IOT BASED SMART GARBAGE LEVEL MONITORING AND INTIMATION SYSTEM USING ARDUINO UNO

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Abstract— *The purpose of this paper is to provide some featuresin DMS that can monitor the dustbin using the new technology. To develop a prototype of the smart dustbin monitoring system, when the trash inside the dustbin is full it will automatically detects by the sensor system. To develop a system that can send information from one place to another place without any limitation we used WiFi technology that provides larger area coverage with less cost and highly reliable. It will also provide the best route for the garbage transportation through WiFi (IP Address) based mapping technology.*

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Keywords— *Dustbin Monitoring System (DMS). Internet Protocol (IP)*

I. INTRODUCTION

Waste management is all the activities and actions required to manage waste from its inception to its final disposal. This includes collection, transportation, treatment and disposal of waste together with monitoring and regulation. Waste collection methods vary widely among different countries and regions. Domestic waste collection services are often provided by local government authorities, Curbside collection is the most common method of disposal in most countries, in which waste is collected at regular intervals by specialized trucks. Waste collected is then transported to an appropriate disposal area. Now a days, cities with developing economies experience exhausted waste collection services, inadequately managed and uncontrolled dumpsites and the problems are worsening , Waste collection method in such countries is an on-going challenge and many struggle due to weak institutions and rapid urbanization. Due to fleetly increase population growth, urbanization, developing countries because of this a lack of public awareness towards the waste management. The most important priorities are to ensure a clean and healthy globe and to protect the urban environment. Over a last few year, the operational cost for management of solid waste has increased gradually.

II. OBJECTIVE

The paper is about monitoring the dustbin inside the hypermarket. This paper is more suitable for area inside hypermarket or in the specific area. The focus of this paper is make easy for cleaner collect the overload garbage without waste of time, they will came collect when get the message. The papers have use Arduino Uno Board because it can control the sensor, WiFi module to upload the datas to the database. This paper have use software and hardware component. For the software application it will apply to activate the components and to run the application WiFi to make the connection between dustbin and management system with internet connectivity. The message full rubbish will send to supervisor for the information and will be notified to cleaner for collect the rubbish.

III. METHODOLOGY

The garbage containers transmit signals to indicate that they are over 80% or 90% full and should be emptied via the mobile communications network, the signals are sent to a web based software application used by the waste management company. In the software, the capacity of the container is indicated, which is taken as a basis to plan the best route for waste collection garbage trucks travel only to those containers that actually need to be emptied.

A. *Block diagram*

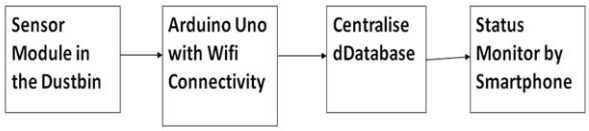

Fig 1: Block diagram of dustbin monitoring system

B. Hardware

1. WIFI MODULE (ESP-8266)

This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area. The ESP8266 supports APSD for VoIP applications and Bluetooth co-existence interfaces, it contains a self-calibrated RF allowing it to work under all operating conditions, and requires no external RF parts. There is an almost limitless fountain of information available for the ESP8266, all of which has been provided by amazing community support. In the Documents section below you will find many resources to aid you in using the ESP8266, even instructions on how to

transforming this module into an IoT (Internet of Things) solution. The ESP8266 Module is not capable of 5-3V logic shifting and will require an external Logic Level Converter. Please do not power it directly from your 5V development board. Low-power, low-cost Wi-Fi modules have changed the landscape of wireless sensor networks. Autonomous, Wi-Fi sensors connect to common, widely available wireless network infrastructure. They send sensor data over standard TCP/IP making their information anywhere in the world from any computer or smart phone.

Fig 3: WiFi module ESP8266

2. ULTRASONIC SENSOR:

An Ultrasonic sensor is a device that can measure the distance to an object by using sound waves. It measures distance by sending out a sound wave at a specific frequency and listening for that sound wave to bounce back. By recording the elapsed time between the sound wave being generated and the sound wave bouncing back, it is possible to calculate the distance between the sonar sensor and the object,Since it is known that sound travels through air at about 344 m/s (1129 ft/s), you can take the time for the sound wave to return and multiply it by 344 meters (or 1129 feet) to find the total round-trip distance of the sound wave. Round-trip means that the sound wave traveled 2 times the distance to the object before it was detected by the sensor; it includes the 'trip' from the sonar sensor to the object AND the 'trip' from the object to the Ultrasonic sensor (after the sound wave bounced off the object). To find the distance to the object, simply divide the round-trip distance in half.

3. ARDUINO BOARD:

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 programmed as a USB-to-serial converter. With the help of this we can directly communicate with the PC or computer. "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. in our paper we use Arduino board since it has inbuilt ADC so we no need to interface external ADC to connect with sensor, since most of the sensor gives their output in analog form. This board is also simple for programming it does not need any external programmer or burner to burn the program in microcontroller. Since it has 32kb flash memory so we can save our program as well as we can change the program according to our requirement.

Feature of Arduino Uno board

- Microcontroller ATmega168 or 328
- Operating Voltage 5V
- Input Voltage (recommended) 7-12V
- Input Voltage (limits) 6-20V
- Digital I/O Pins 14 (of which 6 provide PWM output)
- Analog Input Pins 6
- DC Current per I/O Pin 40 mA
- DC Current for 3.3V Pin 50 mA
- Flash Memory 16 KB (ATmega168) or 32 KB (ATmega328) of which 2 KB used by bootloader

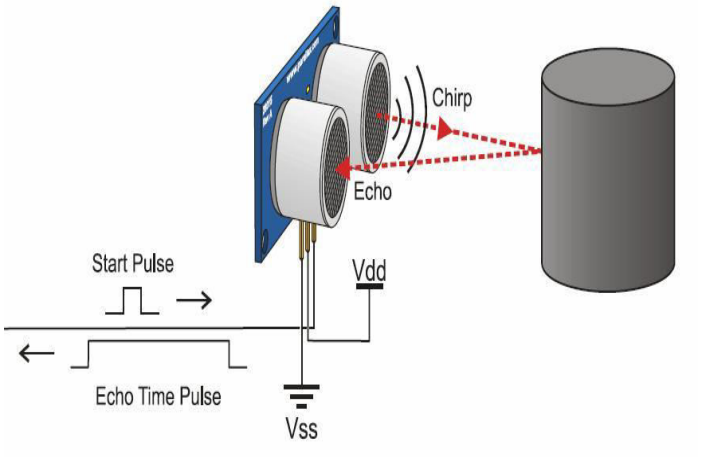

Fig 2: Ultrasonic Sensor

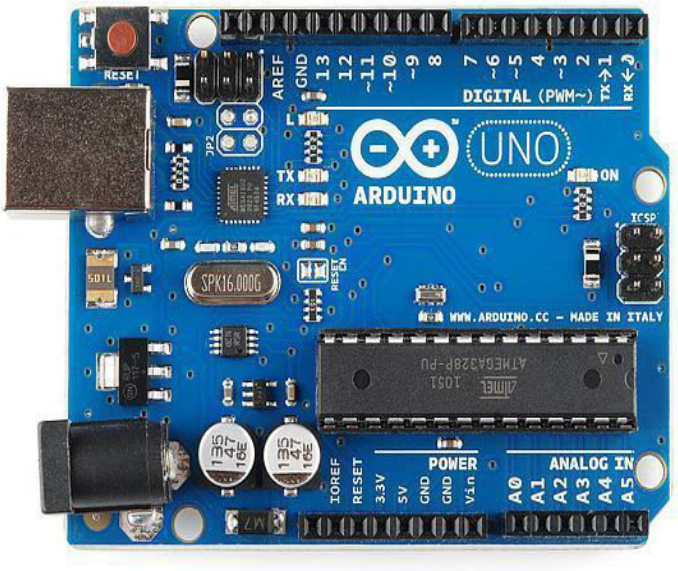

Fig 4:- Arduino Uno Board

4. LCD:

A liquid crystal display, or LCD, is a video display that utilizes the light modulating properties of liquid crystals to display pictures or text on a screen. Since their invention in 1964, LCD screens have grown to be used in a very wide variety of applications, including computer monitors, televisions, and instrument panels. One way to utilize an LCD is with an Arduino microcontroller. By wiring an Arduino microcontroller to the pins of an LCD display it is possible to program the microcontroller to display a desired text string or image on the screen. An LCD display is composed of pixels made up of liquid crystals. Liquid crystals exist in a state that's between a solid and a liquid. At any time liquid crystals can be in a variety of phases, most notably the nematic phase or the smectic phase. In the nematic phase the crystals act more like a liquid, allowing the molecules of the crystals to rearrange themselves while remaining oriented in a uniform direction. In the smectic phase, the molecules can form into layers that can move past one another relatively easily. Molecules of a certain layer can move freely within that layer, but cannot move to adjacent layers.

Fig 5 : Liquid Crystal Display

C. Software

1. Arduino IDE:

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them. Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension .ino. The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom right hand corner of the window displays the configured board and serial port. The toolbar buttons allow to verify and upload programs, create, open, and save sketches, and open the serial monitor.

IV. RESULTS AND DISCUSSION

Fig 6: Implementation of Garbage Monitoring System

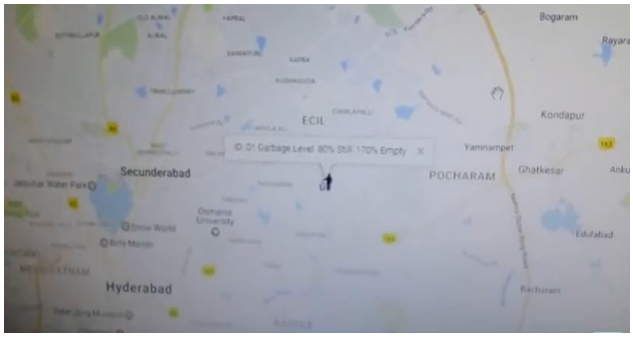

Fig 7: Location Indication with Dustbin Status

IV. CONCLUSION

In this paper, an integrated system of Wi-Fi modem, IoT, GSM, Ultrasonic Sensor is introduced for efficient and economic garbage collection. The developed system provides improved database for garbage collection time and waste amount at each location. We analyzed the solutions currently available for the implementation of IoT. By implementing this paper we will avoid over flowing of garbage from the container in residential area which is previously either loaded manually or with the help of loaders in traditional trucks. It can automatically monitor the garbage level & send the information to collection truck. The technologies which are used in the proposed system are good enough to ensure the practical and perfect for solid garbage collection process monitoring and management for green environment.

V. REFERENCES

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