IOT

Assignment: 1

++ Aim:

- Design & implement IOT system using Arduino Uno / Raspberry Pi using 'Ultrasonic sensor and Servo Motor' such as 'Door opener in home automation'.

++ Objective:

- To connect & implement Raspberry pi, Ultrasonic Sensor using Servo Motor used as Door opener System.

Theory:

& Raspberry Pi :-

- USB ports: these are used to connect a mouse and keyboard. You can also connect other components, such as USB drive.

- SD card slot - you can slot the SD card in here. This is where the operating System Software & your files are Stored.

- Ethernet port - this is used to connect a mouse & keyboard. You can also connectother components, Such as USB drive.

- Audio jack - you can connect headphones or speakers here.

- HDMI port - this is where you connect the monitor (or projector) that you're using to display output from Raspberry Pi, if your monitor has speakers, you can also them to hear sound.

- Micro USB power connecter - this where you connect a power supply. You should always do this last, after you have connected all your other components.

- GPIO ports - these allow you to connect electronic components such as LEDs & buttons to Raspberry pi.

Set up your SD card.

- If you have an SD card that doesn't have raspberry Pi OS on it yet, or if you want to reset your Raspberry Pi, you can easily instal Raspberry Pi OS yourself.

- The Raspberry Pi OS operating system via Raspberry Pi imager.

- Using the Raspberry Pi OS via the Raspberry Pi imager, it is the easiest way to install Raspberry Pi OS on your SD card.

Interfaces:

- You can link devices & components to your Raspberry Pi using a IOT of different types of connections on or off, so that your Raspberry Pi recognises that you've linked something to it via a particular type of connection.

- Camera - enable the Raspberry Pi Camera Module.
- SSH - Allow remote access to your Raspberry Pi Desktop from another computer using VNC.
- SPI - enable the SPI GPIO pins.
- I2C - enable the I2C GPIO pins
- Serial - enable the serial (Rx. Tx) GPIO pins.
- 1-Wire - enable the 1-Wire GPIO pins
- Remote GPIO - allows access to your raspberry Pi's GPIO pins from another computer.

Performace:

- If you need to do so for the particular project you want to work on

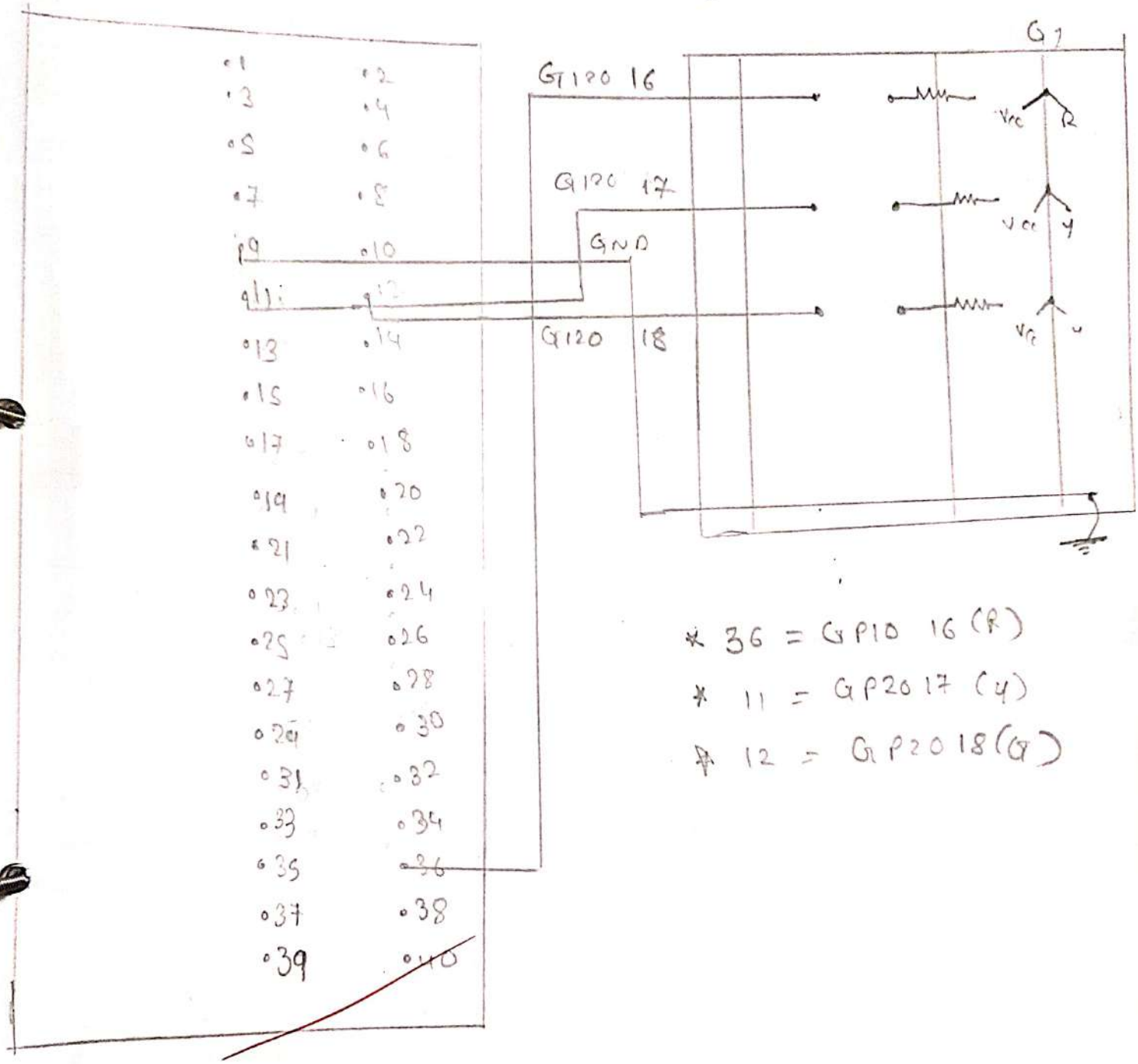
You can change the performance settings of your raspberry Pi in this lab.

Conclusion:

- We implemented IOT system using Arduino Uno / Raspberry Pi.

Diagram:

Circuit Diagram



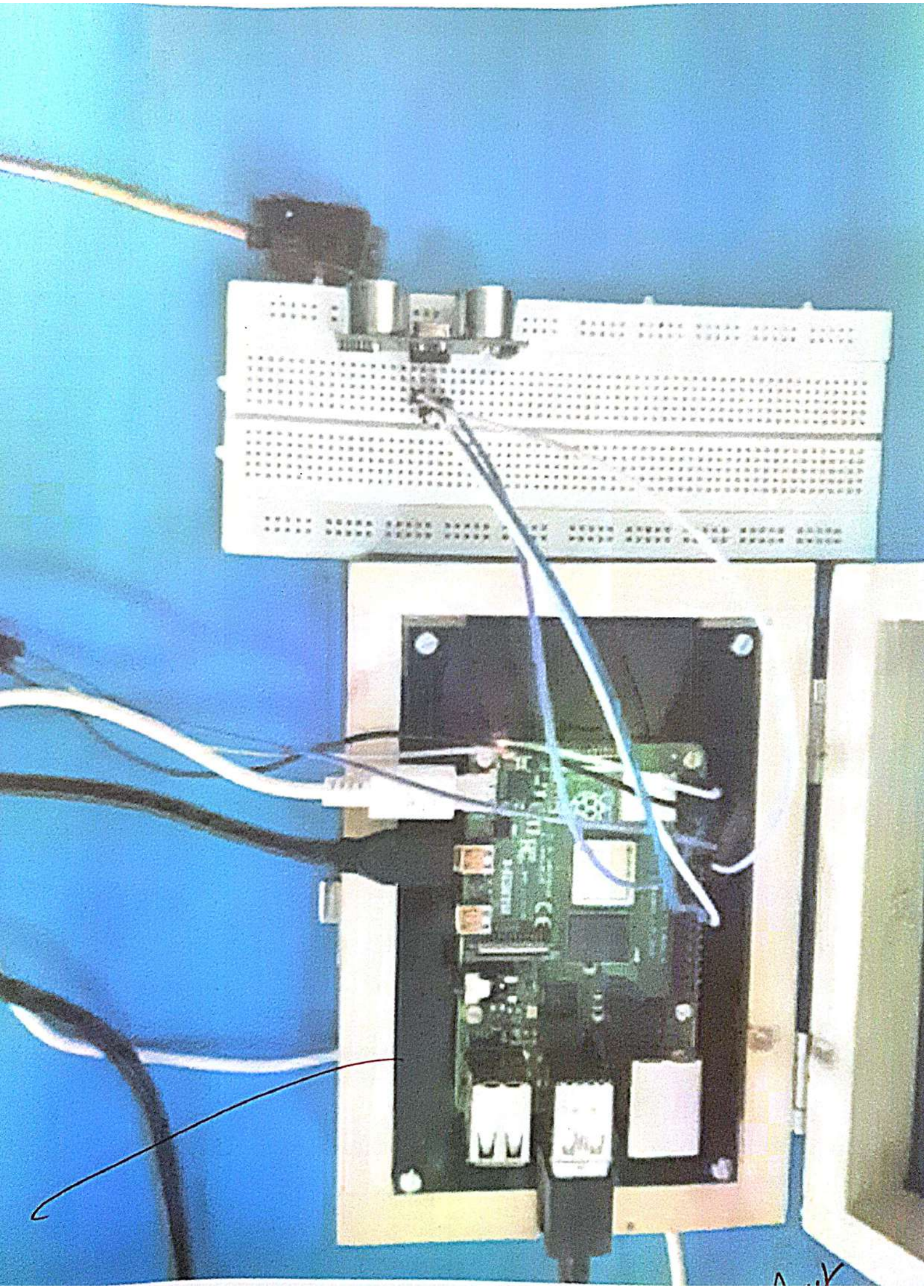
* 36 = GPIO 16 (R)
* 11 = GP2017 (Y)
* 12 = GP2018 (G)

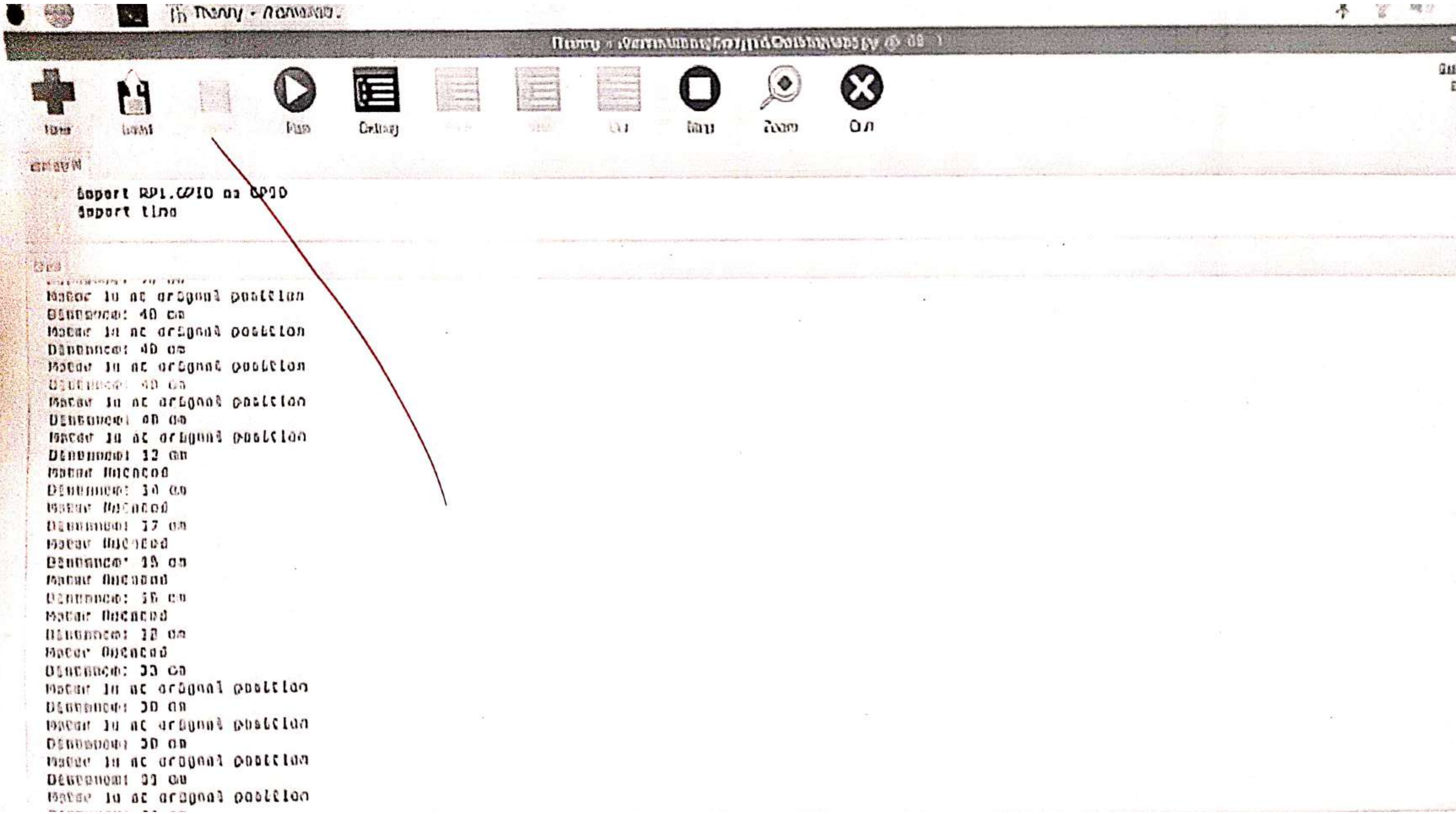
Practical No:1

Program:

```
import RPi.GPIO as GPIO
import time
# Setup GPIO
GPIO.setwarnings(False)
TRIG = 11
ECHO = 8
servoPIN = 18
GPIO.setmode(GPIO.BCM)
# Ultrasonic sensor pin initialization
GPIO.setup(TRIG, GPIO.OUT)
GPIO.setup(ECHO, GPIO.IN)  # Corrected line: Set ECHO pin as input
# Servo motor pin initialization
GPIO.setup(servoPIN, GPIO.OUT)
servo = GPIO.PWM(servoPIN, 50)
servo.start(2.5)
try:
    while True:
GPIO.output(TRIG, False)
        time.sleep(0.000002)
        GPIO.output(TRIG, True)
        time.sleep(0.00001)
        GPIO.output(TRIG, False)
        startTime = time.time()
```

```
            stopTime = time.time()
            while GPIO.input(ECHO) == 0:
             startTime = time.time()
            while GPIO.input(ECHO) == 1:
              stopTime = time.time()
           GPIO.output(TRIG, True)
           timeElapsed = stopTime - startTime
          distance = (timeElapsed * 34300) / 2
           distance = int(distance)
            print("Distance: {} cm".format(distance))
if distance <= 20:
              duty_cycle = 12.5  # Adjust this value for desired servo position
              servo.ChangeDutyCycle(duty_cycle)
             print("Motor Rotated")
              time.sleep(0.1)
            else:
              duty_cycle = 2.5  # Adjust this value for desired servo position
               servo.ChangeDutyCycle(duty_cycle)
             print("Motor is at orignal position")
              time.sleep(0.1)
except KeyboardInterrupt:
    servo.stop()
GPIO.cleanup()
```




Thonny
Zoom
import RPi.GPIO as GPIO
import time
Motor is at original position
Distance: 40 cm
Motor is at original position
Distance: 40 cm
Motor is at original position
Distance: 40 cm
Motor is at original position
Distance: 40 cm
Motor is at original position
Distance: 12 cm
Distance: 17 cm
Distance: 15 cm
Distance: 33 cm
Motor is at original position
Distance: 30 cm
Motor is at original position
Distance: 30 cm
Motor is at original position
Motor is at original position

Assignment: 2

Aim:

- Design and implement parameter monitoring IOT system keeping records on cloud such as environment humidity & temperature monitoring.

Objective:

- To design & implement environmental humidity & temp monitoring.

Theory:

- We are using the DHT11 sensor for sending temp. and humidity data to thing speak using arduino & esp8266. By this method, we can monitor other DHT11 sensor temperature and humidity data on the internet using the thing speak IOT server.

Component Required:

- Arduino One
- ESP8266 wifi module
- DHT11 sensor
- Breadboard
- Jumper wires

Step 1: Thingspeak setup for temperature and humidity monitoring:

- for executing your channel by thingspeak, you first need to sign up on a thingspeak. In case if you already have an account on Thingspeak, just sign in using your id & password.

Step 2: Create a Channel for your data;

- Once you sign in after your account verification. Create a new channel by clicking "New Channel" button.
- Enter the name of your data "Temp." in Field 1 and "Humidity" in field 2.
- After this, click on Save channel button to save your details.

Step 3: API Key;

- To send data to Thingspeak, we need a unique API key, which we will use later in our code to upload our sensor data to Thingspeak website.
- Click on "API keys" button to get your unique API key for uploading your sensor data.
- Now copy your "Write API key". We will use this API key in our code.
- Upload it in Arduino UNO. If you successfully upload your program.

To enhance your IOT -based project on environment humidity and temperature monitoring using the DHT II Sector / Sensor Arduino and esp8266, here are some additional points that can help extend your project and demonstration a deeper understanding.

1). Implement data visualization.
   ↳ Graph Customization.
   ↳ multifield data analysis.

2) Add alert and notification
   ↳ sms or email alerts
   ↳ Integration with IFTTT

3). Optimize power consumption
   ↳ Deep sleep mode for ESP8266
   ↳ Power Efficiency in IOT Deployment

4) Data Backup and Redundancy:
   ↳ Data Storage on SD card
   ↳ Cloud Integration with google Sheets

P.T.O

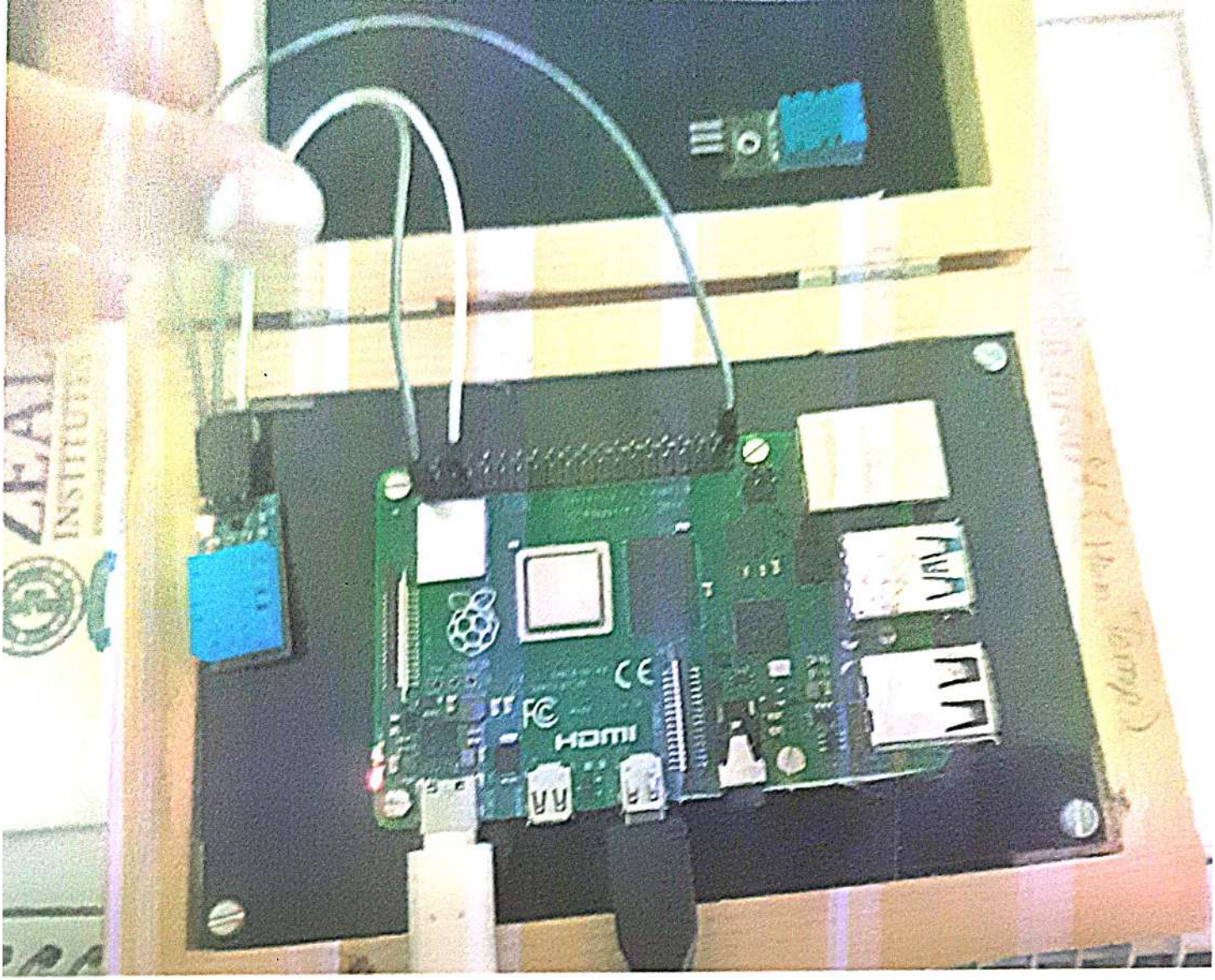
Conclusion;

- This is we have program successfully we get temperature on thing speak.

Practical No:- 02

Code:-

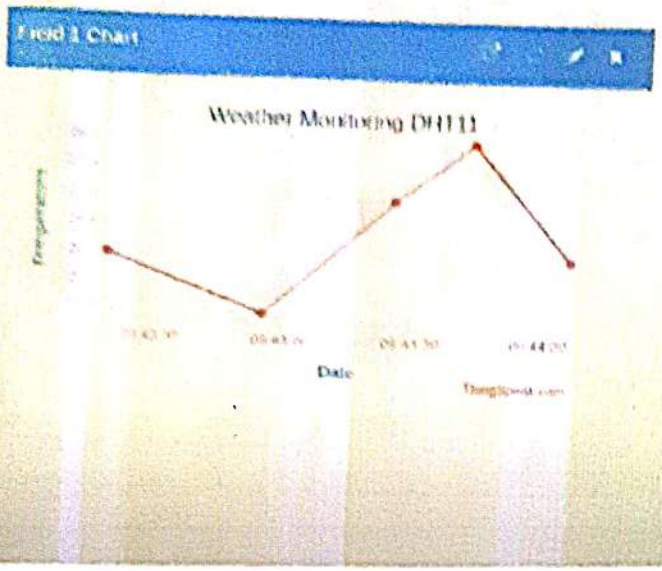
```
import Adafruit_DHT
import os, sys
from time import sleep
import requests
import RPi.GPIO as GPIO
baseURL = 'https://api.thingspeak.com/update?api_key=WRITE API KEY'
SensorPin = 4
while True:
 try:
 print("Program is Runnung")
 humi, temp = Adafruit_DHT.read(Adafruit_DHT.DHT11, SensorPin)
 if (humi > 0 ) and (temp > 0):
 print(humi)
 print(temp)
 print("Data received")
 x = '{}{}{}{}{}'.format(baseURL, '&field1=', temp, '&field2=', humi);
 y = requests.post(x)
 print(y.status_code)
 print(x);
 sleep(5)

 except:
 print("Data not received")
 sleep(5)
```

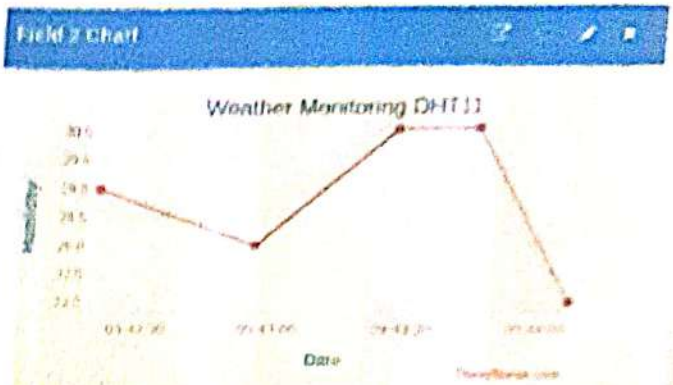


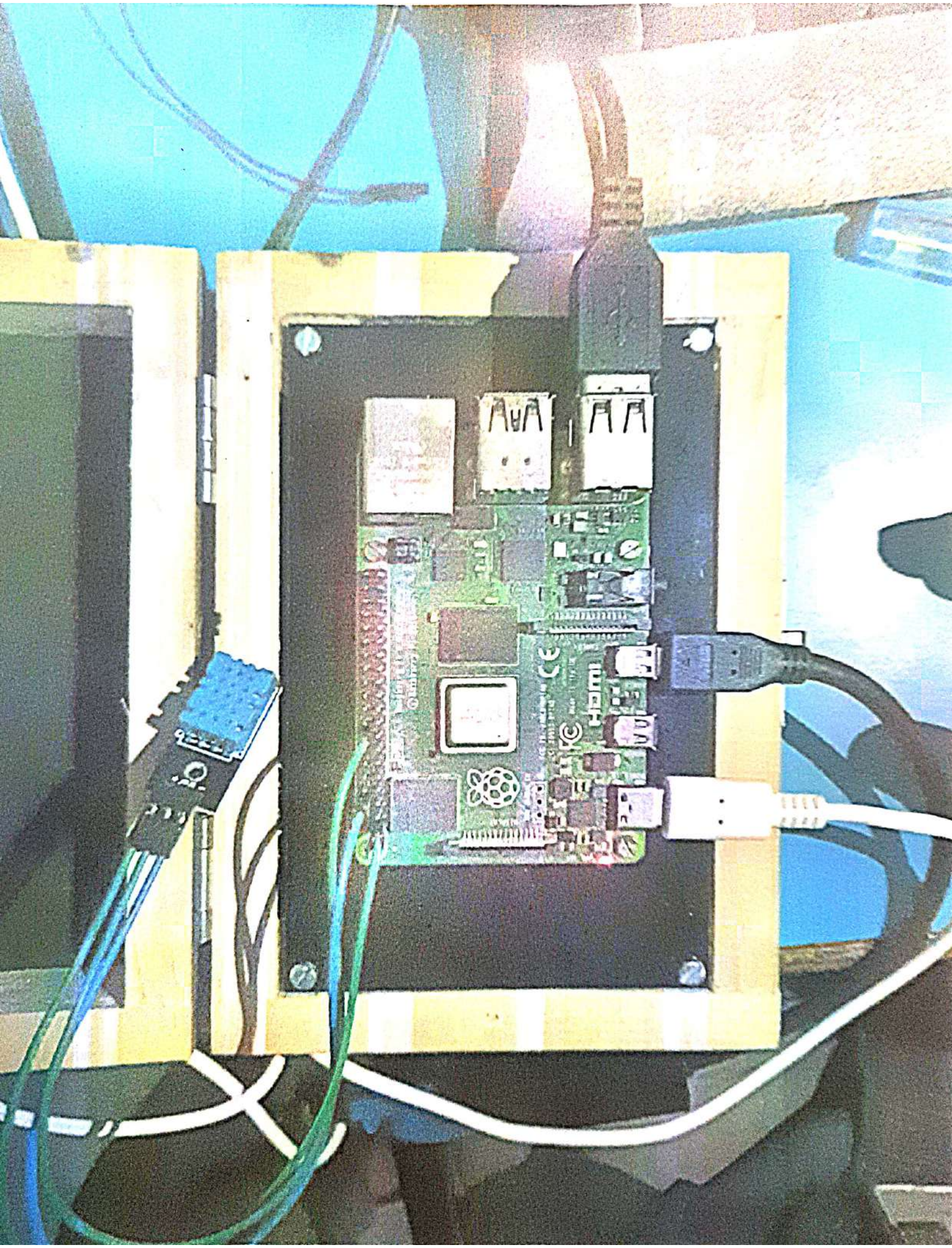
Shell

```
Program is Running
Humidity: 0.0%
Temperature: 0.0°C
Data received
Response Code: 200
Request URL: [illegible]
Program is Running
Humidity: 0.0%
Temperature: 0.0°C
Data received
Response Code: 200
Request URL: [illegible]
Program is Running
Humidity: 0.0%
Temperature: 0.0°C
Data received
Response Code: 200
Request URL: [illegible]
>>>
```

Created: 3 minutes ago
Last entry: less than a minute ago
Entries: 5







Assignment: 3

Aim:

- Design and implement real time monitoring system using android phone (Blynk App) such as 'Soil-parameter monitoring'.

Objective:

- Real time Monitoring of Temperature on Android Phone using Soil Parameter.

Parameters:

- Raspberry Pi, BLYNK, Soil Moisture Sensor.

Theory:

- Agriculture has been the most imp. practice very beginning of human civilization. It has seen many iterations of development in technology with time.
- In last few decades changing weather conditions, increase in global temp. and pollution, has led to abnormal environment conditions like Raining.
- Good control over Environmental parameters like temperature, humidity and moisture plays imp. role in growth of plant. Temp. affects many of plant activities such as pollination and germination. etc.
- It is observed that higher temperature

respiration rate increases results in reduction of sugar contents of fruits and vegetables. At lower temperatures effects many of plant activities such is slowed down. Till date many methods have come into existence where water can be limitedly consumed.

- Wireless sensor networks is also called as wireless sensors & actor network, are distributed spatially autonomous sensors to monitor physical or environmental conditions as temp, pressure, sound, moisture. etc.
- Hence, the wireless sensor network works.

Theory:

→ Scalability & Monitoring (Systems):

- The wireless Sensor Networks (WSN) utilized can be scaled depending on the farm's size. Small farms might require a few sensors to monitor key areas, while larger farms can deploy more sensors to cover a vast area, accross the entire field.

Energy Efficiency:

- Raspberry Pi and other embedded systems are energy efficient devices capable of running continously with low power consumption improving both yield and quality.

IOT Integration:

- The use of IOT in agriculture allows for real time data monitoring and communication between devices like soil sensors and raspberry Pi, which can be accessed remotely via the Blynk app on Android devices. The integration not only improves precision of farming but also helps in reducing the manual effort and resources spent on monitoring field conditions.

Cost effective and easy to implement:

- The System, using Raspberry Pi and off the shel of sensors such as soil moisture sensors, such as soil moisture sensor, offers cost effective solution that can be easily implemented by farmers with minimal technical knowledge, the Blynk app provides a user friendly interface to monitor and control farm activities in real time.

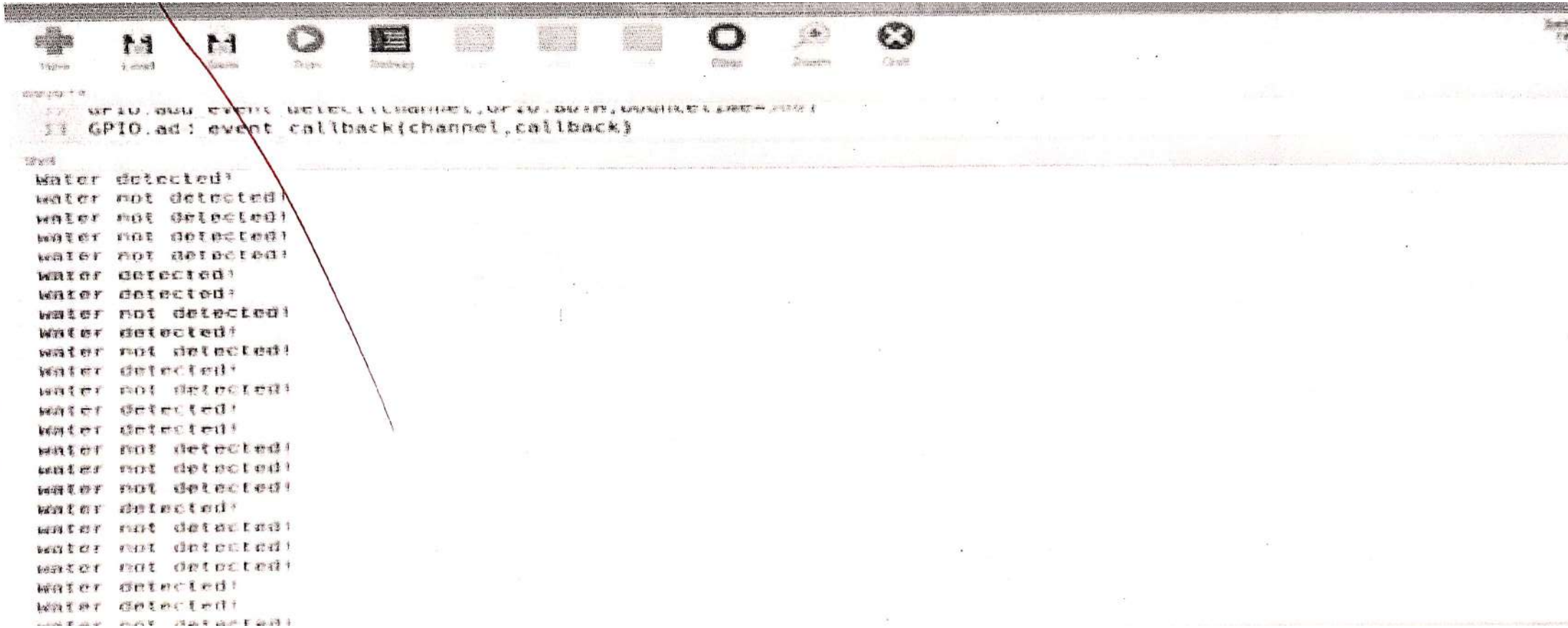
Conclusion:

- The real time monitoring System using raspberry pi and solid moisture sensor provides and efficient for optimizing irrigation agriculture productivity.

Practical No:3

Program:

```
import RPi.GPIO as GPIO
import time
#GPIO SETUP
channel =4
GPIO.setmode (GPIO.BCM)
GPIO.setup(channel, GPIO.IN)
def callback (channel):
if GPIO.input (channel):
print("Water detected!")
else:
print("water not detected!")
GPIO.add_event_detect (channel, GPIO. BOTH, bouncetime=300)
GPIO.add_event_callback(channel, callback)
 while True:
time.sleep(0)
```



```
GPIO.add event callback(channel,callback)

Water detected!
Water not detected!
Water not detected!
Water not detected!
Water not detected!
Water detected!
Water detected!
Water not detected!
Water detected!
Water not detected!
Water detected!
Water not detected!
Water detected!
Water detected!
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Water not detected!
Water detected!
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Water not detected!
Water not detected!
Water detected!
Water detected!
```
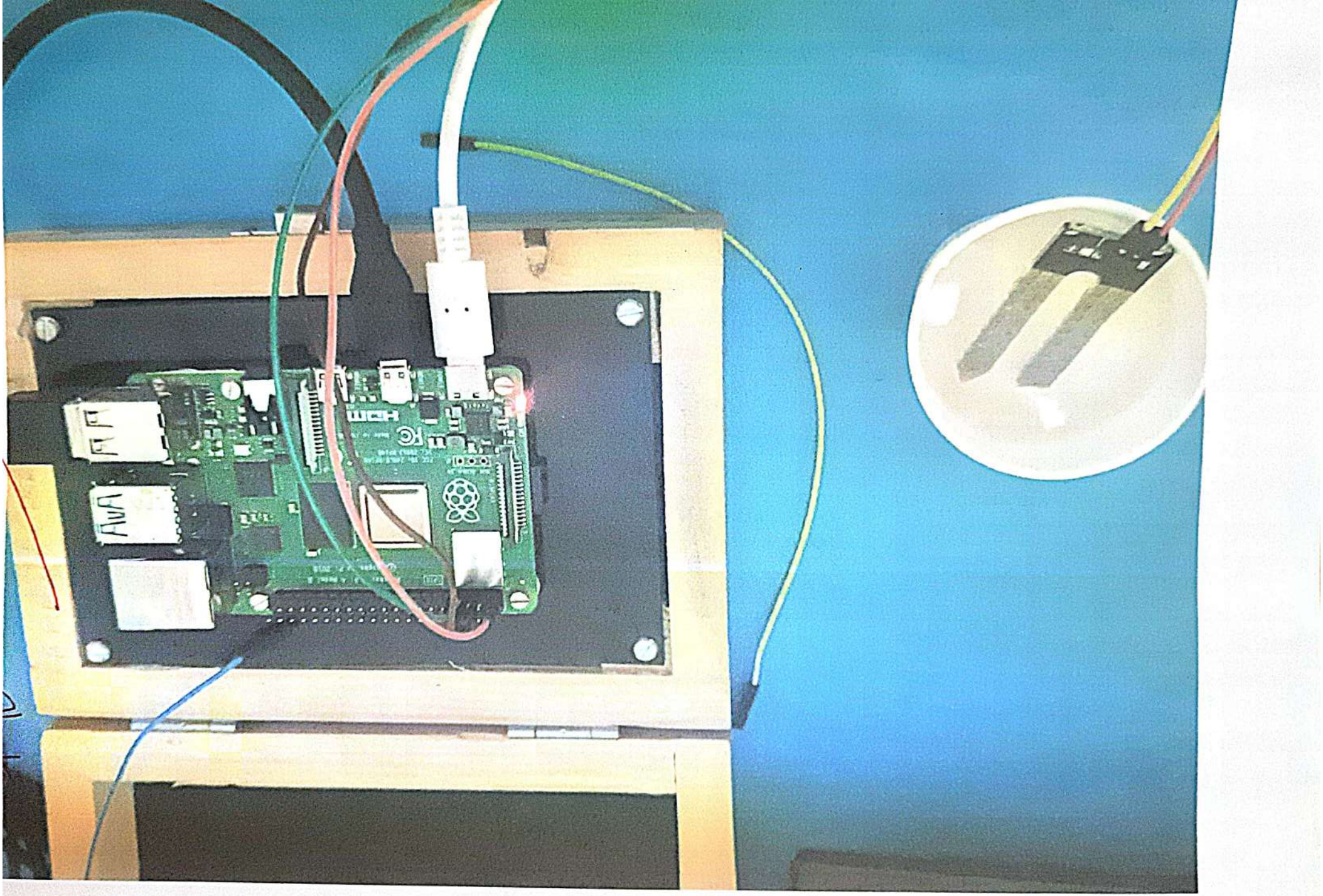



Assignment: 4

Aim:

- Design and implement IOT System for one of application like:
- Traffic Application
- Medical / Health Application
- Social application .etc.

Objective:

- Using for the Manage Traffic Light Signal.

Parameters:

- LED RGB,
- Breadboard
- Raspberry Pi. kit.

Theory:

- First you need to understand how each comp. is connected: An LED requires GPIO pin 36, 11, 12. A ground pin 3 of Raspberry Pi.
- Each comp. requires its own individual GPIO pin, but components can share a ground pin.

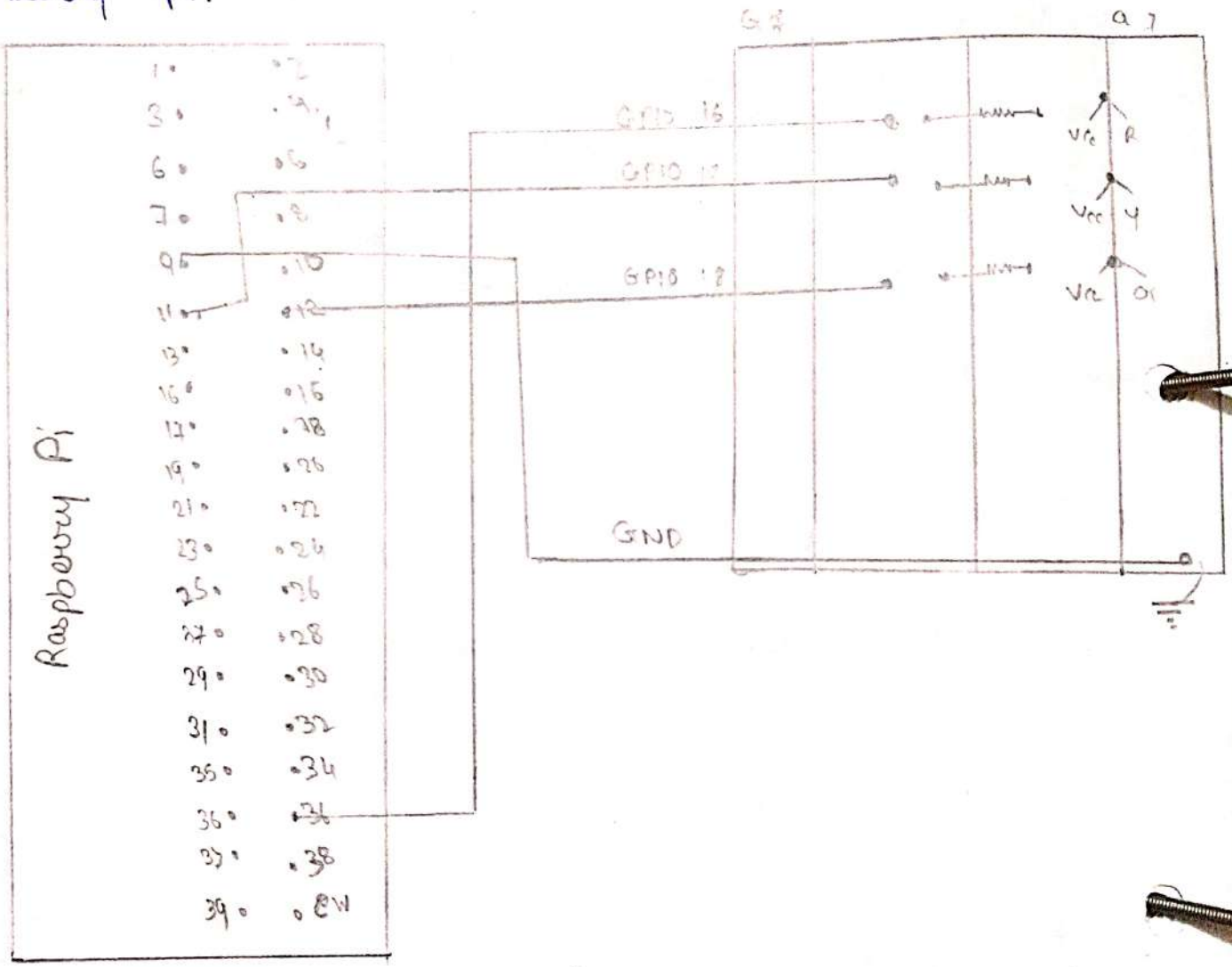
Component Pin:	Button	Red LED	Yellow LED	Green LED
GPIO Pin:	21	16	18	11

Breadboard.

Diagram:

Circuit Diagram:

∵ To get started, you'll need to place all components on breadboard & connect them to appro. GPIO pins on Raspberry Pi.



- 36 = GPIO 16 (R)
- 11 = GPIO 19 (Y)
- 12 = GPIO 18 (G)

Use of GPIO Pins:

- The GPIO is general purpose input - output pins on Raspberry -Pi, serve as an interface to connect and control. where as electronic components → such as LED In this case diff. GPIO pins are used to control, The Red, yellow & Green LEDS.
- Simulating a typical traffic light patter.

Overview of Traffic System:

- A traffic light System plays role on managing traffic flow at intersection, by using Raspberry - Pi → to control LED is representing Traffic lights.
- You can simulate how & actual traffic light works, Using simple IOT Setup, this System can can easily be scaled up and real - world traffic.

→

Diagram:

Real Time Control (with IoT Integration).

- This traffic signal system could be further enhanced by adding real time control and monitoring capabilities.
- Hence, this is time control.

Scalability:

- This basic setup - can be extended by incorporating over traffic lights.
- padestrian crossing, or even remote monitoring via the cloud using IOT technologies, there raspberry-pi can send real time data to a remote server, allowing authorities to manage multiple, intersecting from a central location.

Future enchancements;

- System can be expanded ny integrating cameras, to detect volume of traffic./signal

Conclusion:

- This practical demonstrates, how IOT based systems can be used to control traffic signal providing foundation over/macadvanced traffic management system.

```
1  from gpiozero import LED
2  import time
3  R=LED(16)
4  Y=LED(18)
5  G=LED(17)
6  while(1) :
7      R.on()
8      time.sleep(3)
9      R.off()
10     Y.on()
11     time.sleep(2)
12     Y.off()
13     G.on()
14     time.sleep(3)
15     G.off()
16
```