

Smart Bin

¹Harshita Chugh, ²Dushyant singh, ³Shahensha Shaik, ⁴Ashwani Singla

¹Student, ²Assistant Professor, ³Student, ⁴Student

¹CST, ²CST, ³ECE, ⁴ECE

¹VGU, Jaipur,India, ²VGU, Jaipur, India, ³RGUKT, Kadapa, India, ⁴LIMAT, Faridabad, India,

Abstract :To the rapid growth of industries and people in urban areas generation of garbage is increasing very rapidly by this every day millions of garbage is generated.To resolve this problem we created an intelligence model which can monitor and control of waste through the sensors and gives the information in detailed report which are connected to internet. Initially all the sensors from different location are connected through Internet and in every location sensors will measure and calculate the garbage levels and information will be sent to the server. At Server further information will Process and sent it to the Authorities to take prescribed action. By This approach we can get information of bin locating in different locations and by using an android app also we can get data of bins.

Index Terms - Internet of things, Sensors, Waste Management, Database, Raspberry Pi

INTRODUCTION

In Smart Cities Generation of waste is increasing due to rapid growth of people and industries in urban areas and the biggest problem to authorities is Collection of wastage from different locations i.e Houses, Public Places and Industries[1]. Due to the lack of proper information an amount of 85% of the total municipal solid waste(MSW)[10] budget is spent on waste collection and transportation to tackle this problem we need an intelligence to monitor waste and gives the complete information to authorities by this they can easily solve the waste management problem with well-organized manner[6].

The Approached method given in this paper aims to monitor the bin full or not and it will send the detailed bin information to authorities and concern person to collect the bin. Initially bin monitors the detection of user then if user is detected another sensor will monitor the garbage levels inside the bin further if space is available then motor will turn and bin will be opened. In case user detected and space is not available inside the bin it will check the nearest bin and will give status to user with indication finally full bin details will be update in database and information is sent to the concern person with bin identity.

Other method user can check the details of bin located in House/Public places/Industries by using an android app. Every bin is contained with an identity by simply giving the details of bin in app user can get the detailed information of bin garbage levels easily.

1.1 Internet of Things

The Connecting embedded electronic devices through a medium Internet is called Internet of things. It can be implemented with four steps Computing, Programming, Interfacing, and Networking [3][5][8]. In Computing We can Use either Microcontrollers or Microprocessors such as Microcontrollers (8051,AVR,Arduino) and Microprocessors (RaspberryPi) Both Using will be depend on the User Requirement and Programming also related to the device using Embedded C Programming for Microcontrollers and Python programming for Microprocessors i.e. raspberry In Interfacing user can use any type of electronic devices or sensors either analog or digital sensors and last Networking will Play Vital role in IOT(Internet of things) they are two types LAN and WAN[7][6][5].



Fig 1.1: Internet of Things

1.2 RaspberryPi

Raspberrypi is a low cost small credit card sized computer having functionality related to other computers and it is working on low 5v power supply and designed by the raspberrypi foundation in UK. Raspberrypi contains Linux based raspbian operating system and it supports various Linux operating system i.e. (Ubuntu Mate, Snappy Ubuntu Core, Windows 10 IOT Core, OSMC, LIBREELEC, PINET, RISC, Pidora). It is system-on-chip based multimedia processor which is heart of the Raspberrypi contains Broadcom Arm processor [11].

Features of Raspberry Pi are Having GPIO, LAN, Bluetooth, USB Ports, Display Module, Camera Module, Audio Jack etc. GPIO(General Purpose I/O) pins can easily interact with sensors and for display we can connect HDMI cable and Internet connection we can connect Wi-Fi or LAN Cable, and USB ports are used for serial bus communication[12].

Raspberry is Linux based Raspbian operating system which supports various number of library files and for the ease of communication all supported tools have programmed by using Python[14].

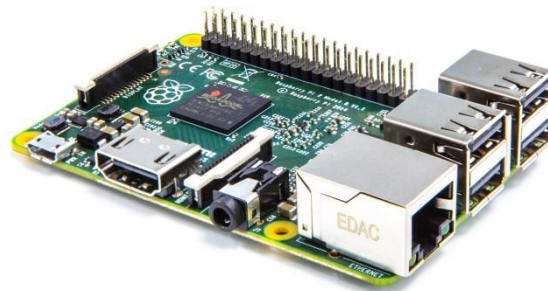


Fig 1.2: Raspberry Pi Board

1.3. Ultrasonic Sensor

Ultrasonic Sensor is used to calculate distance between object and sensor by sending a sound wave at specific frequency to reflect back. The time taken being sound wave generated and bouncing back is possible to calculate the distance between sensor and object and time taken by pulse is actually for to and from travel of ultrasonic signals thus time taken as Time/2 [9].

$$\text{Distance} = \text{Speed} * \text{Time} / 2$$

Speed of Sound at sea level 343 m/s or 34300 cm/s then

$$\text{Distance} = 17150 * \text{time}$$



Fig 1.3: Ultrasonic Sensor

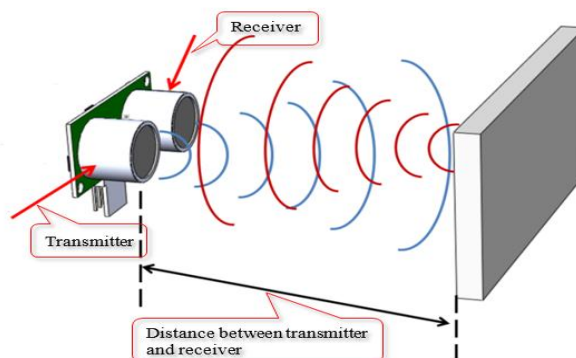


Fig 1.3.1: Working Principle of sensor

1.4 Servo Motor

There is various type of application of electrical motor where rotation of the motor is required for just a certain angle not continuously for long period of time. For these applications we required some special type of motor with special arrangement which makes the motor on certain angle on given input signal. Where DC motor will rotate angle of 360° rotation with the same principle servo motor will comes in mind for rotating specific angle of given signal.

Servos are controlled by sending an electrical pulse of **pulse width modulation(PWM)** through the control signal wire and there is a minimum pulse and maximum pulse and repetition rate. A servo motor can usually turn 0° to 180° movements for example a 1.5ms pulse will make motor rotate the 90° position and shorter of 1.5ms will make counter clockwise towards 0° position.



Fig 1.4.1: Servo Motor

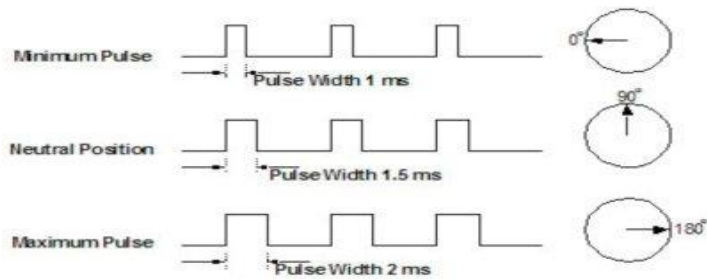


Fig 1.4.2: Angles of servo on time

1.5 Database

Data base is the place where we can get collection of information in well-organized manner and it will be stored in rows, tables, columns and indexed to make easy access for the relevant information[11]. In this paper we used thingspeak database to store the values of every bin pointed from different locations and we had created id related to bin which gives garbage level information to store in database for the further process we used raspberry to get the garbage level information pointed in different location connected to the database(ThingSpeak)[3].

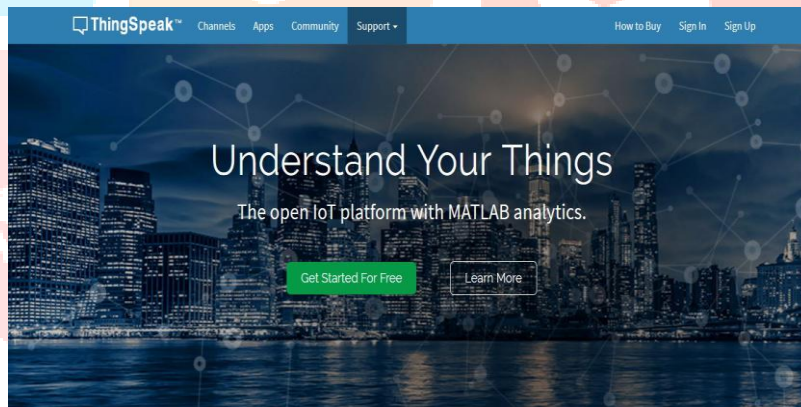


Fig 1.4: Thing speak Cloud Page

2 Block Diagram

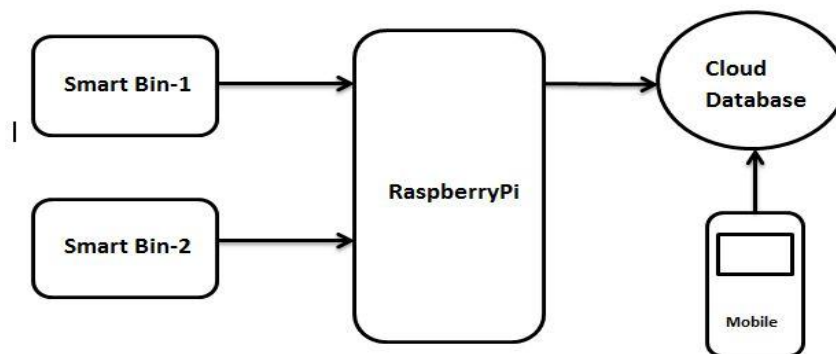
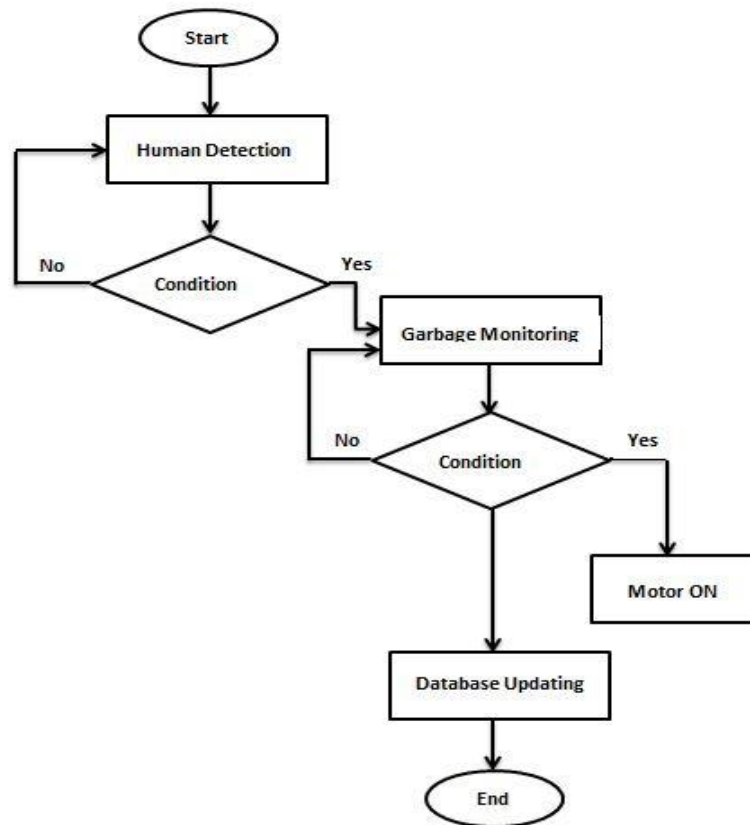


Fig 2: Block Diagram of Proposed System

3 Flow chart



Proposed System working and Results

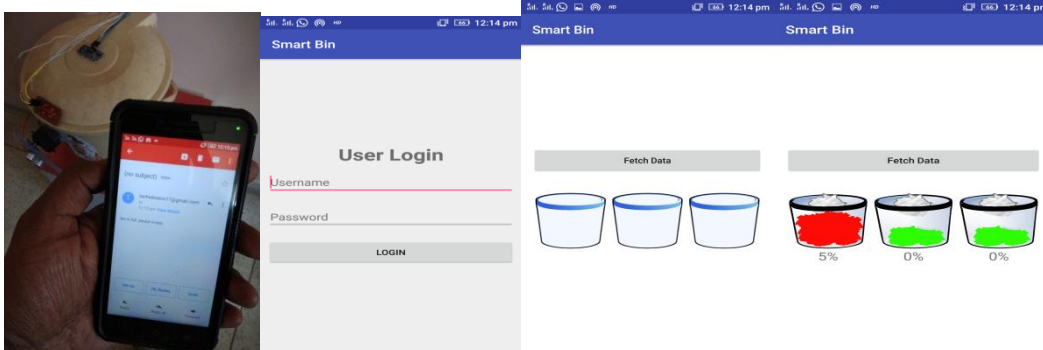
Proposed System Results as follows:



Smartbin

Detection of Person

Filling Dust inside the Bin
Indicating status of fullbin



Email Notification

Smart Android App

Showing Details of Bin

Garbage levels of different bins

4 Conclusion

We have been implemented the real time waste monitoring garbage system with the smart bin to check the levels of garbage in dustbin whether the dustbins are full or not. In this system the information of dustbin can be accessed by the user/authorities from anywhere by using android app. When garbage levels reached the condition details of bin will be sent to the authorities via email and this system will reduce the monitoring system of cleaner to check the garbage levels as result this will reduce the solid waste. our model designed with low cost, high accuracy sensors, cloud database to get the data with high accuracy and we used raspberrypi hear to give the constant internet connection to the system to update the data in cloud database and android app will give the details of bin from cloud database. And further we implement this model to connect all the dustbin together by using own cloud database and web portal will give the information all full dustbins as result it will be easy to monitor the system.

5 Future Work

Future Work for the proposed system as follows:

- In proposed model we connected single dustbin to cloud to get the data further we will connect the entire dustbin together.
- Dustbin information can be checked in cloud database further we will design a web portal to connect all the cities and streets with GUI model.
- Notification of full dustbin will be sent by SMS further.
- Android app update will give a new interface model to interact with all the connected dustbins.
- In proposed system garbage will monitor the all solid system further it will monitor wet and dry garbage levels separately.
- Proposed model will be extending to give free wifi access to the user when dustbin is thrown inside.
- Improving graphical interface of dustbin to monitor the levels of dustbin by android app.
- Further Reset button will be given to dustbin to work in manual mode when cleaners collect the garbage.
- Further indication will be given to the user to move left or right side by when dustbin is full.
- Further all the dustbin full data will together sent to the authorities with a new algorithm.

6 Acknowledgement

I wish to express my special thanks and deepest regards to my Supervisor Mr.Dushyantsingh, Assistant Professor, Computer Science and Technology Department and my colleagues Shahenshashaik, Ashwani single, for providing me invaluable guidance, suggestions, and support which have helped me to complete this research work. Without their wise counsel and able guidance, it would have been impossible to complete the present work.

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