Garbage Monitoring System

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***Abstract*—The Internet of Things (IoT) is a concept in which surrounding objects are connected through wired and wireless networks without user intervention.So now a day's Automatic systems are being preferred over manual system to make life simpler and easier in all aspects.This paper proposes an IoT-based garbage monitoring system composed of a number of smart garbage bins and sensors.The project is designed in such a manner that it is supposed to work with all type of dustbins which contain any type of waste materials which may be mixed materials like papers, glass, metals and fluids.This paper is a review of Garbage Monitoring System based on IoT.**

Keywords—ESP8266, UltraSonic Sensor,Arduino Uno

I. INTRODUCTION

Garbage consists of the unwanted materials left over from city, Urban areas, Educational Institutions, Business organizations, home etc. In present scenario, many times we see the garbage bins gets overloaded due to increase in solid waste everyday. It creates unhygienic environment and bad smell in the society and because of this many disease get spread in the society to avoid this situation we are designing "Garbage monitoring system"

In metropolitan or city areas, the clearance of waste management is one of the challenging tasks for the majority of the country all over the world. There is need of a well organized waste clearance system is mandatory by keeping green environment [1]. There are many existing expertise mechanism are available for handling as well as managing waste. But, there is lacking for gathering information is a major challenging task. This miscommunication will affect the fast national growth rate in dense suburban area and also it is increasing demand for urban ecological protection. This is a major challenging in waste management system to create a prototype because the lack of coordination among government, people and local authority for shipping and processing waste. Currently the waste gathering is conventional which acquire a lot of labors and is time overwhelming process

In this proposed system the multiple dustbins are located throughout the city, these dustbins are embedded with low cost embedded device. When the dustbin gets filled then the notification will get filled. The proposed system is cost effective because it will notify to the organization and they will add a dustbins where their will be requirement.

II. LITERATURE SURVEY

This is not an original idea, for the implementation of smart dustbins ; the idea has existed for many years, after the IoT field finding its grip in our lives. This is, however an original plan for designing a garbage monitoring system with Ultrasonic sensor and predicting the number of dustbins required. By using garbage monitoring system the information of all smart dustbins can be accessed from anywhere and anytime by the concern person and he/she can take the decision accordingly. We are using Arduino integrated development environment (IDE).It is a cross-platform application (for Windows, macOS, Linux) that is written in the programming language Java. It is used to write and upload programs to Arduino board.

III. SYSTEM ARCHITECTURE

In the proposed system, the level of waste in the dustbins is detected with the help of Ultrasonic sensor.In this the garbage dustbins are set in the a city and a ultrasonic sensor is set on the different dustbins location.The sensor measures the distance of the garbage. When the measured value of sensors exceeds a certain threshold value then "dustbin is full" message is displayed.If at particular location dustbin get filled more than the dustbin allocated then a new dustbin id no will be added at particular location and increase the counter of dustbin at that location.This will help in managing the garbage collection efficiently. In this way we can develop a system. The other methods are also available. But arduino uno is less expensive, thus cost effective.

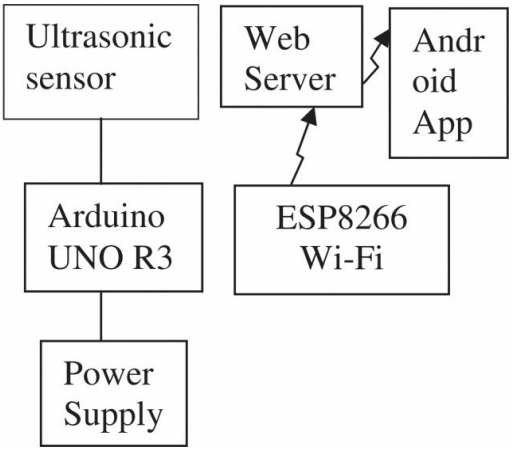

Fig. 1 Block diagram of garbage monitoring system

IV. HARDWARE USED

ARDUINO UNO

The Arduino Uno is a microcontroller board grounded on the ATmega328 (datasheet). It comprises of 14 digital input/output pins (out of which 6 can be utilized as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a facilitation for USB connectivity, a power jack, an ICSP header, and a reset button.Its designs comprises of assistances that supports the microcontroller in every possible way. In order to get to work with it one has to simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery. It is accessible in two different versions namely Arduino Uno[1] and Genuino Uno which could be visualized in Figure 1. The variations is observed with reference to the region. The Uno is unique from all its former boards in the way that it does not makes use of the FTDI USB-to-serial driver chip. The word "Uno" refers to one in Italian and it is named so to mark the forthcoming release of Arduino 1.0. The Uno and version 1.0 are the reference versions of Arduino in the forward journey. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform.

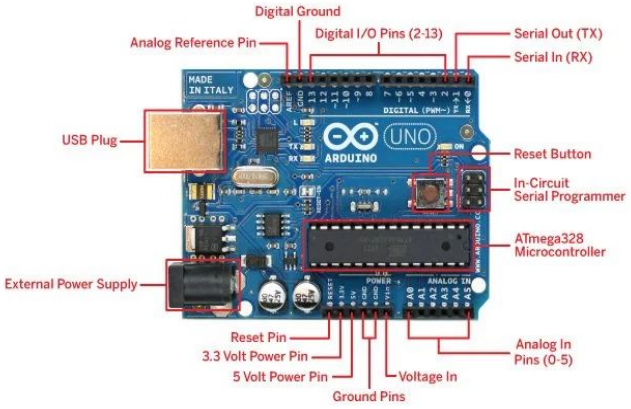

Fig. 2

ULTRASONIC SENSOR HC - SR04

Ultrasonic ranging module HC - SR04 offers a 2 cm - 400 cm non-contact measurement function, the ranging accuracy could reach up to 3mm. The building modules includes ultrasonic transmitters[2], receiver and control circuit. The basic principle:

(1) Making use of IO trigger for at least 10 us high level signal,

(2) The Unit inevitably sends eight 40 kHz and detects whether there is any pulse signal back.

(3) If any of a signal is received back in a high level, time of high output IO duration is the time from sending ultrasonic signal and receiving it back.

Test distance = (high level time× velocity of sound (340M/S) / 2

Here electrical energy is transformed into sound to send the pulse. The sound that is received back is converted into electricity. Thus the time lag between the sent and received sound signal is used to estimate the distance to the object. Spacing between sensors is dogged by their beam angles. The sensors must be spaced so that they do not interfere with each other. This interference is sometimes referred to as “crosstalk”. The target should be mounted perpendicular to the axis of the sensor.

Fig. 3

ESP8266

The arduino uno WI-FI module can be used as WI-FI modem. The Wi-Fi module is based on ATmega328P(datasheet) with an ESP8266[1]Wi-Fi module integrated. It has 14 digital I/O pins, 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a Reset button. The ESP8266 Wi-Fi module is a self contained SoC with integrated TCP/IP protocol that can give access to the Wi-Fi network [3] .

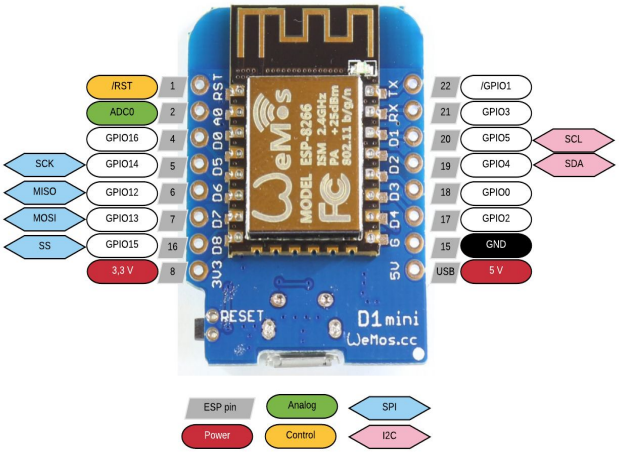

Fig. 4

V. IMPLEMENTATION & RESULT

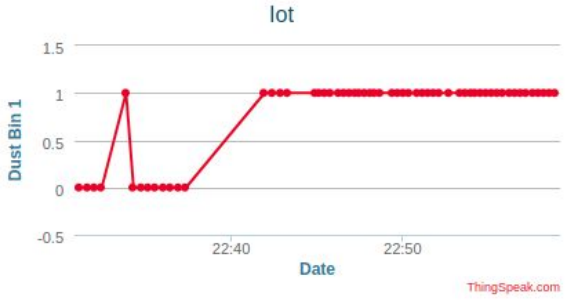

Fig. 5 Data uploaded on Thingspeak

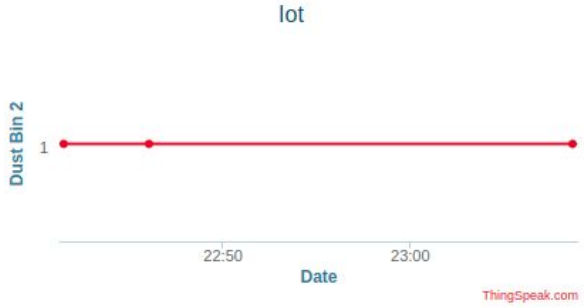

Fig. 6

Data of dustbin filled is uploaded on thinkspeak.So that it can be used in future to predict the no of dustbin required at that location.

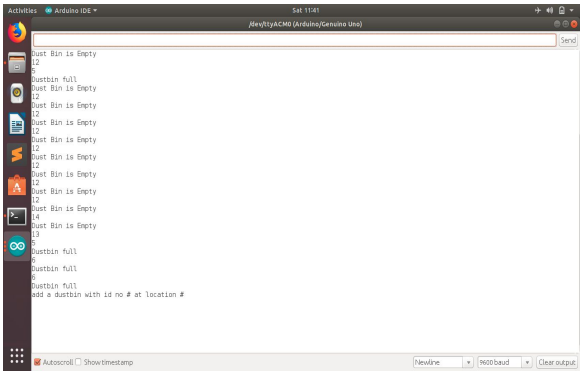

Fig. 7

DATABASE

To identify each dustbin, each Sensor node is given a unique ID number, this ID number allows each bin to be identified.

Using the information uploaded into the database, it is possible to generate analytical information on each of the dustbins that are within the area. This allows the city authorities to have access to information that would otherwise be absent. In addition, this information is also used in the predicting the no of dustbins.

The database of dustbins required at different location.

Serial no.	X Cordinate	Y Cordinate	No of Dustbins
1	8	9	4
2	8	1	5
3	2	4	4
4	8	8	4
5	2	5	4
6	1	4	3
7	8	4	5
8	3	8	3
9	6	6	5
10	9	7	4
11	1	7	3
12	7	3	5
13	10	3	3
14	2	1	5
15	7	3	5

Fig. 8

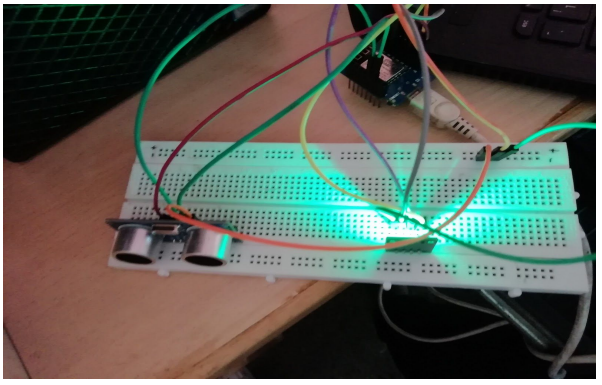

Fig. 8 Green light when dustbin is empty

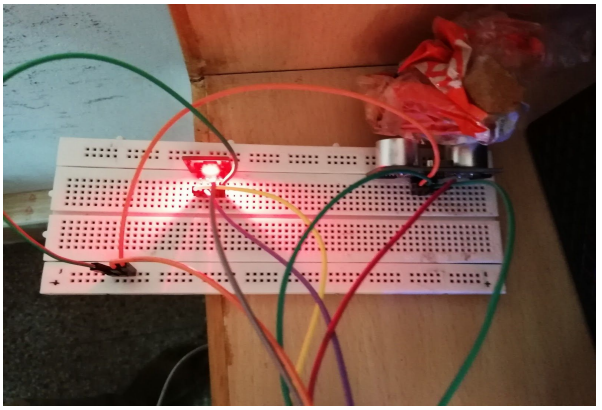

Fig. 9 Red light when dustbin is full

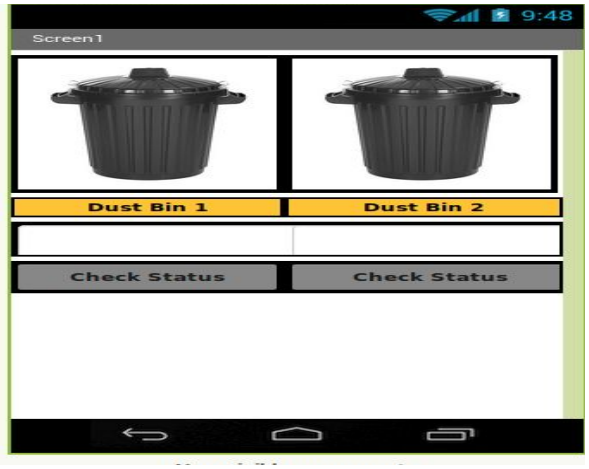

Fig. 10 App for garbage monitoring system

VI. CONCLUSION & FUTURE WORK

In this paper, we proposed an IoT-based Garbage Monitoring System.This paper gives basic idea about efficient garbage monitoring system by using the technology of IoT. In this work it is reported that using ultrasonic sensors. Further development can be done as per requirements. This paper has been done with the help of recent works, given in references. But we have tried our best to improve it with further developments based on our ideas.

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