PIT ALARMING SYSTEM

Report submitted to
The LNM Institute of Information Technology, Jaipur
for the award of the degree

of

Bachelor of Technology
in Electronic and Communication Engineering

By

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING **MAY 2018**
LNM INSTITUTE OF INFORMATION TECHNOLOGY, JAIPUR

DECLARATION

I hereby certify that,

a) the work contained in this report is original and has been done by me under the guidance b) of my supervisor(s).

c) the work has not been submitted to any other Institute for any degree or diploma.

d) I have followed the guidelines provided by the Institute in preparing the report.

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f) Whenever I have used materials (data, theoretical analysis, figures, and text) from other sources, I have given due credit to them by citing them in the text of the report and giving their details in the references. Further, I have taken permission from the copyright owners of the sources, whenever necessary.

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Date: 10/05/ 2018

CERTIFICATE

This is to certify that the Dissertation Report entitled, "Pit Alarming System" submitted by Mr. Navdeep Singh, Mr. Vishal Jain, Mr. Yash Gupta, Mr. Yash Kumar to The LNMIIT, Jaipur, Rajasthan, is a record of bonafide Project work carried out by them under our supervision and guidance and is worthy of consideration for the award of the degree of Bachelor of Technology in Electronics and Communication Engineering of the Institute.

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Date: 10/05/2018

ACKNOWLEDGMENT

This document is prepared by the inspiration received from Mr. Kumar Padmanabh , Department of CSE and Mr. Abhishek Sharma, Department of ECE.

Many colleagues at LNMIIT have carefully read and improved the document their contributions are gratefully acknowledged.

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Introduction

1.1 Pit Alarming System

“India faces major environmental challenges associated with waste generation and inadequate waste collection, transport, treatment and disposal. Current systems in India cannot cope with the volumes of waste generated by an increasing urban population, and this impacts on the environment and public health.**”**

We got this idea from various cleanliness movements like “SWACHH BHARAT ABHIYAN”. It is a massive movement that seeks to create a clean India. We thought of making a smart device that could save people resources involved in the movement.

1.2 Problem Statement

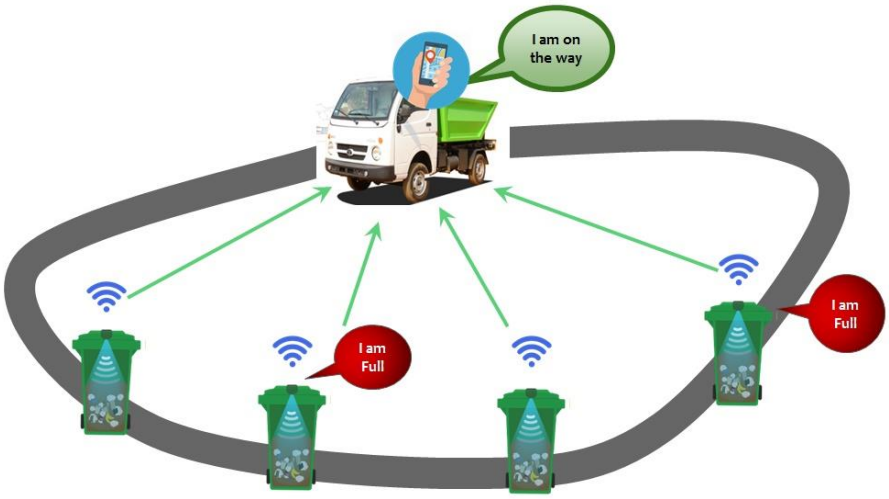
We generally come across a scenario when the garbage bins are full and the excess garbage is thrown around the pit. This condition creates a foul smell and destroys the beauty of city which is kept clean by people working hard in the movement.
Peoples hardwork goes into vain if ultimately the roads are not clean .

Proposed Work

2.1 Proposed Solution

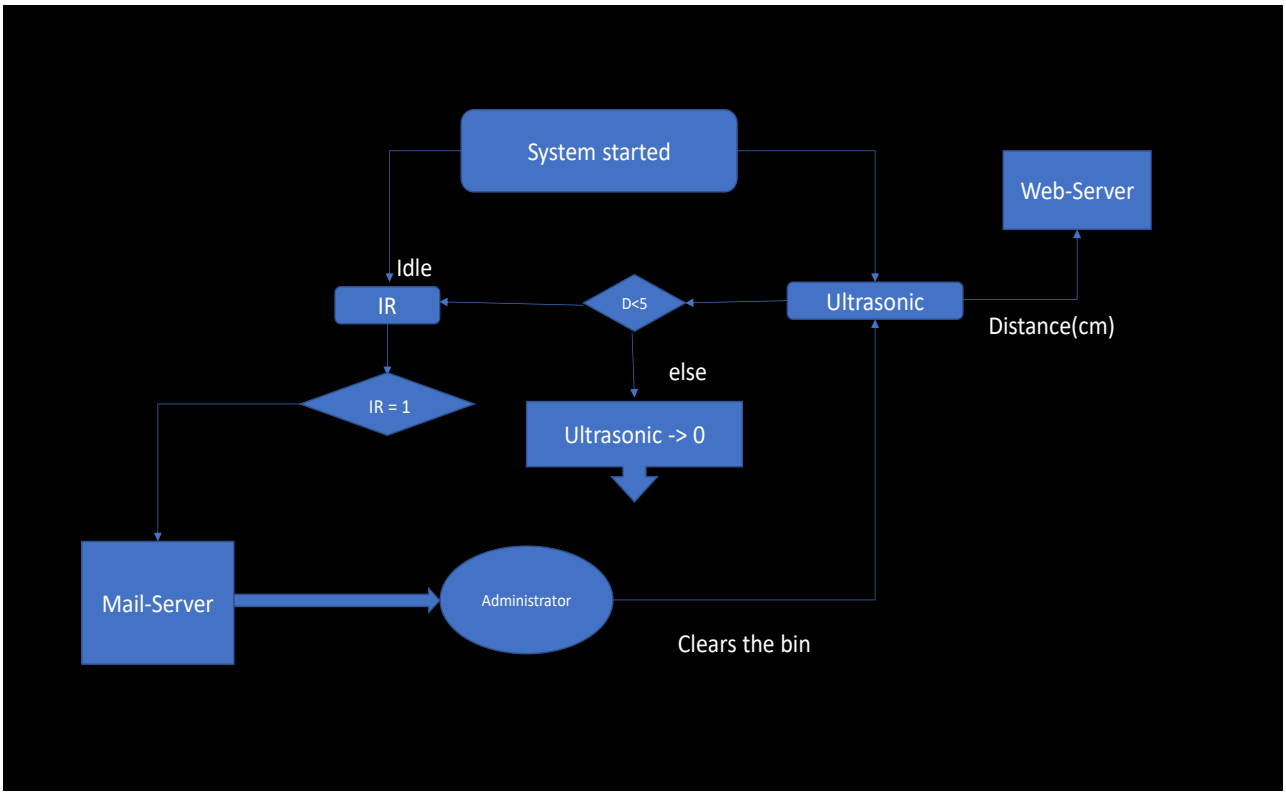
- The main objective of this project is to help people to monitor the garbage pits and inform the current status about the level of the garbage inside the pit.

- As an alarming system, a proposed e - mail will be sent to the municipal corporation.
- Alarming system can be combination of LEDs or sound Buzzer.
- After the e-mail alert received by the in-charge, the garbage can be emptied from the pits.



- There will be a real time data generated which can be further used to study the behaviour of people.

FLOW-CONTROL



PROTOCOLS USED

- **IEEE 802.11**
  For wireless connection of the server and the IOT devices (Raspberry pi3)
- **HTTP**
  For hosting a server(PC) for sharing the Real time measurement generated by the Ultrasonic sensor.
- **SMTP**
  For sending E-mail to inform the municipality administrator to empty the pit/bin.
- **IP**
  For internet connectivity.

A STUDY ON SENSORS

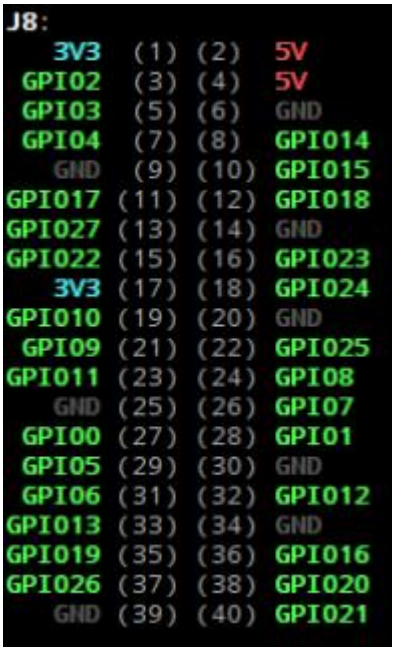
3.1 Components

3.1.1 Raspberry pi3

The **Raspberry Pi** is a low cost, credit-card sized computer that plugs into a computer monitor or TV and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python.

GPIO Pins:

A powerful feature of the Raspberry Pi is the row of GPIO (general-purpose input/output) pins along the top edge of the board.



3.1.2 Sensors

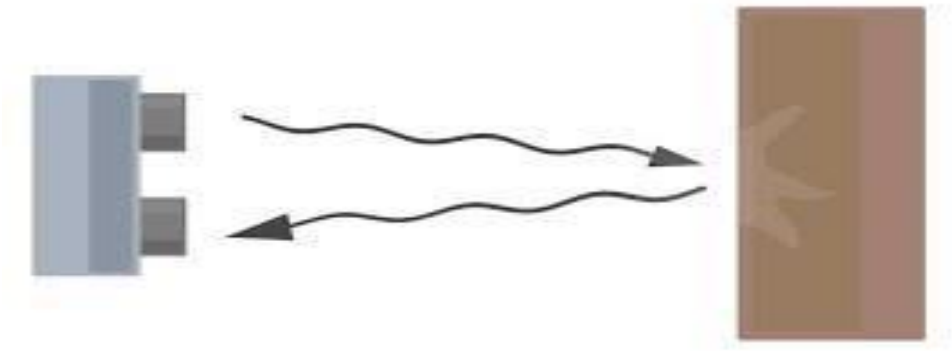
In a Garbage pit there is a need to calculate distance between the garbage level and the brim. This can be done using the following:

1. Ultrasonic (HC-SR04)
2. IR

These sensors are widely used for contact-less, mid-range distance measurements in navigation systems for humans, mobile robots and vehicle related applications.

Ultrasonic sensors

The ultrasonic sensor uses time of flight (TOF) method for distance measurement, which refers to the time taken for a pulse to travel from the transmitter to an observed object and back to the receiver. They work on the principle of SONAR used by submarines to measure the depth.



3.2 Working

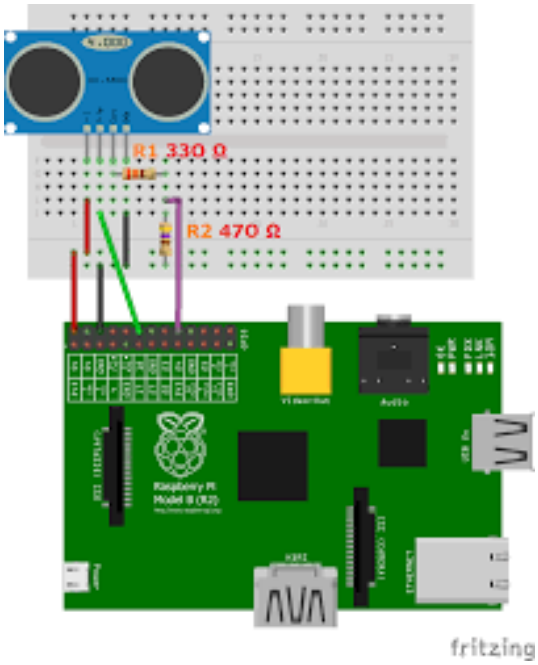
This sensor is a very popular sensor used in many applications where measuring distance or sensing objects are required. The module has two eyes like projects in the front which forms the Ultrasonic transmitter and Receiver. Ultrasonic sensors works with the simple formula

Distance = Speed × Time

The Ultrasonic transmitter transmits an ultrasonic wave, this wave travels in air and when it gets objected by any material it gets reflected back toward the sensor this reflected wave is observed by the Ultrasonic receiver module as shown in the picture below.

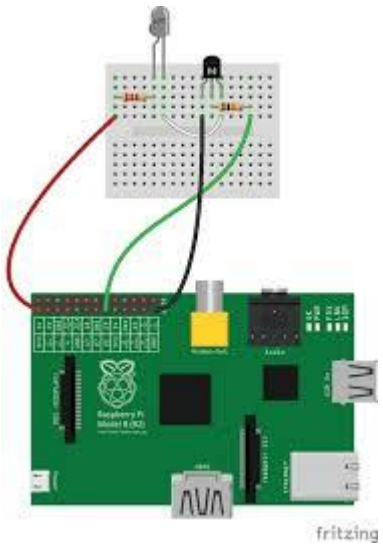
Ultrasonic sensor on Raspberry pi3

HC-SR04 is a 4 pin module whose pin names are Vcc, Trigger, Echo and ground respectively.



Infrared sensors

The Infrared sensor works based on the detection of a specific light of wavelength in the range of 760 nm (IR spectrum), which is emitted by an IR Light Emitting Diode (LED). The distance can be measured based on the change in intensity of the received light. For the IR sensor ,colour of the obstacle material could also affect the reading of the sensor.



3.3 Ultrasonic sensors v/s Infrared sensors

1. Infrared sensors cannot work in dark environments while ultrasonic sensors can, therefore brighter surfaces are easier to detect for infrared than dark.
2. Infrared sensor values normally fluctuates in variant light conditions while there is no such drawback in ultrasonic sensors.
3. For the IR sensor ,colour of the obstacle material could also affect the reading of the sensor.
4. Inability to use infrared sensors in sunlight due to interference.
5. Ultrasonic sensors work using sound waves, detecting obstacles is not affected by as many factors.
6. Ultrasonic sensors are more reliable than IR sensors.

Pin configuration of IR sensor

Pin number	Pin name	Description
1	VCC	Powering the system(5v) *GPIO.Board pin02 on Raspberry pi3*
2	OUTPUT	Output to the Raspberry pi3 *GPIO.Board pin40 on Raspberry pi3*

Pin configuration of ULTRASONIC sensor

Pin number	Pin name	Description
1	Vcc	Powering the system (5 V) *GPIO.Board pin05 on Raspberry pi3*
2	Trigger	Input pin to the sensor. *GPIO.Board pin16 on Raspberry pi3*
3	Echo	Output pin. *GPIO.Board pin18 on Raspberry pi3*
4	GND	Ground

Conclusion and Future Scope

4.1 Result

The aim of the project was to make the work of the Municipality easy and with accurate time so that no scenery beauty of the city is damaged. This is a smart device which will help to keep the city clean and make the job of people, who clean the roads, easy.

4.2 Further Research

In this study, an alarm is raised to inform the municipality to clean the garbage pit as soon as possible. To further proceed in this project we can implement a self-cleaning system so that the pit is automatically emptied and transfer to disposing site.

4.3 Limitations of the above implementation

The project is working fine in out scenario, but there are many complications that can occur in real scenario. There can be a case in which the garbage gets obstructed in-front of the sensors which will alter the readings.

There can be a case in which the garbage pit is filled by rain water ,in this case the sensors will take the correct reading but there will be misunderstanding between the municipality admins to clean the garbage pit. The IR sensor fails if the obstacle is Black coloured. Thus, reading will change in case of black obstacle in the garbage pit.

4.4 Solution

- We need to put more sensors to sense the data, if the data is sensed by others is incorrect.
- Different types of sensors can be used to overcome the limitations of IR sensor.
  Sensors like:
  Non-dispersive infrared sensor
  (NDIR) – For measuring the level of carbon-dioxide released by the garbage pit;
  Catalytic Bead sensors
  For measuring the level of Methane gas released by garbage-pit.
- There should be automatic cleansing of the garbage pit if the sensors are detecting obstacle like rain water.
- The pit should be checked as soon as the email is received by the Municipality head.

REFRENCES

[1] https://www.raspberrypi.org/products/raspberry-pi-3-model-b/

[2] http://education.rec.ri.cmu.edu/content/electronics/boe/ultrasonic_sensor/1.html

[3] https://pypi.org/project/RPi.GPIO/

[4] https://docs.python.org/2/library/smtplib.html

SOURCE CODE

Infrared-sensor

```
import RPi.GPIO as GPIO
import time
import mailtext

def IRread():

    GPIO.setwarnings(False)
    GPIO.setmode(GPIO.BOARD)

    GPIO.setup(40,GPIO.OUT)
    GPIO.output(40,0)

    GPIO.setup(8,GPIO.IN)

    if(GPIO.input(8) == True):
        GPIO.output(40,1)
        mailtext.send_mail()

def SonicRead():


def main():
  try:
    while(1):
        IRread()
  except KeyboardInterrupt:
        GPIO.cleanup()

main()
```

Ultra-Sonic sensor

```
import RPi.GPIO as GPIO
import time
import sys

GPIO.setwarnings(False)
GPIO.setmode(GPIO.BOARD)

def USonicRead():
    pin_trigger = 16
    pin_echo = 18

    GPIO.setup(pin_trigger,GPIO.OUT)
    GPIO.setup(pin_echo,GPIO.IN)

    GPIO.output(pin_trigger,1)  #trigger pin is high
    time.sleep(0.1)  # 1ms
    GPIO.output(pin_trigger,0)  #trigger pin is low

    start = time.time()
    stop = time.time()

    while GPIO.input(pin_echo) == 0:
        start = time.time()


    while GPIO.input(pin_echo) == 1:
        stop = time.time()

    timedifference = stop - start
    distance = ( timedifference * 34300 )/2  #distance = time*speed

    return distance

if __name__ == '__main__':
    try:
        while 1:
            dist = USonicRead()
            print("[+] Measured distance > % 1f cm" %dist)

            if dist <= 5.00 :
                    last_reading = dist
                    print("The Pit is FULL\n")
                    print("[+] Last Value > % 1f cm" %last_reading)

                    sys.exit()

    except KeyboardInterrupt:
        print("[-] Measurement Stopped Forcefully")
        GPIO.cleanup()
```

Mail-server

```
import smtplib
from email.mime.text import MIMEText
import datetime

def send_mail():
    to = '15ucc043@lnmiit.ac.in'
    from_email = 'behungrybefoolish007@gmail.com'
    from_email_pass = 'Rproject'
    smtpserver = smtplib.SMTP('smtp.gmail.com',587)
    smtpserver.ehlo()
    smtpserver.starttls()
    smtpserver.ehlo()

    smtpserver.login(from_email,from_email_pass)

    at_time = datetime.date.today()
    c = datetime.time()
    msg = MIMEText('The Pit is Full on %s' % at_time.strftime('%b %d %y') )
    msg['Subject'] = 'Raspberry PI3'
    msg['From'] = 'behungrybefoolish007@gmail.com'
    msg['To'] = '15ucc043@lnmiit.ac.in'

    smtpserver.sendmail(from_email,[to],msg.as_string())
    smtpserver.quit()
```