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RESEARCH ARTICLE OPEN ACCESS

SMART DUSTBIN USING IOT

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Abstract:

In our towns, we can see that the garbage bins are always overflowing in all public places. This is because of lack of details about the filled level of the bins. Nowadays we all are trying to make our cities Smart cities. A smart city is incomplete without a smart waste management system. So we propose a system of SMART DUSTBIN. In this system, when the dust reaches the threshold level, it will display the status in the website owned by the municipal authority. By employing these smart dustbins all over the city, we can get updates about the status of the dustbins regularly. This proposed system uses Arduino, Ultrasonic sensors, smell sensors and Wi-Fi module to update the data on the website.

Keywords: Arduino, ultrasonic sensor, smell sensor, Wi-Fi module.

1. INTRODUCTION

From the last few decades, we have seen substantial growth in the population. This rapid growth has resulted in a need for urbanization which created a new thought of smart cities. Nowadays, many times we see that the garbage bins or Dustbins are placed at public places in the cities are overflowing due to increase in the waste every day. It makes an unhygienic and unhealthy condition for the people and creates bad smell around the surroundings. This results in the spread of many diseases and illness. To avoid this, we propose a new system of Smart Dustbin. In this proposed System, there are multiple dustbins located in the campus theare arranged with embedded devices which helps in tracking the level of the garbage bins and a unique ID will be provided for every dustbin in the city so that it is easy to identify which garbage bin is full. When the level of dust reaches a specified level, the data is uploaded to the website which contains all the dustbins details. These details can be accessed anywhere through the internet and immediate action can be made to clean the

dustbins.

2. EXISTING SYSTEM

The existing system is a traditional system. In this system, the municipality cleaners will visit the streets once in a week and clean the garbage bins. But there are some places where the rate of filling is much faster and the garbage is overflowing in the streets. When there are conditions like rain, this garbage creates an unhygienic environment and spread many diseases. There is a chance of animals creating a mess around the bins and they pull the garbage out of the bins.

3. PROPOSED SYSTEM

In the proposed system, the dustbins are connected with an embedded device that is used to give information about the bin. The dustbin is made to automatically open and close by using ultrasonic sensors when a person came to throw the garbage. It will give the level of the dustbin so that we can use it. When the level reaches the specified value, the ultrasonic sensor reads it and sends the data to Arduino. If it is full, it will show another nearest bin with help of LCD display and update the status to the website with the help of internet. We can sprinkle bleaching powder when we find any bad smell in the bin by using smell sensor.

3.1 Block Diagram

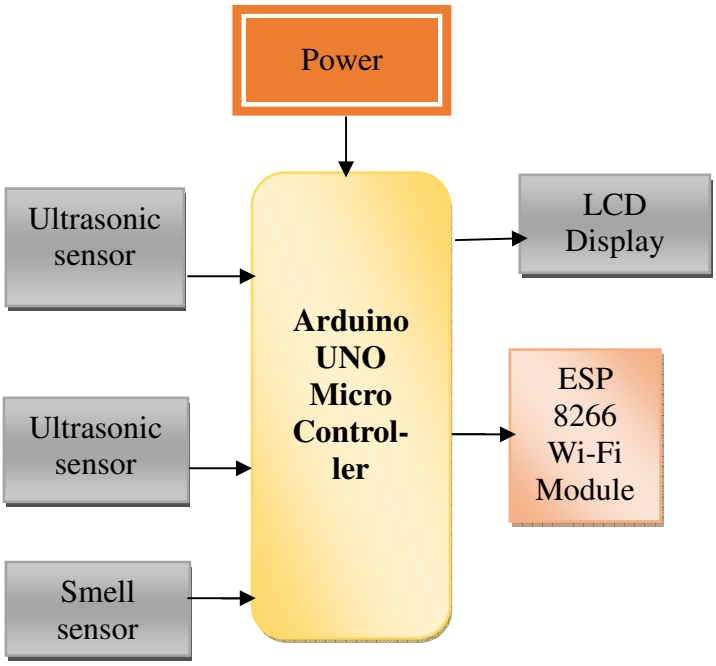

Fig 3.1 Block Diagram

4. BLOCK DIAGRAM DESCRIPTION

The proposed system consists of Arduino UNO board, ultrasonic sensors, smell sensors, Wi-Fi module, LCD display and 9V battery for powering the kit. It uses Arduino IDE as the software tool for writing code to Arduino board.

4.1Arduino UNO Microcontroller

The Arduino Uno is a microcontroller board based on the ATmega328. It manufactures and designs microcontroller based kits for building devices which are digital and interactive objects those can control and sense objects in the

physical world. Arduino UNO has 14 digital I/O pins, which has 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains 5 pins for power supply they are 5V, 3.3V, Vin, and two pins for ground.It has InCircuit Serial Programmer and USB plug is used for serial transmission or as a power supply.

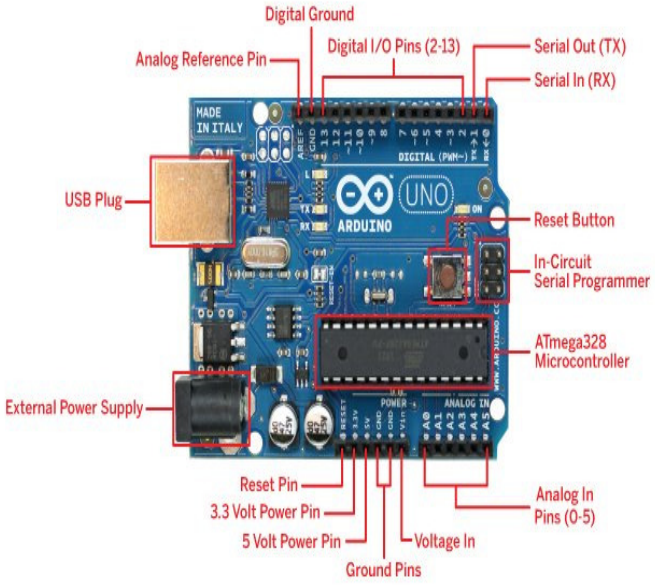

Fig 4.1 Arduino UNO Microcontroller

Specifications

- Operating voltage: 5v
- DC current for I/O pin: 40mA
- DC current for 3.3V pin: 50mA
- Flash memory: 32KB
- EEPROM: 1KB
- SRAM: 2KB
- Clock speed: 16MHZ

4.2 Ultrasonic sensor

Fig 4.2 Ultrasonic sensor

The ultrasonic sensor is used to find the level of the garbage present in the bin. It has four pins they are VCC, GND, Trig, and Echo. VCC and GND are used as supply pins. Trig and Echo pins are used for range measurement. It calculate the distance sandwiched between the object and finds the range. It sends a trigger pulse of frequency 40HZ and if an object is present, the signals are bounce back. It measures the time taken to reach the bounced signal and find the distance of the object from the sensor.

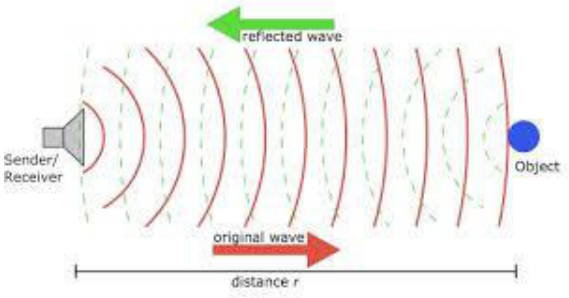

Fig 4.2.1 Working of Ultrasonic sensor

Specifications

- Operating voltage: 5v DC
- Operating current : 40mA
- Operating Frequency: 40Hz

- Min Range: 2cm
- Max range: 4m
- Measuring angle: 15 degree

4.3 Smell sensor

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Smell sensor is used to find the methane gas, smoke, and combustible gas which are emitted when the garbage is rotten and emits a bad smell. It consists of four pins VCC, GND, AO, DO. A0 is the analog pin is input to the Arduino and D0 is the digital input pin to the smell sensor which is either 0 or 1. When the gas exceeds the threshold limit then the D0 pin is set to high and it is connected to sprinkler which is used for powder sprinkling.

Specifications

- Operating Voltage: 5V DC
- Analog Output voltage : 0 to 5V
- Digital Output voltage: 0V or 5V
- Preheat duration: 20 seconds

4.4 Wi-Fi Module

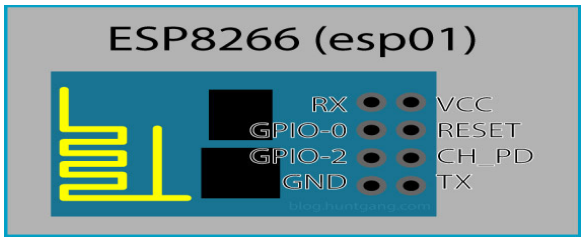

Fig 4.4 ESP8266 Wi-Fi Module

Wi-Fi module is used to provide the internet connectivity to our device. Here we use ESP8266 Wi-Fi module. It has TCP/IP protocol stack and antenna switch balloon, power management device, bottom external electronic equipment. It can be interfaced with any microcontroller and can be served as a web server. It can be operated at baud rates between 5760-115200. However, we use the baud rate as 9600. For setting the ESP module, we need to add the ESP libraries to the project code before using them.

Specifications

- Operating Voltage : 3.3V
- Protocol :802.11 b/g/n protocol
- Wi-Fi Direct, soft-AP

4.5 Arduino IDE Software

Arduino software is used for developing and implementing the project. We use Arduino IDE software for writing the code for the project. IDE means Integrated Development Environment. The programs written using this are called sketches. Arduino software is open source and we can program many Arduino

boards using this software. To program a board we need to select the type of board and upload the sketch using the cable.

5. WORKING PROCEDURE

In this system, multiple dustbins are located throughout the city or the campus, these dustbins are provided with a sensor which helps in tracking the level and weight of the garbage bin. Each garbage bin is provided with a unique ID to identify which bin was full. In the smart dustbin, hardware contains motor-driver, 16*2 LCD Display, Arduino UNO, Smell Sensors, Bread Board, Power Supply, ultrasonic sensor.

The dustbin is connected with lock assembly and ultrasonic sensor, when a person reaches the bin, it is automatically opened by using the lock assembly and the ultrasonic sensor detects the level of garbage in the bin and generates a message of whether if it is full or empty. All the data generated by the bin sensors is updated to a website by using the Wi-Fi module. The webpage displays the details about the multiple bins located in different places. It uses smell sensor to identify any rotten smell around the bin by sensing methane gas and if it is high then it sprinkles bleaching powder by using a chemical sprinkler.

6. EXPERIMENTAL RESULTS

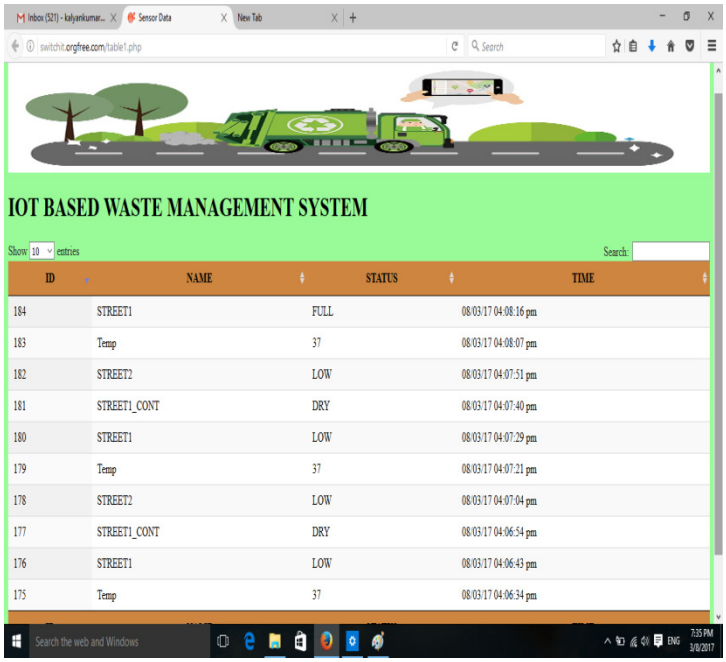

Fig.4.5 Result format in website

Real time monitoring of bin can be done by this project. The experimental results of our project is as shown in above fig.

7.CONCLUSION

This system assures the cleaning of dustbins soon when the garbage level reaches its maximum.This reduces the total number of trips of garbage collection vehicle and hence reduces the overall expenditure associated with the garbage collection.Thestatus of the bin is continuously monitored at the control station and is presented in a Graphical User Interface toprovide a user interaction with the system. The values stored in the database helps a user to have the updated data of thebin as well as the previous values of the parameters of the bin.

8.REFERENCES

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