IOT Based Smart Bin

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Abstract - The Main aim of this paper is to develop an intelligence bin which can monitor waste through sensors and gives the information in detailed which are connected to internet. Initially all the sensors from different location are connected through Internet in every location sensors will measure and calculate the waste and information will be sent to the server. At Server it will Process the information and sent it to the concern Authorities to take necessary action. By This approach we can get information of bin by using an android app also.

Key Words: InternetofThings, Sensors, Waste Management, Database, Raspberry Pi

1. 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 Industries1[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 proposed method will calculate the sensor levels in bin and data will be sent to database second to second. First sensor will monitor the detection of user and second sensor will calculate the levels further if sensor-1 detected any user status of flag will be sent to other sensor if levels are under condition motor will turn on and bin will be open then if bin is full Motor will be off and it will look for other empty bin which is near to it as result led will indicate the user to go left or right.

Other method User can check the levels of bins located in House/Public Places by using android app also every bin has contains distinct id. User can check the levels of garbage in bin by given details of bin id.

Our Designed algorithm will monitor all the bins located in different location and will give the status of bins. If any one of the bin is full then details will be sent to the concern authorities any user can also get the details of notification.

1.1 Internet of Things

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].
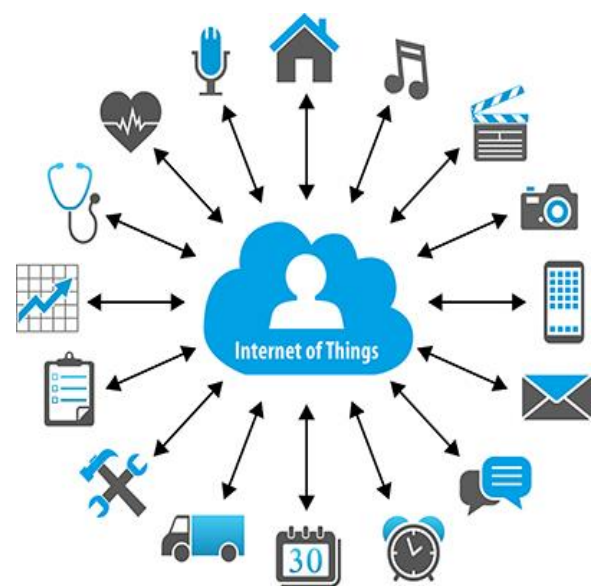

Fig 1.1: Internet of Things

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 RaspberryPi is 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].
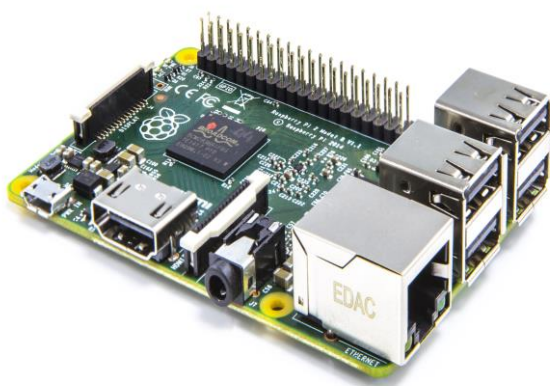

Fig 1.2: RaspberryPi Board

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].

Distance = Speed*Time/2

Speed of Sound at sea level 343 m/s or 34300 cm/s then
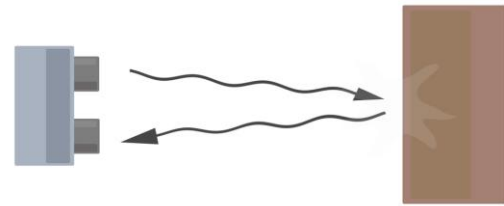
Distance = 17150* time

Fig 1.3: Ultrasonic Sensor

1.4. 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 thing speak 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(Thing Speak)[3].
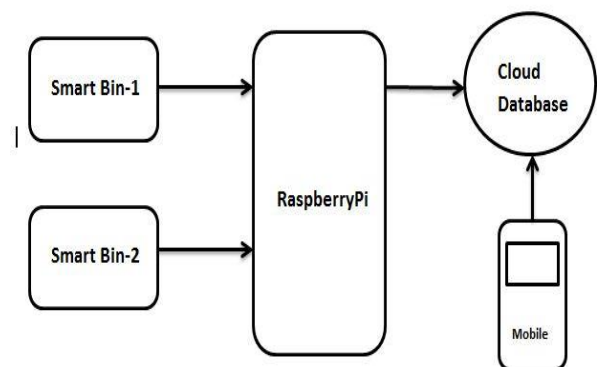

2. Block Diagram

Fig 2: Block Diagram of Smart Bin
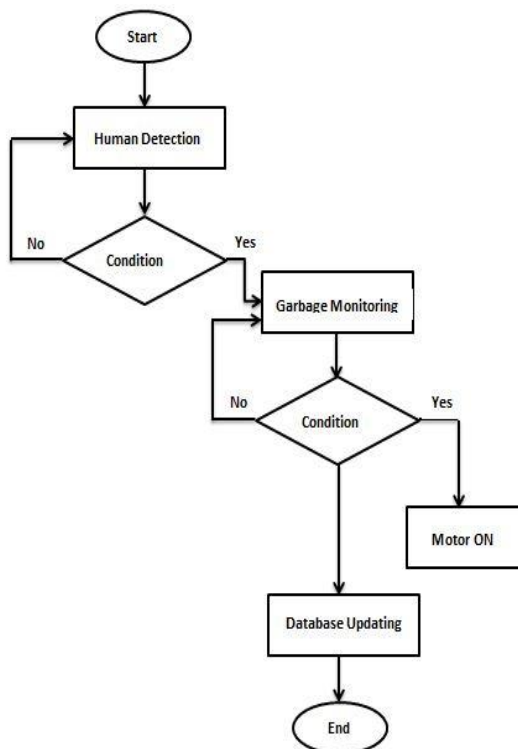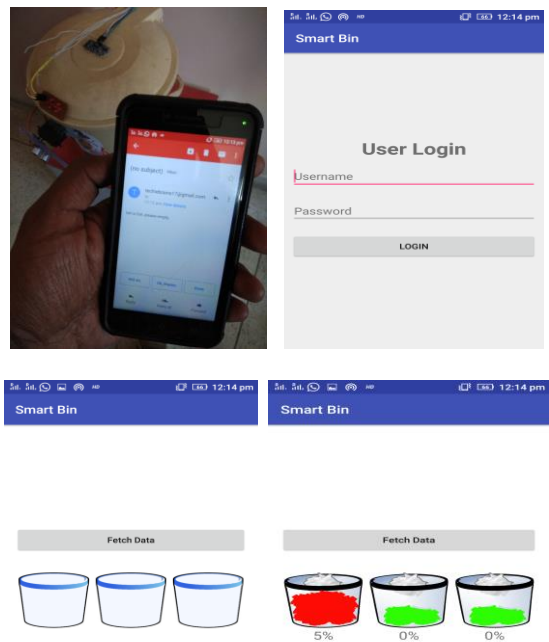
3. Flow Chart

Fig 3: Flow Chart

Results

Proposed System Results as follows:

4. CONCLUSIONS

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 raspberry_pi 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.
- Data of dustbin can be checked in cloud database further we will design a web portal to connect all the dustbin together
- Notification of dustbin is done by email further it will sent by the SMS

- Android app will designed 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 wife 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.

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