



COMPUTER SCIENCE AND ENGINEERING

IMPLEMENTATION OF SMART DUSTBIN USING ARDUINO FOR
CITY-CORPORATION AND USERS

DIGITAL SYSTEM DESIGN

COURSE CODE : CSE 412

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Abstract

In the present scenario as the population is increasing day by day, the environment should be clean and hygienic. In most of the cities, the overflowed garbage bins creating an unhygienic environment. This will further lead to the arise of different types of unnamed diseases. This will degrade the standard of living. To avoid all such situations this paper gives a clear picture of IOT based garbage monitoring system to keep environment clean and safe. This project IOT based 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. Also it indicates the status of toxic gas formation inside the bin as well as the weight of the bin. For this, the system uses ultra sonic sensor placed over the bins to detect the garbage level and compare it with the level of the garbage bin's depth. The system makes use of Advanced Virtual Reduced (AVR) Instruction Set microcontroller, Organic Light Emitting Diode (OLED) screen, Global system for mobile communication (GSM) modem for sending data and a buzzer. The system is powered by a solar cell and battery. The Organic Light Emitting Diode (OLED) screen is used to display the status of the level of the garbage collected in the bins, whereas a web page is built to show the status to the user monitoring it. The web page gives a graphical view of the garbage bins. The display shows the condition of the trash stage and the other feeler information. The system puts on the buzzer when the level of garbage composed crosses the set limit or if there is occurrence of toxic gases. Thus this scheme helps to maintain the city sparkling by informing about the trash levels of the bins by providing graphical representation of the bins via a web page.

Contents

| | | |
|----------|---------------------------------|-----------|
| 1 | Introduction | 3 |
| 2 | Methodology | 4 |
| 2.1 | Working Process | 4 |
| 3 | Requirements | 5 |
| 3.1 | What is Requirement | 5 |
| 3.2 | Hardware | 5 |
| 3.2.1 | Arduino Uno | 5 |
| 3.2.2 | sonar-sensor | 6 |
| 3.2.3 | GSM | 6 |
| 3.2.4 | Cables and Connectors | 7 |
| 3.2.5 | Breadboards | 8 |
| 3.2.6 | Resistors | 9 |
| 3.2.7 | LED | 9 |
| 3.3 | Software | 10 |
| 3.3.1 | Arduino IDE | 10 |
| 3.3.2 | Arduino Stdio | 10 |
| 3.4 | Smart Dustbin | 13 |
| 4 | Limitation strength | 15 |
| 4.1 | Strength | 15 |
| 4.2 | Limitation | 15 |
| 5 | Conclusion | 16 |
| 5.1 | References | 16 |

Chapter 1

Introduction

The word DUSTBIN is the combination of two words Dust +Bin, which means a garbage container. It stores to manage the the dust or rubbish. To keep the dust, wrapper, used packets of eatable material and so on in the Bin. This is the safer way than to throw the small rubbish particle here there. By doing this we can get healthier average rate. So, we must use Bin to feel hale hearty. The issue we have to deal is its open cap. Due to this open cap, insect and flies visit the garbage and also the same flies roam around out kitchen or lunch buffet. This leads to serious health issue. In our country we are facing some problem by traditional dustbin, such as-water pollution ,air pollution ,dustbin always full etc. In order to solve this issue, we had design here a Smart Dustbin using Arduino Uno.

In our project ,dustbin detect garbage level. By this feature we will understand how much dustbin is full.

Its send message to the control room ,when it send message then collector clean dustbin .

If the system is implemented properly it will really make the cities cleaner and greener and makes the smart city a reality.

Chapter 2

Methodology

2.1 Working Process

This proposed system has been divided into two layers: 1) Dustbin Layer: - This layer consists of internet and Wi-Fi enabled dustbins. Every dustbin contains a sensor which senses the fill up status of dustbin and sends the data to the server. It also sends its current GPS location to the server at regular intervals. 2) Server layer: Server collects the fill up status and location of dustbins. It processes the client's query and it responds with nearest dustbin location and with direction to access dustbin.

This smart bin with ultrasonic sensors which measure the level of dustbin being filled up. The container is divided into three levels of garbage being collected in it. Every time the garbage crosses a level the sensors receive the data of the filled level. This data is further sent to the garbage analyzer as an instant message using GSM module. Placing three ultrasonic sensors at three different levels of the container may be a disadvantage as the cost of the dustbin increases due to the sensors and also the sensors can be damaged due to the rough action by the users.

Chapter 3

Requirements

3.1 What is Requirement

In product development and process optimization, a requirement is a singular documented physical or functional need that a particular design, product or process aims to satisfy. It is commonly used in a formal sense in engineering design, including for example in systems engineering, software engineering, or enterprise engineering. It is a broad concept that could speak to any necessary (or sometimes desired) function, attribute, capability, characteristic, or quality of a system for it to have value and utility to a customer, organization, internal user, or other stakeholder. Requirements can come with different levels of specificity.

3.2 Hardware

3.2.1 Arduino Uno

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language

(based on Wiring), and the Arduino Software (IDE), based on Processing.



3.2.2 sonar-sensor

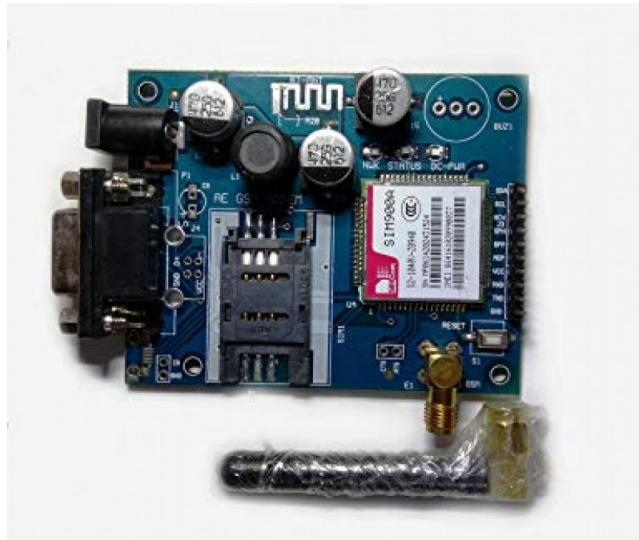
A sensor is a device, module, or subsystem whose purpose is to detect events or changes in its environment and send the information to other electronics, frequently a computer processor. A sensor is always used with other electronics.



3.2.3 GSM

GSM (Global System for Mobile communication) is a digital mobile network that is widely used by mobile phone users in Europe and other parts of the world. GSM uses a variation of time division multiple access (TDMA) and

is the most widely used of the three digital wireless telephony technologies: TDMA, GSM and code-division multiple access (CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either the 900 megahertz (MHz) or 1,800 MHz frequency band. GSM, together with other technologies, is part of the evolution of wireless mobile telecommunications that includes High-Speed Circuit-Switched Data (HSCSD), General Packet Radio Service (GPRS), Enhanced Data GSM Environment (EDGE) and Universal Mobile Telecommunications Service (UMTS).



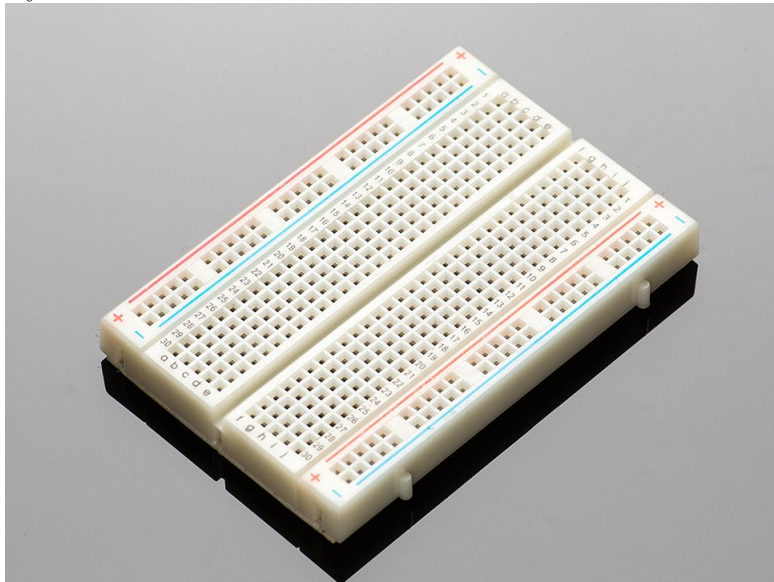
3.2.4 Cables and Connectors

In information science, connectors, normally called "input-output connectors" (or I/O for short), are interfaces for linking devices by using cables. They generally have a male end with pins protruding from it. This plug is meant to be inserted into a female part (also called a socket).



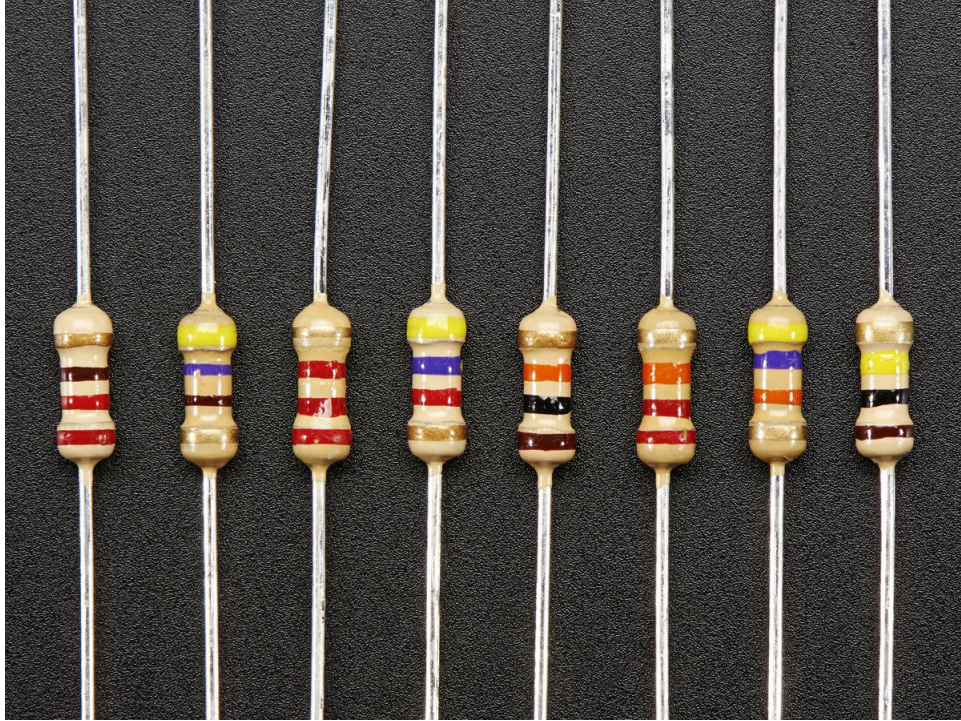
3.2.5 Breadboards

A breadboard is a construction base for prototyping of electronics. Originally it was literally a bread board, a polished piece of wood used for slicing bread. In the 1970s the solderless breadboard (a.k.a. plugboard, a terminal array board) became available and nowadays the term "breadboard" is commonly used to refer to these.



3.2.6 Resistors

A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses.



3.2.7 LED

A LED lamp or LED light bulb is an electric light for use in light fixtures that produces light using light-emitting diode (LED). LED lamps have a lifespan many times longer than equivalent incandescent lamps, and are significantly more efficient than most fluorescent lamps.



3.3 Software

3.3.1 Arduino IDE

The Arduino integrated development environment (IDE) 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.

3.3.2 Arduino Stdio

Android Studio is the official[7] integrated development environment (IDE) for Google's Android operating system, built on JetBrains' IntelliJ IDEA software and designed specifically for Android development.[8] It is available for download on Windows, macOS and Linux based operating systems.

```
include<SoftwareSerial.h>

SoftwareSerial GPRS(5, 6);

int echoPin = 11;
```

```

int trigPin = 12;

int led1 = 2;

int led2 = 3;

int led3 = 4;

long distance;
int echoTime;

void setup()

pinMode(echoPin, INPUT);

pinMode(trigPin, OUTPUT);

pinMode(led1, OUTPUT);

pinMode(led2, OUTPUT);

pinMode(led3, OUTPUT);

GPRS.begin(9600);

Serial.begin(9600);

delay(50);

void loop()

digitalWrite(trigPin, LOW);

delayMicroseconds(2);

```

```

    digitalWrite(trigPin, HIGH);

    delayMicroseconds(10);

    digitalWrite(trigPin, LOW);

    echoTime = pulseIn(echoPin, HIGH);
    distance = echoTime * 0.0340 / 2;

    if(distance > 27 && distance < 18)

        digitalWrite(led1, HIGH);
        Serial.println( "dustbin is reached level 1");
        delay(10);

        else if(distance < 18 && distance > 10)
        digitalWrite(led1, HIGH);
        digitalWrite(led2, HIGH);
        Serial.println( "dustbin is reached level 2");
        delay(10);

        else if(distance < 10 && distance > 1)
        digitalWrite(led1, HIGH);
        digitalWrite(led2, HIGH);
        digitalWrite(led3, HIGH);
        sendSMS();
        Serial.println( "dustbin is reached max level");
        delay(10);

    else
        digitalWrite(led1, LOW);
        digitalWrite(led2, LOW);
        digitalWrite(led3, LOW);

    delay(1000);

```

```

void sendSMS()

    GPRS.println(" AT+CMGF=1");
    delay(1000);

    GPRS.write(" AT+CMGS=");

    GPRS.write(0x22);

    GPRS.write("01641050371");

    GPRS.write(0x22);
    GPRS.write(0x0D);

    GPRS.write(0x0A);

    delay(1000);

    GPRS.print("ID:=1 LOCATION:=VISIT THE ABOVE DUSTBIN REACHED
    ITS MAXIMUM CAPACITY PLEASE COME AND COLLECT TO KEEP
    CITY CLEAN"); // Send the text message to the GSM module
    GPRS.write(0x0D);
    GPRS.write(0x0A);

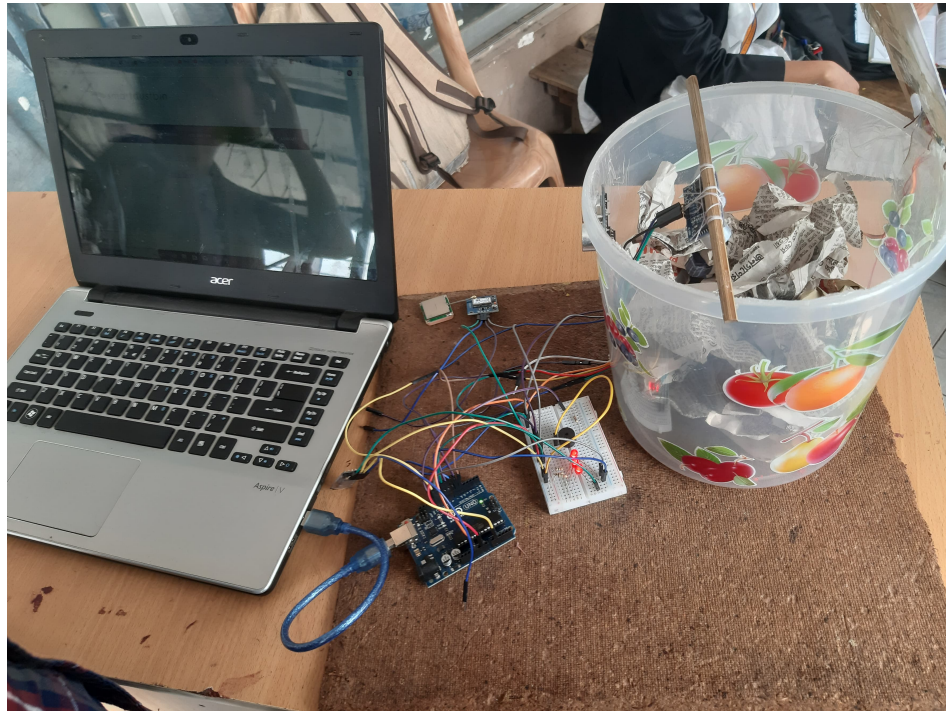
    delay(1000);

    GPRS.write(26);

```

3.4 Smart Dustbin

This is the project of our smart dustbin .



Chapter 4

Limitation strength

4.1 Strength

This project has lots of strength. There are- 1.Our system provides greater accessibility to the dustbin. 2. In our system if dustbin is relocated to another location it will automatically registered with the server with the new GPS location. 3. It will save fuel and time using appropriate route planning. 4. This practice is highly lucrative 5. Keeps the environment clean and fresh 6. Reduces environmental pollution.

4.2 Limitation

In this project also has some limitation. There are - 1. The process is not always cost-effective 2. The resultant product has a short life 3. The sites are often dangerous 4. The practices are not done uniformly 5. Waste management can cause more problems 6. Garbage segregation is very difficult

Chapter 5

Conclusion

This system help the local municipal administration in waste management system. i.e., monitoring of domestic wastage clearance at proper time to avoid damage to the public health. A web server is also been set up through which the municipal authorities also get information about the bins in their area. It uses sensors for sensing information of Bins and sending to workstation, which is situated at municipal office for finding shortest path. This project came in comfortable which a worthy elucidation for maintaining green environment.

5.1 References

Issue 6 , June 2016. [3] S.S.Navghane, M.S.Killedar, Dr.V.M.Rohokale, “IoT Based Smart Garbage and Waste Collection Bin”, IJARECE) Volume 5, Issue 5, May 2016.

Lehrer, Jonah. "GROUPTHINK". New Yorker. Retrieved 23 October 2013.