IOT Based Garbage Monitoring and Sorting System

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Abstract - *"Swachh Bharat" is a national campaign by the tatutory cities and towns to clean the roads streets and infrastructure of the country. When the massive amount of waste material is collected, it is difficult to separate and unhygienic. Now a day's garbage is separately thrown i.e. dry and wet. The Internet of Things (IoT) shall be able to incorporate transparently and coherently a large number of different and heterogeneous end systems, while providing open access to selected subsets of data for the developing a digital services. Building a general architecture for the IoT is hence a very complex task, mainly because of the extremely large variety of devices, link layer technologies. One of the main concerns with our environment has been solid waste management which in addition to disturbing the balance of the environment also has adverse effects on the health of the society. The detection, monitoring and management of wastes are one of the primary problems of the present period. The traditional way of manually monitoring the wastes in waste bins is a complex, cumbersome process and utilizes more human effort, time and cost which is not compatible with the present day technologies in any way. This is an advanced method in which waste management is automated. In this "IOT based garbage monitoring and sorting system" The separate the wet and dry garbage using the moisturized sensor. This system is based on the separation and monitoring of garbage using Arduino Uno, Wi-Fi-module, ultrasonic sensor, moisturized sensor, gas sensor. Online identification of the garbage level using IOT, ultrasonic sensor and Wi-Fi module makes this system more effective than other system.*

***Key Words*: IOT, Moisturized sensor, Ultrasonic sensor, ESP8266 Wi-Fi Module, Arduino Board, gas senser.**

1. INTRODUCTION

In this system, we are going to make an IOT based dumpster/garbage Monitoring System it will tell us that whether the trash can is empty or full through the web server and you can know the status of your 'Trash Can or 'Dumpsters' from anywhere in the world over the Internet. It will be very useful and can be installed in the trash cans at public places as well as at home. Garbage may consist of the unwanted material left over from the city, public Areas, society, college, home etc. his system is related to the "Garbage Monitoring" and based on "Internet of Things". This system will help to minimize the garbage disposal problems and help to keep the clean city.

In this system an Ultrasonic Sensor is used for detecting whether the trash can is filled with garbage or not and will measure the distance of garbage from the top of Trash can and we can set a threshold value according to the size of trash can. We will use ESP8266 Wi-Fi module for connecting the Arduino to the web server. Here we have used Local web server to demonstrate the working of this Garbage Monitoring System. This system monitoring the garbage bins and informs about the level of garbage collected in the garbage bins via a web page. The system makes use Arduino, LCD screen, Wi-Fi modem for sending data The LCD screen is used to display status of the level of garbage collected in the bins. Where the web page is built to show the status of user monitoring it. The web page gives a graphic view of the garbage level. Thus this system helps to keep the city clean by informing about the garbage levels of the bins by providing graphical image of the bins via IoT Pup web development platform.

1.1 LITERATURE SURVEY

In solid waste monitoring system garbage been set the public place then Camera set for garbage bin location. The camera captured image for garbage bin. Radio Frequency Identification (RFID), GPS and GIS send image for work station. The RFID reader and camera are mounted in the truck, when truck comes closer to the bin RFID reader communicated RFID tag. & send all information. A astounding 0.1 million tonnes of waste is generated each day in India. Sadly, only 5% of this colossal amount of waste is recycled. Wet material makes dry material wet if we not separate, it causes difficulties in recycling process [1]. The gases produce by the garbage is harmful for the public.

The control station compiled all the information and stored in the system database. The bin status and waste truck was monitored.

1.2 SYSTEM ARCHITECTURE

The IOT Garbage Monitoring system is a very innovative system which will help to keep the cities clean. This system monitors the garbage bins and informs about the level of garbage collected in the garbage bins via a web page. For this the system uses ultrasonic sensors placed over the bins to detect the garbage level and compare it with the garbage bins depth. The system makes use of Arduino family microcontroller.
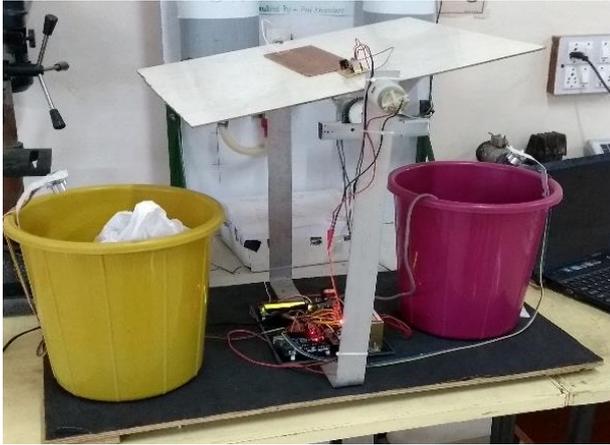
Fig.-1: IOT based Garbage monitoring and sorting system

In this system 9v of dc power supply is used. This Power supply is given to the Arduino board. The Ultrasonic Sensor is used to measure the distance with high accuracy and stable readings. It can measure distance from 2cm to 400cm or from 1 inch to 13 feet. The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back. The input to the arduino is ultrasonic sensor has four pins. Two are VCC and the distance d GND which will be connected to the 5V and the GND of the Arduino while the other two pins are Trig and Echo pins which will be connected to any digital pins of the Arduino. The trig pin will send the signal and the Echo pin will be used to receive the signal. To generate an ultrasound signal, you will have to make the Trig pin high for about 10us which will send a 8 cycle sonic burst at the speed of sound and after striking the object, when the strike signal come quickly it means that the garbage level is high, if it take some time to come back it means that level is medium and if it takes more than medium level it means that garbage level is low. According to the garbage level detected that information is send to the LCD screen on the bins and the same information is sends to the municipality office via ESP8266 Wi-Fi module.
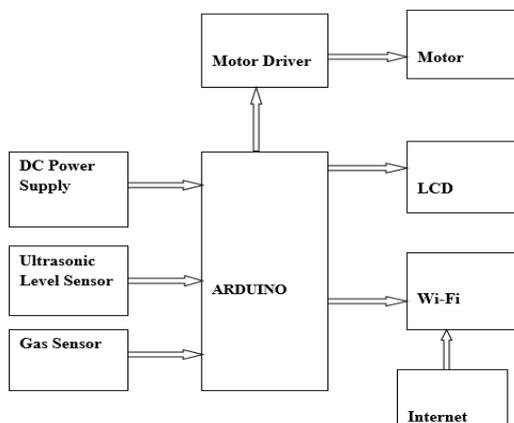

Fig.-2: Block Diagram of Garbage Monitoring System
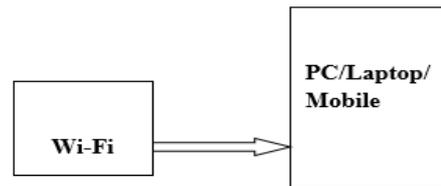
Fig.-3: Wireless Communication System

2. ARDUINO BOARD

Arduino is the best choice as a single-board computer that has deliberately been designed to be used by people who are not experts in electronics, en-Gingering or programming. It is inexpensive, cross-platform (the Arduino software runs on Windows, Mac OS X, and Linux), and easy to program. Both Arduino hardware and software are open source and extensible. Arduino is also powerful despite its compact size, original navigation computers from the Apollo Programmers, designers, do-it-yourselves and artists around the world take advantage of Arduino's power and simplicity to create all sorts of innovative devices

Fig.-4: Arduino Board

Aurdino is an open source computer hardware and software company, project and user community that design and manufacturers single-board microcontroller and microcontroller kits for building digital devices and interactive objects in the physical world. The hardware consist of a simple open hardware design for the arduino Yun board on-board input output support and Atmel atmega328 microcontroller. Arduino is an open-source single-board microcontroller and a successor to the open-source wiring platform. The hardware consists of a simple open hardware design for the arduino Yun board with an Atmel atmega328 microcontroller and on-board input / output support. The microcontroller on the board is programmed using the arduino programming language and the arduino development environment. The developed program can be compiled, tested and can be uploaded to the microcontroller board by universal bus (USB). The arduino the development environment here used is Arduino 1.5.3 supported on windows platform. The software consists of a standard programming language compiler and a boot loader that runs on the board. Arduino hardware is programmed using a wiring-based language (syntax and libraries), similar

to c++ with a few simplifications and modifications, and a processing-based integrated development environment

The EPS8266 has 8 pin in which we use only 4 pins. VCC ,CH-PD,TX & RX the VCC and CH-PD pins are useful for the purpose of enable the Wi-Fi it will be connected to the 3.3V.The TX and RX pins are used for the communication or esp8266 with arduino.thr receiver pin only work on the 3.3V so for this we can use voltage divider in our project.

3. COMPONENTS

3.1 DC MOTOR

A DC motor plays an important role in this project it relies on the fact that like magnet poles repels and unlike magnetic poles attracts each other. A coil of wire with a current running through it generates an electromagnetic field aligned with the center of the coil.
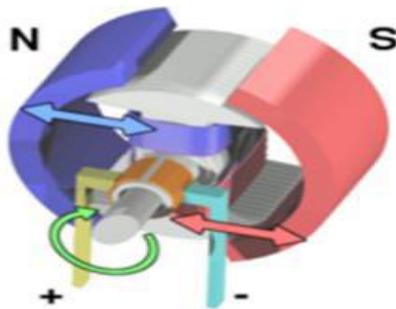

Fig.-5: DC Motor

By switching the current on or off in a coil its magnet field can be switched on or off or by switching the direction of the current in the coil the direction of the generated magnetic field can be switched 180°.

3.2 MQ-135 Gas Sensor

Fig.-6: MQ-135 Gas Sensor

MQ-135 module is used to detect the different types of gases present around the air. In our project it is used to detect or sense the harmful gases around the dustbin and shows the % of harmful gases. MQ-135 Module sensor has lower conductivity in clean air. It is with low cost and suitable for

different applications such as harmful gases/smoke detection. The MQ135 gas sensor has high sensitivity to Ammonia, Sulphide and Benzene steam, also sensitive to smoke and other harmful gases. When the target combustible gas exists, the sensors conductivity is higher along with the gas concentration rising, Convert change of conductivity to correspond output signal of gas concentration.

3.3 Ultrasonic Sensor

The Ultrasonic Sensor sends out a high-frequency sound pulse and then times how long it takes for the echo of the sound to reflect back. The sensor has 2 openings on its front. One opening transmits ultrasonic waves, (like a tiny speaker), the other receives them. The speed of sound is approximately 341 meters (1100 feet) per second in air. The ultrasonic sensor uses this information along with the time difference between sending and receiving the sound pulse to determine the distance to an object.

3.3 WI-FI Modem

The WI-FI 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. It has a 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.

3.4 Advantages

1. Monitors the garbage bins and informs about the level of garbage collected in the garbage bins.
2. To keep our Environment clean & green.
3. The cost & effort are less in this system.

3.4 Applications

It is used in the" SMART CITY". It is helpful in the government project of "SWACHH BHARAT ABHIYAN".

4. RESULT

Fig.-7: Output of System

5. CONCLUSIONS

In this paper we present, our work on developing an affordable and efficient method that can support to sort the dry and wet garbage. In this the new innovation is that we use the IOT (Internet of Things) from this we can monitor our system from any where using internet of thing. If we use this system in our home then the wet and dry garbage is separated from our houses this is the vital role plays in this system. Further, a wireless interface has been provided to control the system wirelessly and keep the cities clean from unhygienic and hazardous environments. 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

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