions are also cooperated with us nicely for the smooth development of this project. I would also like to thank my parents and friends who helped me a lot in finalizing this project within the limited time frame.

REFERENCES

- 1]. Arkady Zaslavsky, kostas Kolomvatsos, Alexey Medvedev, Pouria Amirian, Jeremy Morley, Stathes Hadjieftymiades "Challenges and opportunities of Waste Management in IOTenabled Smart cities: A survey" an IEEE Transaction 2017.
- 2]. Krishna Nirde, Prashant S. Mulay, Uttam M.Chaskar" IOT based solid waste management system for smart cities" an ICICCS in 2017.
- 3]. Dr. N. Sathish Kumar, B. Vijayalakshmi, R. Jenifer Prathana, A. Shankar", IOT based smart garbage alert system using Arduino Uno" an IEEE in 2016.
- 4]. Andrei Borozdukhin, Olga Dolinina and Vitaly Pechkin, " Approach to the garbage collection in the Smart clean city Project", in Yuri Gagarin State Technical University of Saratov,Russia in 2016.
- 5]. Abhay Shankar Bharadwaj, Rainer Rego, Anirban Chowdhury, "IOT based Solid Waste Management system", on Frugal Labs Tech Solutions Private Limited in 2016.