IOT BASED GARBAGE MANAGEMENT IN SMART CITY

PAIDI KISHORE KUMAR [1],KUDA NAGESWARA RAO [2]

M.TECH STUDENT[1] , PROFESSOR[2]

Department Of Computer Science & System Engineering, Andhra University College of Engineering (A), Visakhapatnam, India.

Abstract – Internet of Things(IOT) is enabled by the proliferation of various devices like RFIDs ,sensors,and actuators. The Internet of Things(IOT),as expected infrastructure for envisioned concept of Smart City, brings new possibilities for the city management. IOT vision introduces promising and economical solutions for huge data collection. In many area's, it can be seen that the Municipal garbage bins are overflowing and they are not cleaned at proper time. As a result of Which the consequences are severe. The concept of the project is the ultrasonic sensor is placed in the dustbin will detects the depth of the waste and the data will be stored in the raspberry pi.The stored data will be displayed on the webpage through WIFI and also displayed in Thing Speak. The servo motor will be placed on the top of the bin Which will open and closes the bin lid automically.This system uses the GPS it will give the latitude and longitude values based on the values we identify the current location of the dust bin. We finds the Shortest distance of the particular bin based on the latitude and longitude values by using of web server.The GSM sensor send alert message to the garbage collector when bin reaches the threshold level.

Key Words: Sensors, Raspberry pi, IOT, Garbage bins, Waste management.

1. INTRODUCTION

Things (Embedded devices) that are connected to Internet and sometimes these devices can be controlled from the internet is called as Internet of Things. In our system, the dust bins are connected to the internet to get the real time information about the smart dust bins. In recent years, there was a rapid growth in population which leads to more waste disposal. So proper waste management system is need to avoid spreading some deadly diseases. The basic project idea is to design a smart waste detection system which would automatically notify the centralized system about the current status of various garbage bins in the city, would have real-time monitoring capabilities. The Ultrasonic sensor finds the level of the dust in dustbin and sends the signals to micro controller, which would be remotely controlled using IoT techniques.

Communication of the devices connected to an internet enabled network constitutes what is called ' Internet of Things' .The activity of sensing, communicating, networking and producing new information are the basic key features of Internet of Things (lOT). It is the state of ever-growing network of physical objects which features internet connectivity over IP address, and the communication that occurs between these objects and other network connected devices and systems. The Internet of Things conceptually embodies intelligent visions of automating the day to day activities. Ideally, IoT will optimize our future routines with intelligent and robust systems that will make our life not only easily but also fast based upon our preferences and priorities like morning alarms, coffee timing, medicine uptake etc. Its vast applications will make our travel arrangements intelligently, by giving frequent updates on-minute and weather data. Our workflows will be smooth and refined, tasks will be prioritized based upon what is happening throughout our organization. It will help us maintain our appliances and vehicles, by notifying us about their maintenance and cleaning or - in the case of our lighting controls - automatic shutdown (based upon the usage and real time presence). It will enable our vehicles to communicate with other vehicles so as to maintain proper synchronization of traffic and tracking solutions. It will regulate our heaters, AC, and other home appliances and devices, to intelligently take decisions as we enter and exit rooms and based upon our usage level.

In short, IoT has the power to meet our every need before we even need realize what we want and will need. Interconnectedness and automation is the real power of Lot solutions. IoT has not only made our lives easier but also has lots of potential to drive economic value and social change. But still, 85% of things still are unconnected and a security threat pervasive, for which industry has yet to conquer the real potential of IoT.

Solid waste management is a big task in urban areas for most of the countries throughout the world. An efficient waste management is a pre requisition for maintains a safe and green environment as there are increasing all kinds of waste disposal. There are many technology's are used for waste collection as well as for well managed recycling.

The Information gathering is big and confusion. The concurrent effects of a fast national growth rate, of a maximal and dense residential area and a pressing demand for urban environmental protection create a challenging Framework for waste management. The complexity of context and procedure is indeed a elementary concern of local municipal officers due to problems related to the collecting, transportation and processing of residential solid waste. Present the garbage collection is manual which takes a lot of efforts and is time consuming. It is comprehensive logistics solution that saves time, money and the environment. It uses sensors to measure and show the fill level of waste containers and generates smart collection plans using the most efficient schedules and routes [2].

2. EXISTING SYSTEM

In the present system there is no indication whether the dustbin is full or empty. The muncipal corporation has to collect the garbage by weekly once or by 2 days once, though the garbage shrinks or overflows the bin and pollutes the environment. This will cause severe consequences. The rain water gets filled in the bin along with the waste which creates a bad smell and releases the harmful gases.

Limitations of the existing system:

➢ Time consuming and less effective.

➢ High costs.

➢ Unhygienic environment.

➢ Cause illness to human beings.

3. PROPOSED SYSTEM:

The proposed method for the management of waste is well-organized and time saving process. The ultrasonic sensor which is placed in the dustbin will detect the depth of the waste and the data will be stored in the raspberry pi and displayed data in the webpage. The servo motor will be placed on the top of the bin Which will open and closes the bin lid automatically.This system uses the GPS it will give the latitude and longitude values based on the values we identify the current location of the dust bin. We finds the shortest distance of the particular bin based on the latitude and longitude values by using of the web server. This can be implemented at any place with simple and within reasonable amount of time and reliable with long distance coverage.

Advantages:

➢ It is a time saving process.

➢ It supports low cost of transportation (fuel consumption).

➢ The information will be updated every 5 minutes.

➢ Reduce human efforts.

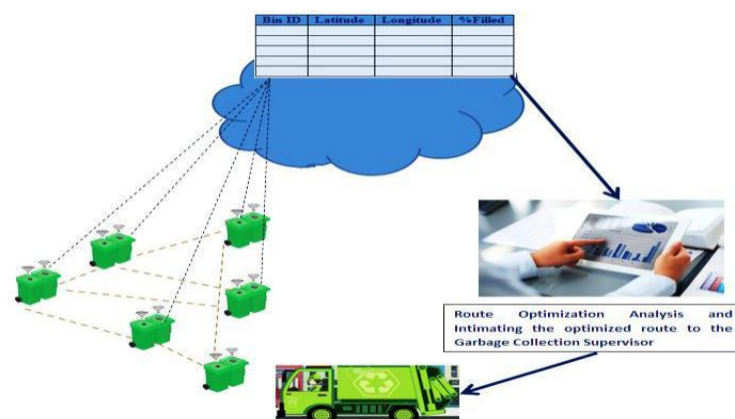➢ Enhancement of a smart city vision.

➢ Reduce environmental pollution.

Fig 1: Block diagram

4. PROPOSED DESIGN METHODOLOGY

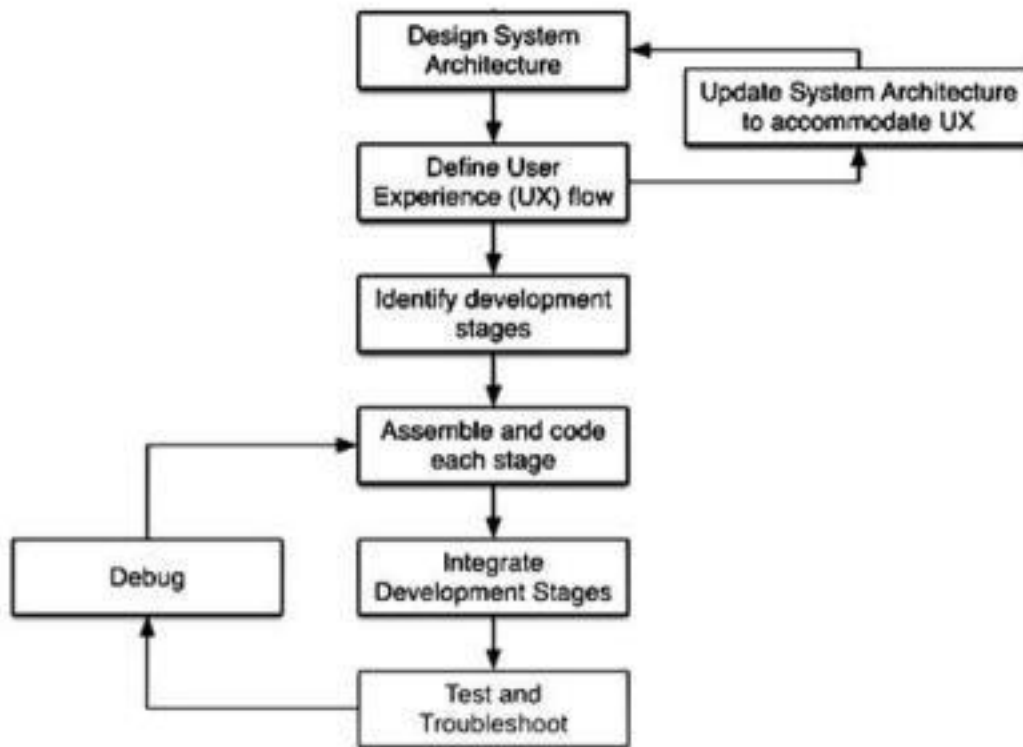The propose system follows the some steps to implement the our required design.

Figure 2: Design Methodology

4.1 Hardware

1.Ultrsonic sensor

The Ultrasonic sensor finds the depth(level) of the garbage present in the dustbin. This sensor sends the ultrasonic waves within the range of 100cm. Ultrasonic sensor sends the ultrasonic waves from its sensor head and again receives the ultrasonic waves reflected from an obstacle(object). If they hitting any object, they reflect back echo signal to the sensor.

2.Servo motor

The servo motor is used in this project, the servo motor is worked based on the ultrasonic sensor that is if any object find the ultrasonic sensor dust bin of lid is automically open after some time closed.

3.GPS Sensor

GPS sensor is gives the present dust bin latitude and longitude values , based on the values we find out present location of the dust bin.By using the GPS sensor to find out the particular location of the dust bin.

4.GSM sensor

GSM is a mobile the mobile communication modem.It stands for global system for mobile communication.The GSM is widely used mobile communication system in the world.It is a open and digital cellular technology used for transmitting mobile voice and services operates at the 850MHz,900MHz,1800MHz and 1900MHz frequency bands GSM is used to send the alert message to the garbage collector when the dust bin reaches the threshold level.

Rain drop sensor detects the water once it starts raining and close the bin automatically with the help of motor.

4.2 Analog to digital conversion

The data which have been retrieved from the sensor will be stored in raspberry pi. The Raspberry pi is a cheapest credit-card sized computer that connects a system monitor or TV,and used to a standard keyboard and mouse.The raspberry pi is a small device that enables us all ages to explore computing,and to learning how to program in languages like Scratch and

python.it's capable of doing everything you'd expect a desktop computer to do,from browsing the internet and playing the high-definition video's, to make the spreadsheets,word-processing,and playing games.

Fig 3: Raspberry pi 3 model B

The Raspberry pi has the ablity to interact with the outside world,and has been used in a wide array of digital maker projects,from music machines and parent detectors to weather stations and tweeting birdhouses with infra-red cameras.we want to see the Raspberry pi being used by kids all over the world to learn to program and understand how computer work.

4.3 Data storing

The data stored in the raspberry pi is transferred to the SQL database through WiFi. The WiFi is utilized with the help of inbuilt WiFi in the raspberry pi.

The cloud server which is used in this project is Thing Speak. It is an open source Internet of Things (IoT) application and API to store and retrieve data from things using HTTP protocol over the Internet or via a Local Area Network. Thing Speak enables the creation of sensor logging applications, location tracking applications, and a social network of things with status updates. The data sensed from the ultrasonic sensor and GPS sensor are stored in this cloud storage.

4.4 Software

Python
Pthon is a interpreted, high-level, general-purpose programming language. Python constructs and object-oriented
approach aim to help programmers write clear, logical code for small and large-scale projects.Python is dynamically typed and garbage-collected. Pyhon supports multiple programming paradigms, including procedural, object-oriented, and functional programming.

5. APPLICATIONS OF THE PROPOSED WORK

1. Waste Level detection inside the garbage bins. Transmission of the information wirelessly to concerned officials through internet.

2. System can be accessed at any time and from anywhere.

3. Real-time data transmission and accessing.

4. Avoids the overflows of garbage bins to reduce the harmful gases releasing.

5. The proposed project can only be used by municipal authorities or other private firms to tackle the current problem of urban waste collection.

6. Improves Environment quality-Fewer smells-Cleaner cities.

7. The proposed system has no individual use, but can be used by a city, state or a country.

8. Using this system, waste collection would become efficient and also reduction in transportation costs and traffic control can be witnessed.

6.RESULTS

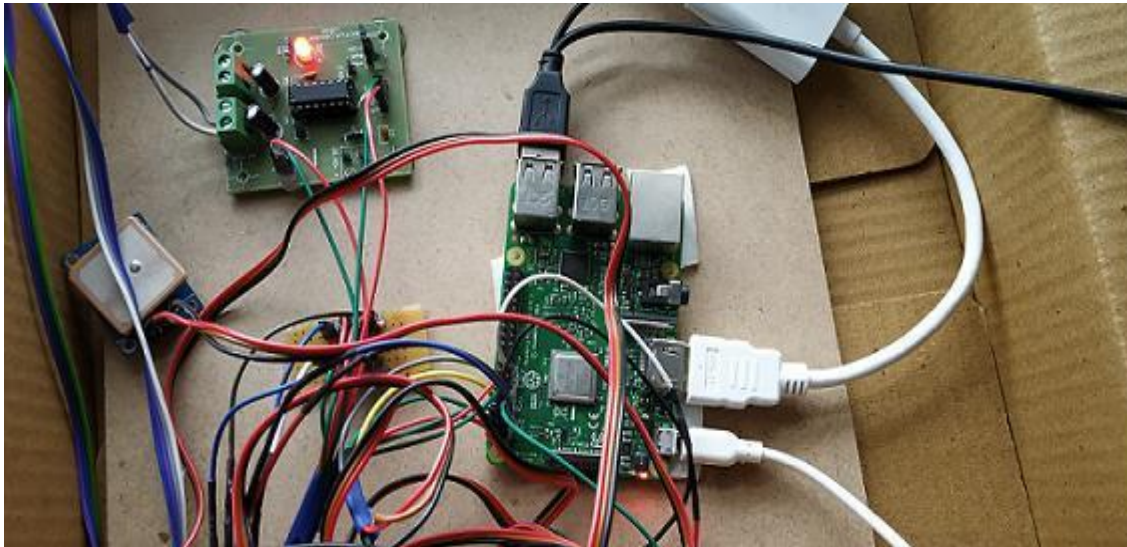The proposed system set up of the Smart waste management system is shown in figure 3

Figure 4:connections of the Raspberry

Normal bin is used for the prototype purpose.We made a temporary arrangement of the module on a plank and integrated suitably the module to the bin.The ultrasonic sensor are placed on the top of the bin.A buzzer is set to indicate the threshold level.We have to continuously monitor the dust bins and check of the status of the amount of garbage filling up in the bins.When the threshold point(say 80 or 85% filled)is reached,it has to trigger an alert to the central management office,indicating that it is time for the garbage collection at that bin point.You have to take utmost care in this step to avoid false alarms i.e.,reading a wrong status.These false alarms can be triggered because of uneven filling of the bin.A buzzer is beeped in such case.We use the GPS sensor its gives the latitude and longitude values based on the values we find the location of the dust bin.The servo motor is used to automaticlly open the lid when the object detected after some delay closed.

Figure 5: status and location of the dust bin in Thing Speak

The data stored in the Thing Speak.It is open source of IOT and API to store and retrieve data from things using to the HTTP protocol over the internet or local area network.The following figure shows the storing of data into Thing Speak.Thing speak enables the creation of sensor logging applications,location tracking applications,and a social network of things with status updates.Thing speak was originally launched by IOT Bridge in 2010 as a service in support of IOT applications.Thing Speak has integrated support from the numerical computing software MATLAB from Math Works.

7.FUTURE SCOPE

This can be made much more useful by use of drones which is able to collect the garbage and around the bin, put them in respective garbage vehicles. This helps in reducing the cost, manpower and also saves the time.

8. CONCLUSION

Various features such as durability, affordability, prevention against damage and maintenance issues are addressed when these smart dustbins are designed. This Smart Dustbin can contribute a lot towards clean and hygienic environment in building a smart city. But since the technology is new in India, proper awareness should be created among the public before it is implemented on a large scale. Otherwise, sensitive devices like sensors might be damaged due to rough(hard) action of the users.

REFERENCES

[1] Monika K A, Nikitha Rao, Prapulla S B, Shobha G, "Smart Dustbin-An Efficient Garbage Monitoring System", International Journal of Scientific & Engineering Research, Volume 6, Issue no 6,2016.

[2] Twinkle Sinha,Mugesh Kumar, P.Saisharan, "Smart Dustbin", International Journal of Industrial Electronics and Electrical Engineering, SRM University, India, vol-3, Issue-5, 2015,pp.101-104.

[3] Narayan Sharma, Nirman Singha , Tanmoy Dutta, "Smart Bin Implementation for Smart Cities" , International Journal of Scientific & Engineering Research, vol 6, Issue 9, 2015,pp-787-789.

[4] M.T.H. Shubho, M.T Hassan, M.R. Hossain and M. N. Neema, "Quantitative Analysis of Spatial Pattern of Dustbins and its Pollution in City--A GIS Based Approach", Asian Transactions on Engineering (ATE ISSN: 2221-4267) vol. 03 Issue 04, September 2013, pp.1-7.

[5] Jose M. Gutierrez, Michael Jensen, Morten Henius and Tahir Riaz , "Smart waste Collection System Based on Location Intelligence ", ScienceDirect Procedia Computer Science61(2015)120-127.

[6] Insung Hong, Sunghoi Park, Beomseok Lee, Jaekeun Lee, Daebeom Jeong, and Sehyun Park, "IoT-Based Smart Garbage System for Efficient Food Waste Management", the Scientific World Journal, Volume 2014 (2014), Article ID 646953.
[7] Peter Barry, Patric Crowley, "Modern Embedded Computing, Elsevier, ISBN: 978-93-81269-77-0 (Chapter 4,5,6,7,8,10,14). S.S. Navghane, MS killedar, Dr. V.M.Rohokale, "IoT based Smart Garbage and Waste collection bin", IJARECE, Volume 5, Issue 5, May 2016, ISSN: 2278-909X.