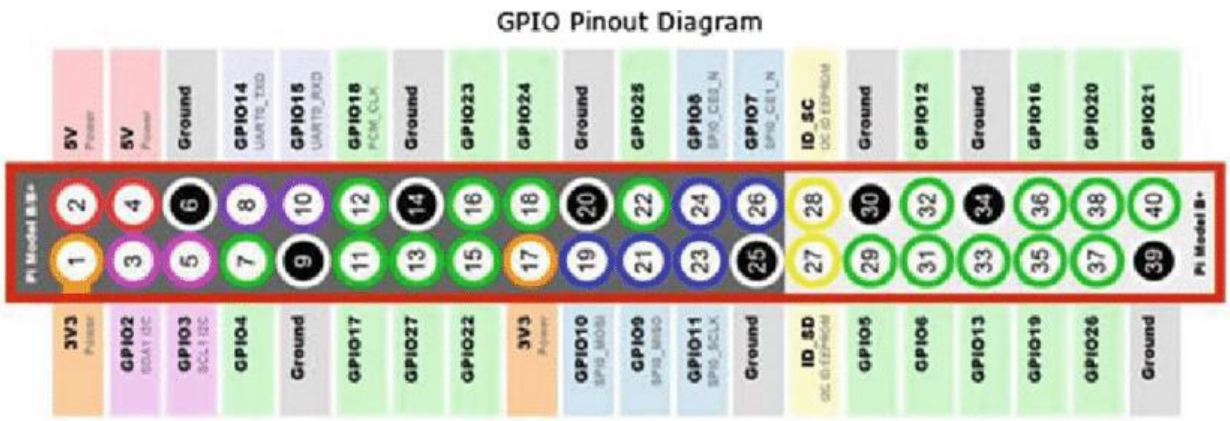
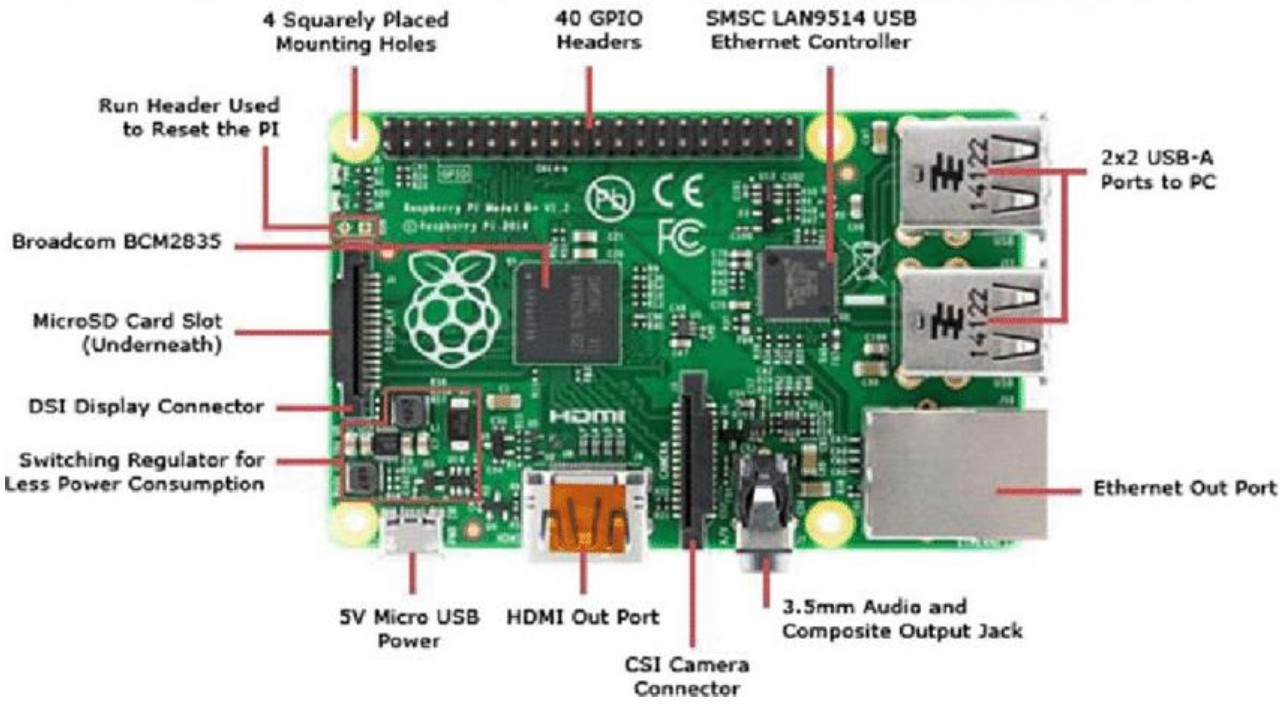
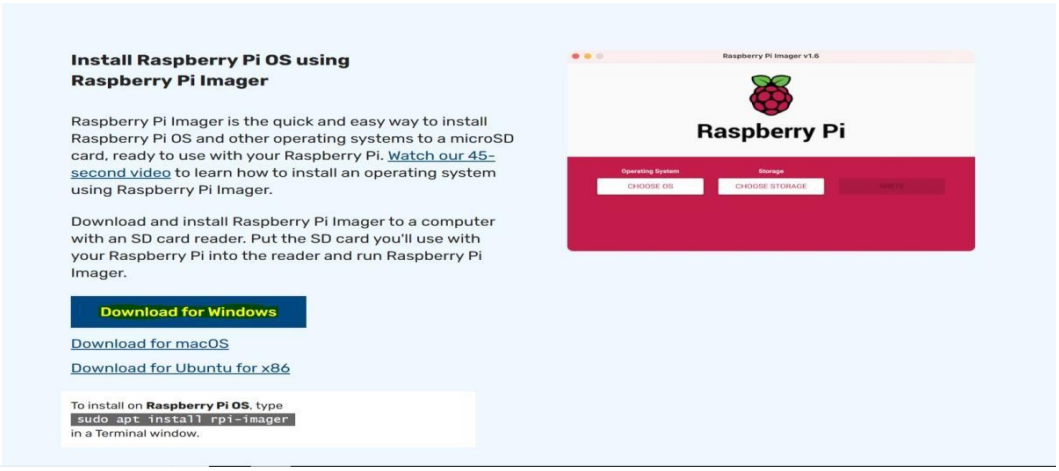
INTERNET OF THINGS

PRACTICAL 1: Starting Raspbian OS, Familiarizing with Raspberry Pi Components and Interface, Connecting to Ethernet, Monitor, USB.



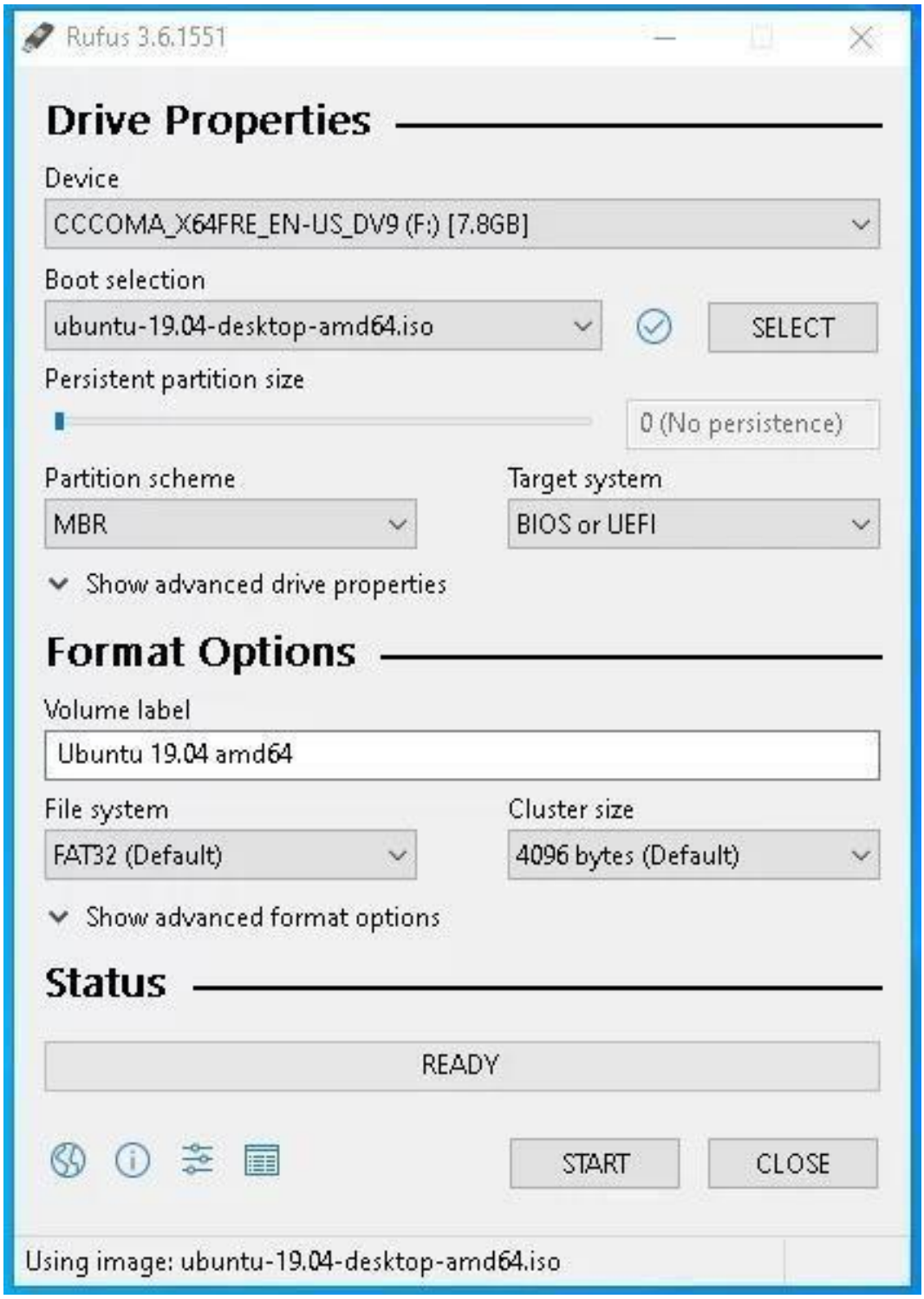


Step 1: Download Raspberry pi.
https://www.raspberrypi.org/downloads/raspbian



Step 2: Unzip the downloaded file.
Step 3: Start the downloaded file.
Step 4: Download Rufus.
Step 5: By using Rufus Install the Raspbian OS (copy the image file) in the SD Card.

After installing the OS, the name of the SD Card will change to boot drive. It means the OS is successfully installed in the SD Card.

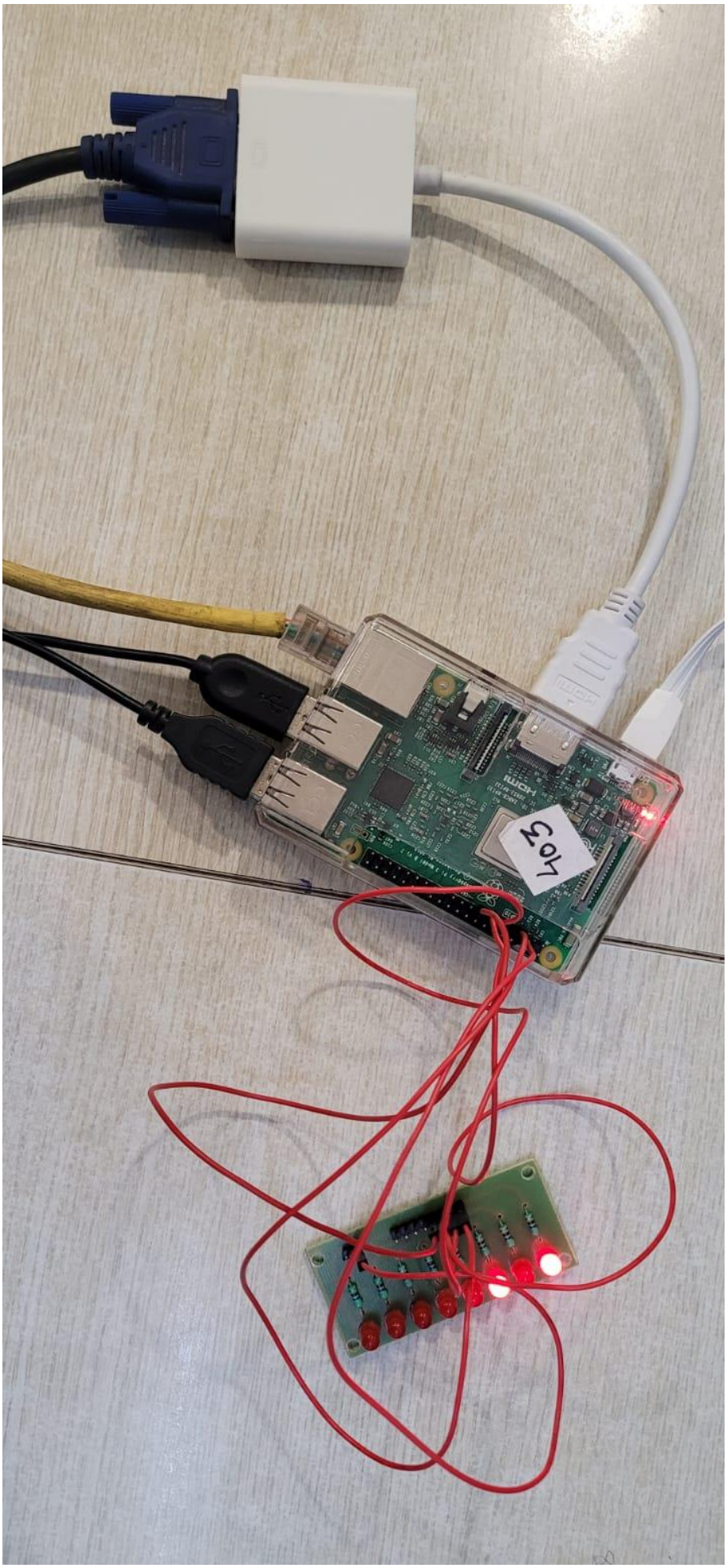


<u>PRACTICAL 2:</u> Displaying different LED patterns with Raspberry Pi.

Required Components:
Raspberry Pi - 1
Power Supply 12 V/2 Amp - 1
HDMI Port - 1
USB Keyboard - 1
USB Mouse - 1
Micro SD Card - 1
LED Module - 1
Jumper (F to F) - 5
Connection:
Connect Pin no.7 (GPIO 4) to LED1 of LED module
Connect Pin no.11 (GPIO 17) to LED2 of LED module
Connect Pin no.13 (GPIO 27) to LED3 of LED module
Connect Pin no.15 (GPIO 22) to LED4 of LED module
Connect Pin no.6 (GND) to GND of LED module

Code:
```
import RPi.GPIO as GP
import time
GP.setmode(GP.BOARD)
GP.setup(7,GP.OUT)
GP.setup(11,GP.OUT)
GP.setup(13,GP.OUT)
GP.setup(15,GP.OUT)
while (1):
GP.output(7,GP.HIGH)
time.sleep(0.2)
GP.output(11,GP.LOW)
time.sleep(0.2)
GP.output(13,GP.HIGH)
time.sleep(0.2)
GP.output(15,GP.LOW)
time.sleep(0.2)
print (" LED IS ON! ")
GP.cleanup()
```

Output:



<u>PRACTICAL 3:</u> Displaying Time over 4-Digit 7-Segment Display using Raspberry Pi.

Required Components:

Raspberry Pi - 1
Power Supply 12 V/2 Amp - 1
HDMI Port - 1
USB Keyboard - 1
USB Mouse - 1
Micro SD Card - 1
4-Digit 7-Segment Module - 1
Jumper (F to F) - 4

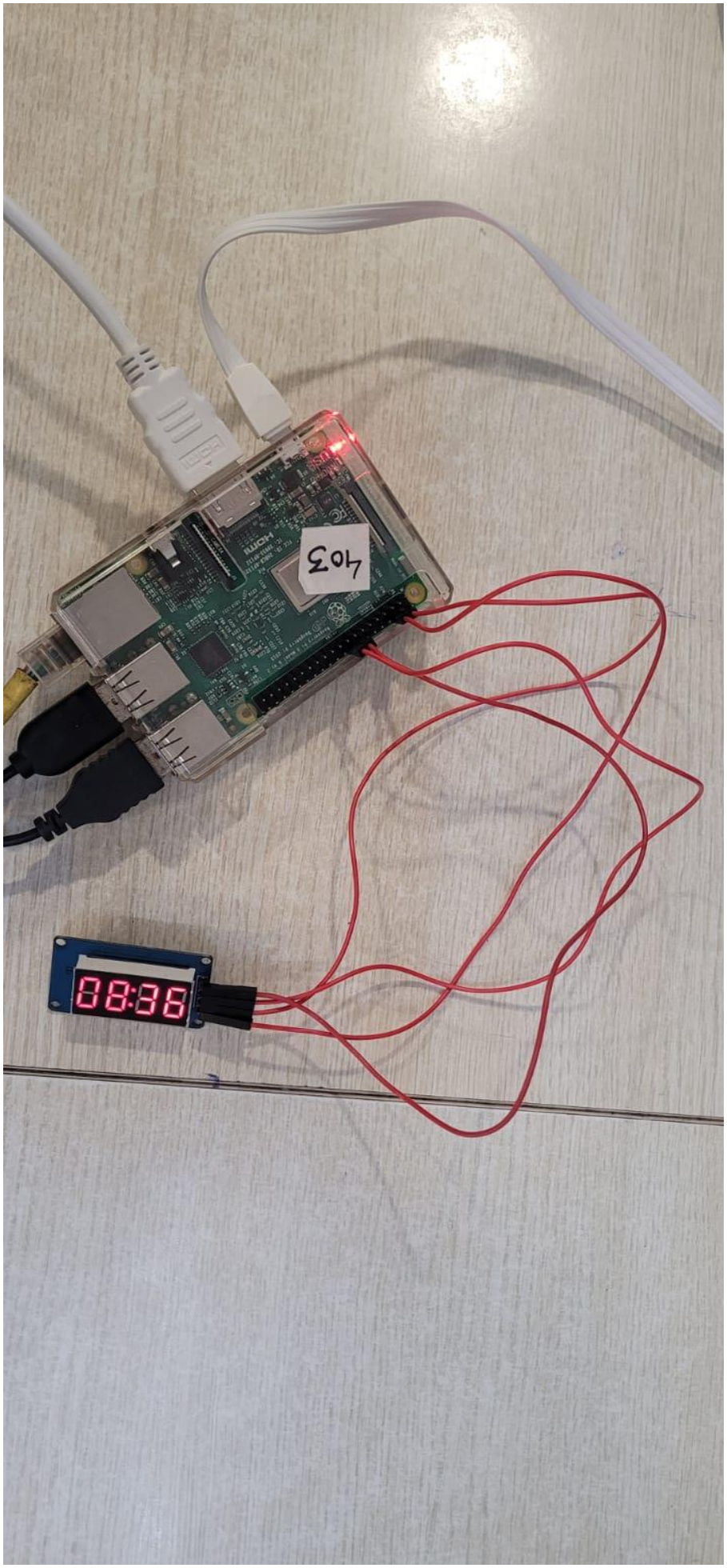
Connection:

Connect Pin no.16 (GPIO 23) to CLK of Timer
Connect Pin no.18 (GPIO 24) to DIO of Timer
Connect Pin no.4 (5V Power) to VCC of Timer
Connect Pin no.6 (GND) to GND of Timer

Code:

```
import sys
import time
import datetime
import RPi.GPIO as GP
import tm1637
Display = tm1637.TM1637 (23,24, tm1637. BRIGHT_TYPICAL)
Display.Clear()
Display.SetBrightness (1)
while (True):
now = datetime.datetime.now()
hour = now.hour
minute = now.minute
second = now.second
currenttime = [ int (hour / 10), hour % 10, int (minute / 10), minute % 10 ]
Display.Show(currenttime)
Display.ShowDoublepoint(second % 2)
time.sleep(1)
```

Output:



<u>PRACTICAL 4</u>: Interfacing Raspberry Pi with RFID.

Required Components:
Raspberry Pi - 1
Power Supply 12 V/2 Amp - 1
Power Supply with Red & Black extension - 1
HDMI Port - 1
USB Keyboard - 1
USBMouse - 1
Micro SD Card - 1
Ethernet - 1
RFID Card Reader - 1
USB to TTL Converter - 1
Jumper (F to F) - 4

Connection:
Connect TX of Card Reader to RX of TTL
Connect GND of Card Reader to GND of TTL
Connect Red of Power Supply to VCC of Card Reader
Connect Black of Power Supply to GND of Card Reader
Connect TTL to Raspberry Pi

Code:

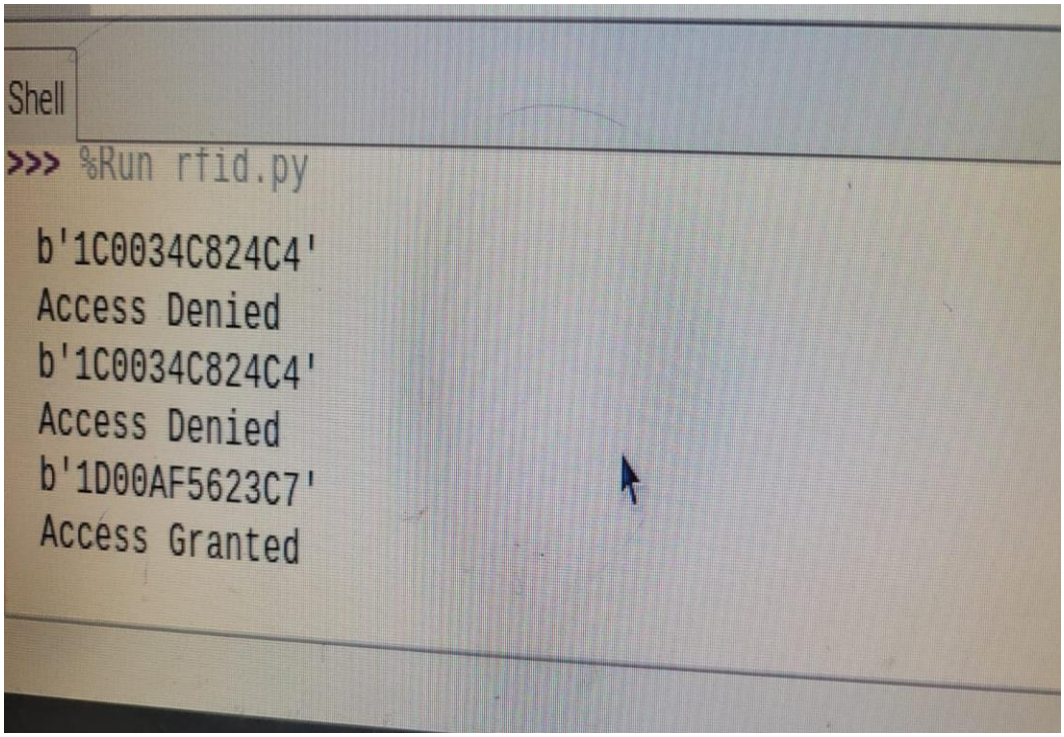
```
import RPi.GPIO as GP
import time
import serial
GP.setmode(GP.BOARD)
def read_rfid():
ser=serial.Serial("/dev/ttyUSB0")
ser.baudrate=9600
data=ser.read(12)
ser.close()
return data
try:
while True:
id=read_rfid()
print(id)
if id==b'1D00AF5623C7':
print ("Access Granted")
time.sleep(2)
else:
```

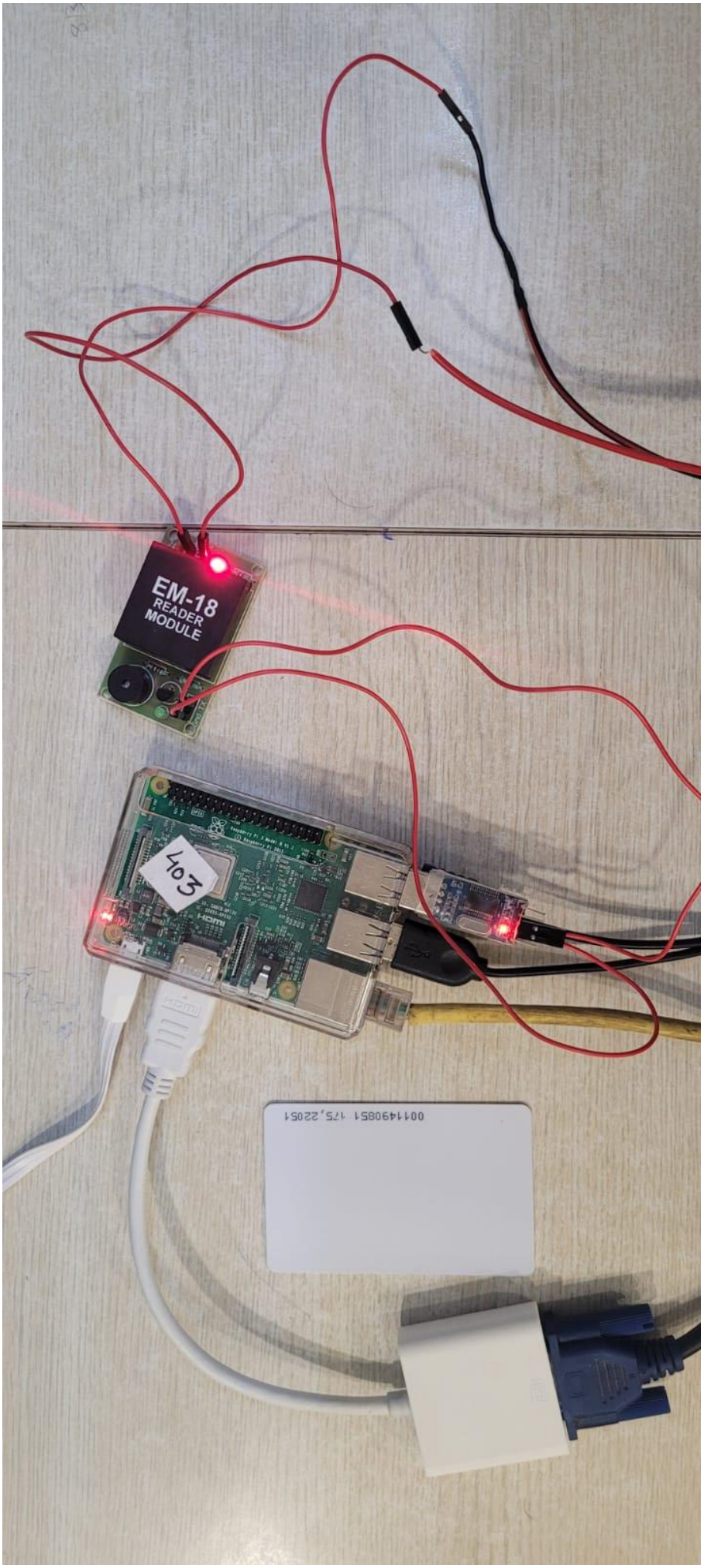
```
print ("Access Denied")
time.sleep(2)
finally:
GP.cleanup()
```

<u>Note</u> - If (/dev/ttyUSB0) error occurs run the following commands in the Terminal:

- sudo apt-get update
- sudo apt-get upgrade
- sudo raspi-config (in 'Interface' option 'enable spi')
- sudo reboot (compulsory)
- sudo apt-get install python3-dev python3-pip
- sudo pip3 install spidev

Output:



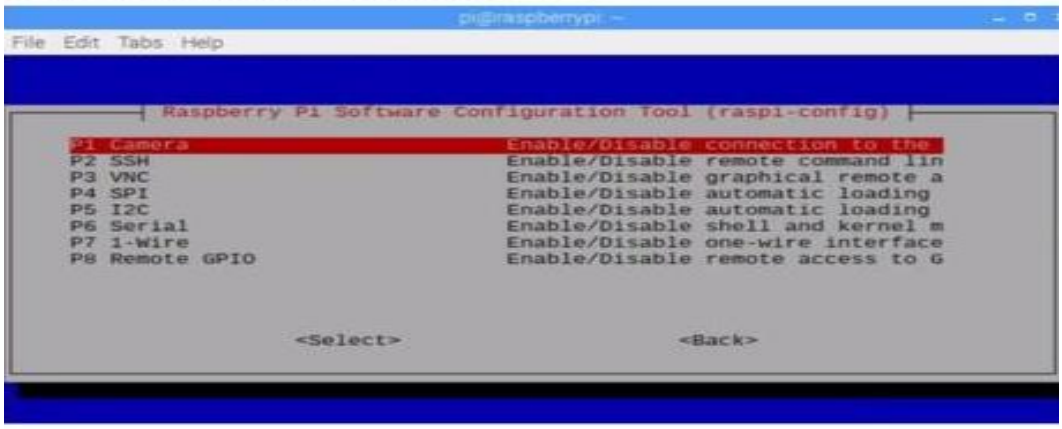

EM-18
READER
MODULE
403
0014490851 175,22051

<u>PRACTICAL 5:</u> Visitor Monitoring with Raspberry Pi and Pi Camera.

Required Components:
Raspberry Pi - 1
Power Supply 12 V/2 Amp - 1
HDMI Port - 1
USB Keyboard - 1
USB Mouse - 1
Micro SD Card - 1
Pi Camera Module - 1

Connection:
Connect Pi Camera Module to CSI Camera Port

Select Interfacing Options → Camera → Enable



After this reboot the system, using **sudo reboot** command.

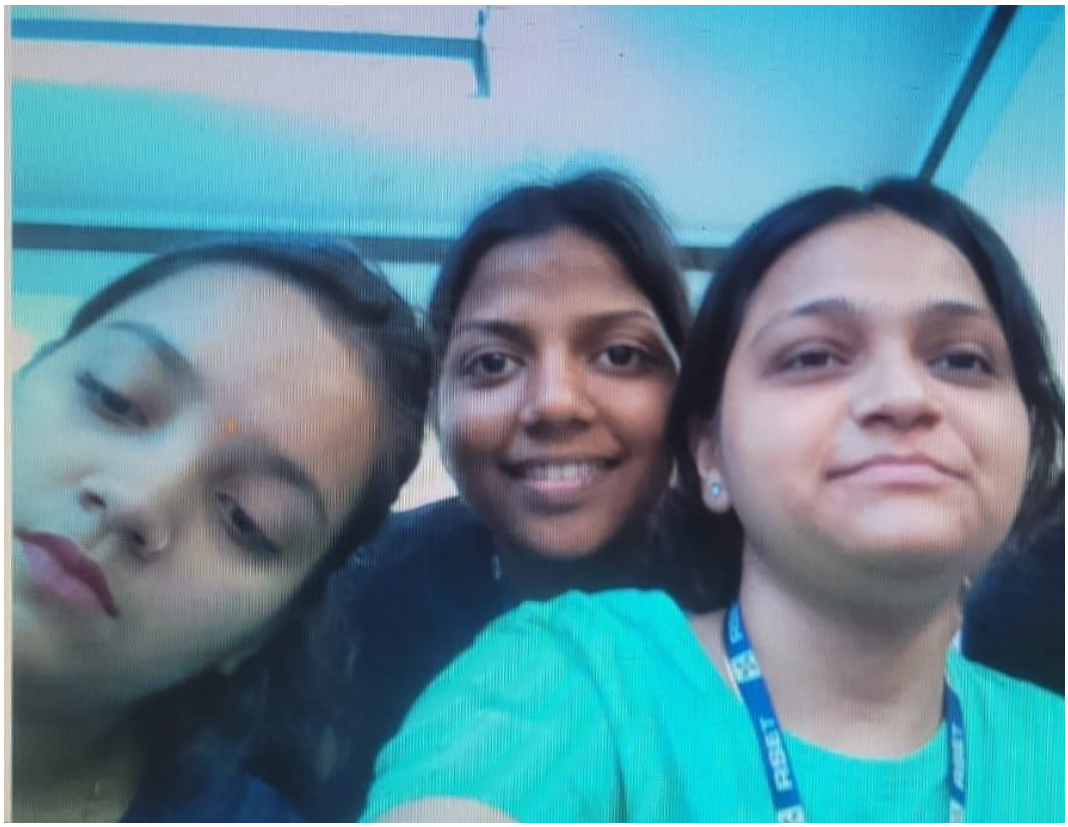
Commands: To install Pi-camera packages.

- sudo apt-get install python-picamera
- sudo apt-get install python3-picamera
- sudo pip install picamera

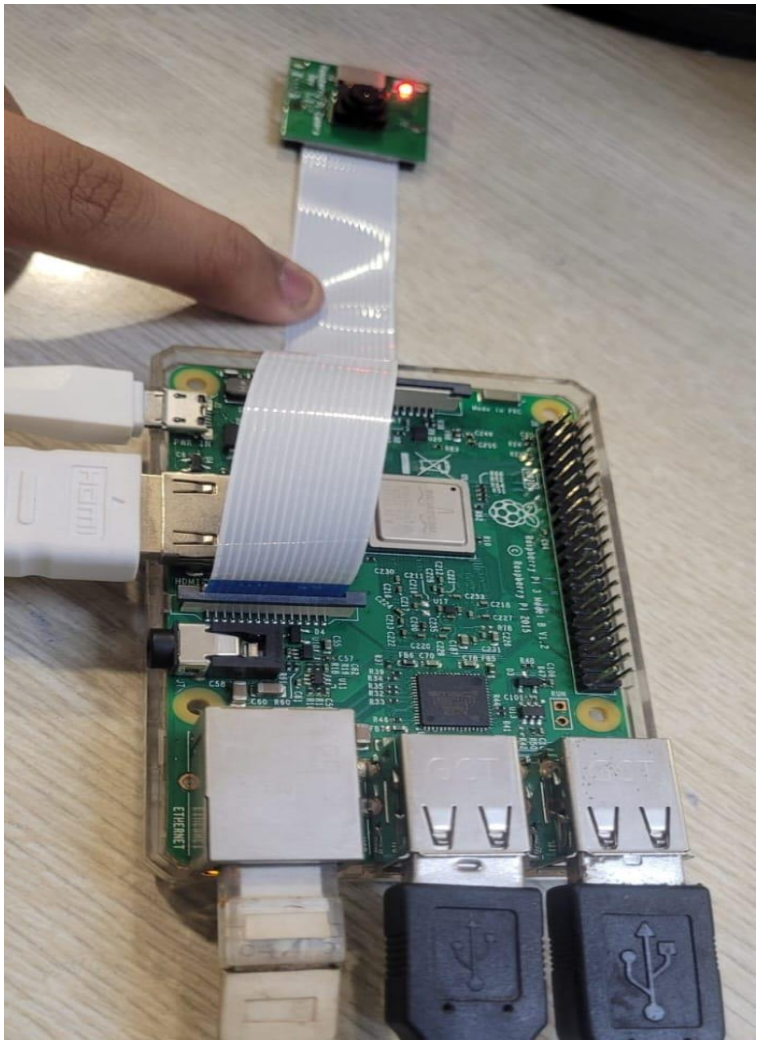
Code:

```
import time
import picamera
camera=picamera.PiCamera()
camera.resolution=(1024,768)
camera.start_preview()
time.sleep(2)
camera.capture('/home/pi/Desktop/visitor/images%s.jpg')
camera.stop_preview
```

Output:



<u>Note</u> - Type ‘exit()’ in the shell to esc from the image screen.



<u>PRACTICAL 6:</u> IoT based Web Controlled Home Automation using Raspberry Pi.

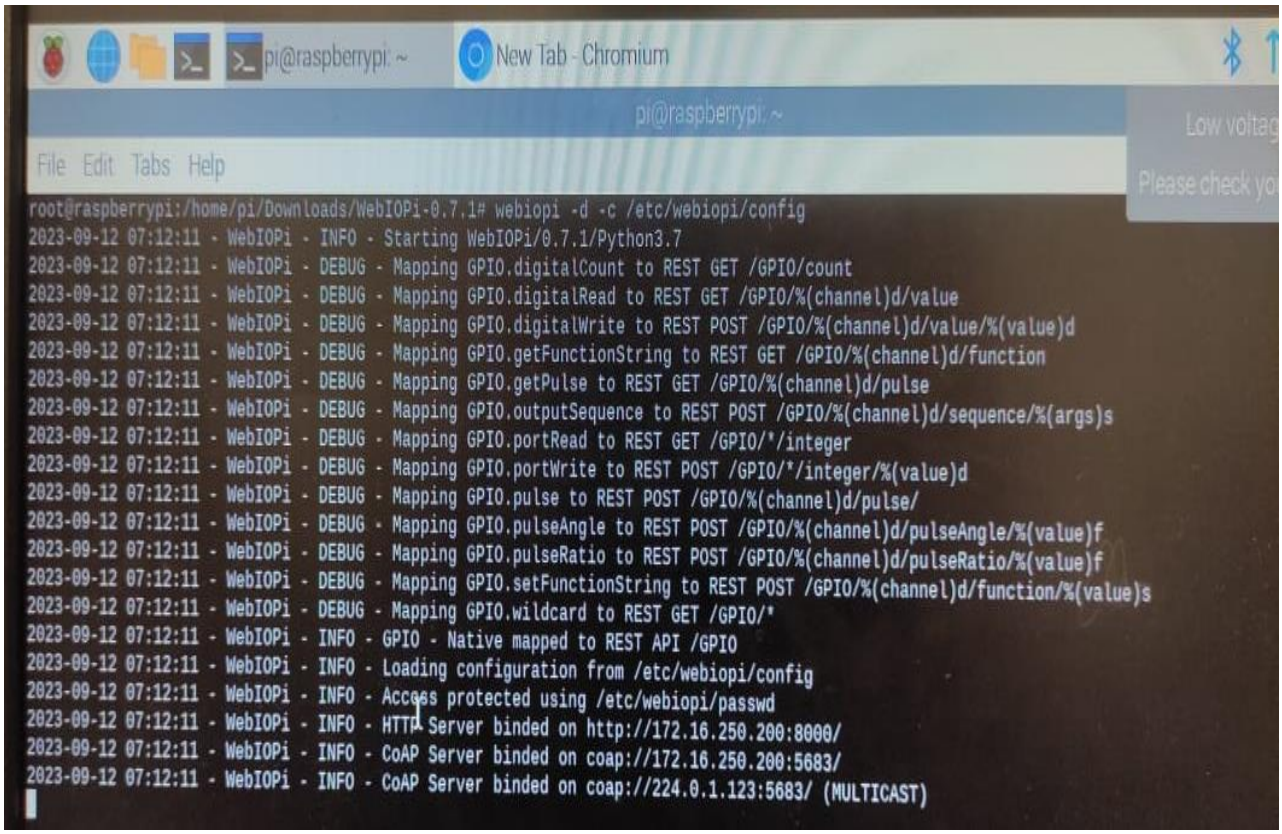
Required Components:
Raspberry Pi - 1
Power Supply 12 V/2 Amp - 1
HDMI Port - 1
USB Keyboard - 1
USB Mouse - 1
Micro SD Card - 1
LED Module - 1
Jumper (F to F) - 2
Connection:
Connect Pin no.3 (GPIO 2) to LED1 of LED module
Connect Pin no.6 (GND) to GND of LED module

Steps:
1) Go to Web browser.
2) Type http://webiopi.trouch.com/DOWNLOADS.html & download it.
3) Extract the downloaded file.

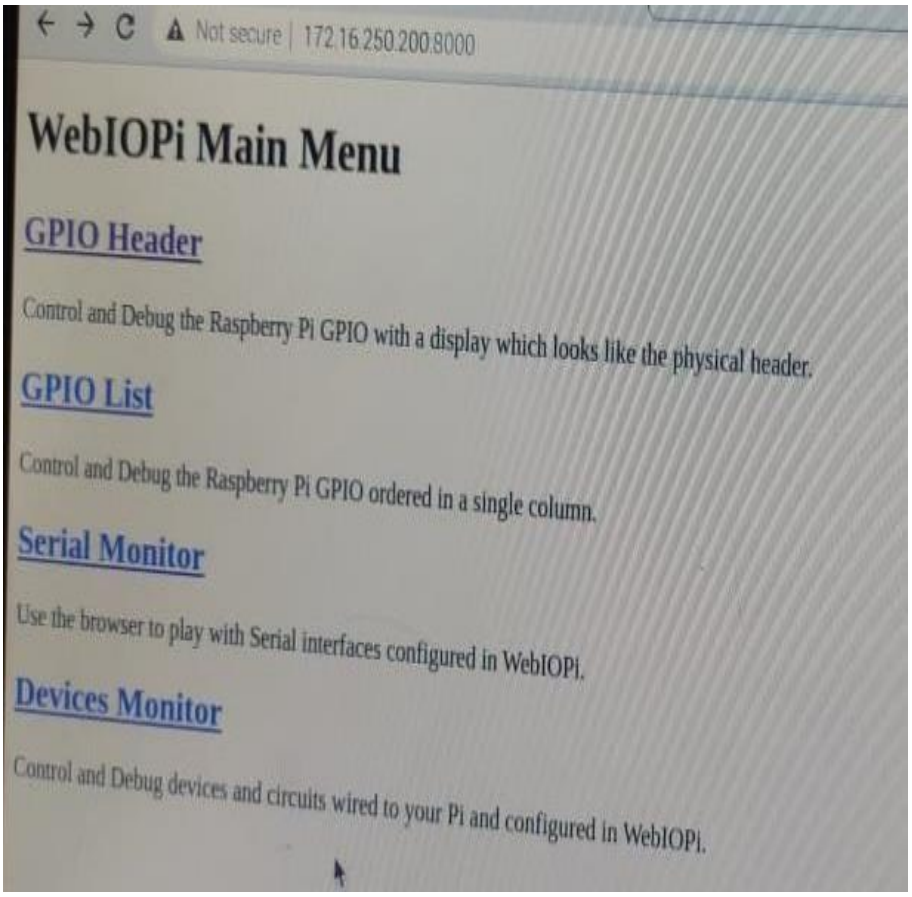
Commands: It should be executed in Terminal.
- sudo apt-get update
- sudo apt-get upgrade
- cd/home/pi/Downloads (Move to the downloaded folder)
- tar xvzf WebIOPi-0.7.1.tar.gz
- cd WebIOPi-0.7.1
- wget https://raw.githubusercontent.com/doublebind/raspi/master/webiopi-pi2bplus.patch
- patch -p1 -i webiopi-pi2bplus.patch
- sudo ./setup.sh
- sudo reboot
- sudo webiopi -d -c/etc/webiopi/config

  Go to Web browser
  Type http://172.16.250.200:8000/

Output:

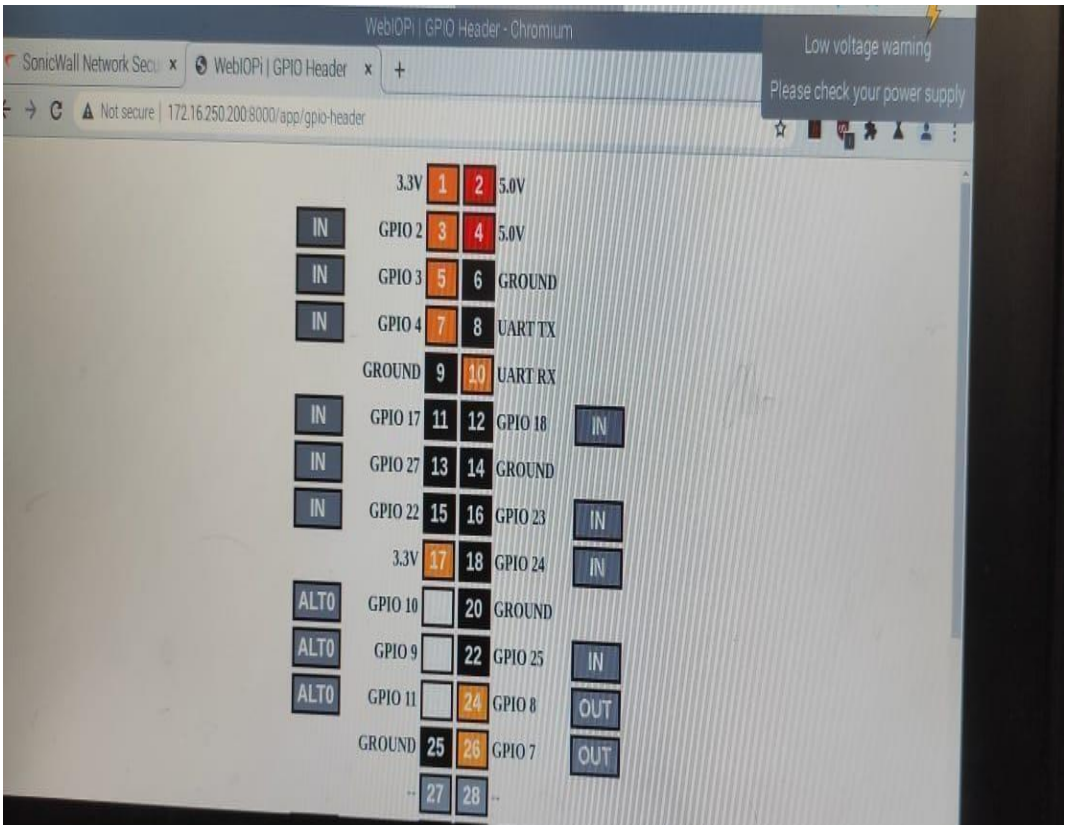


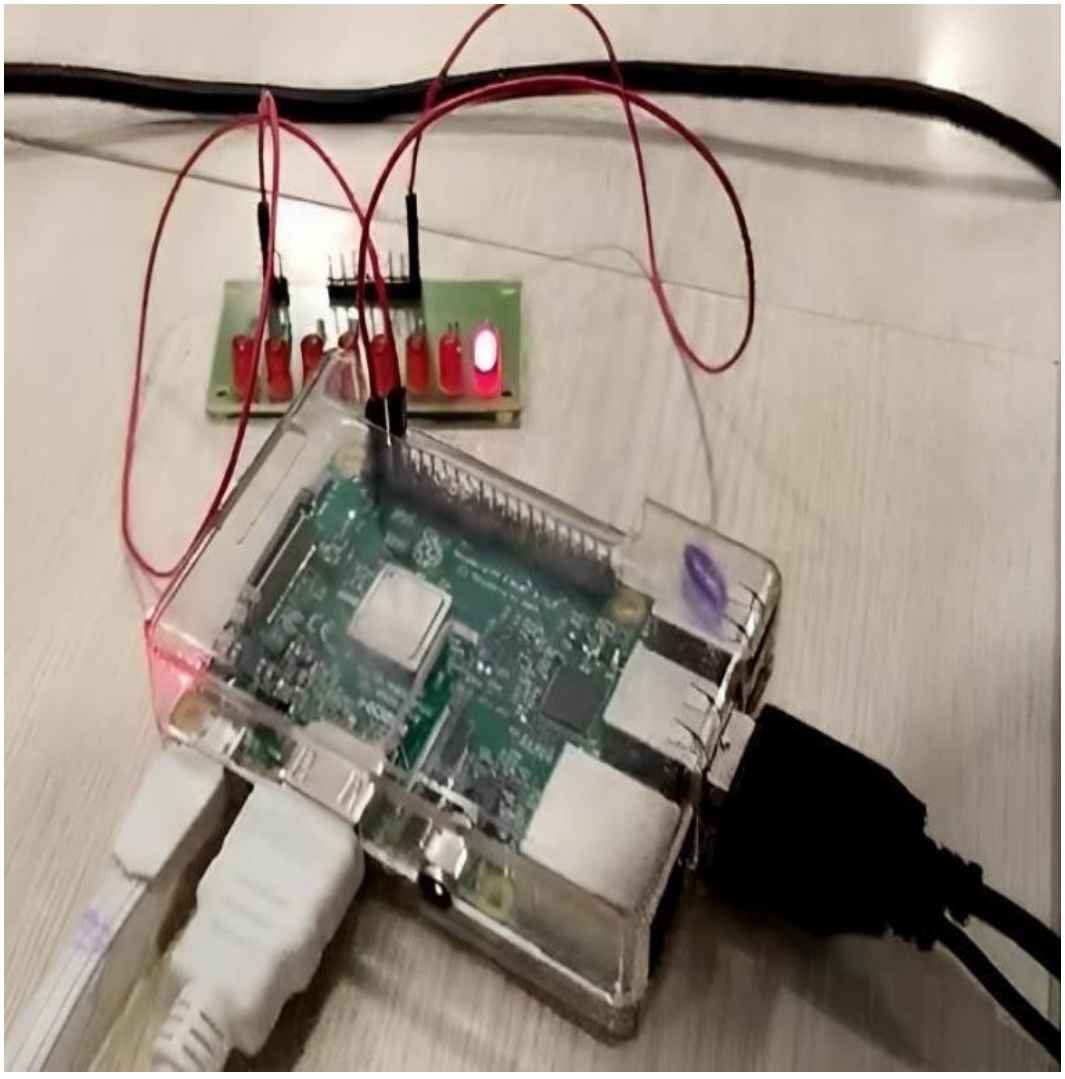
Click on the GPIO Header.



First click on ‘IN’ next to GPIO 2(Pin no.3) & turn it into ‘OUT’.

Now click on Pin no.3 to turn LED “ On & Off ” and get the output.





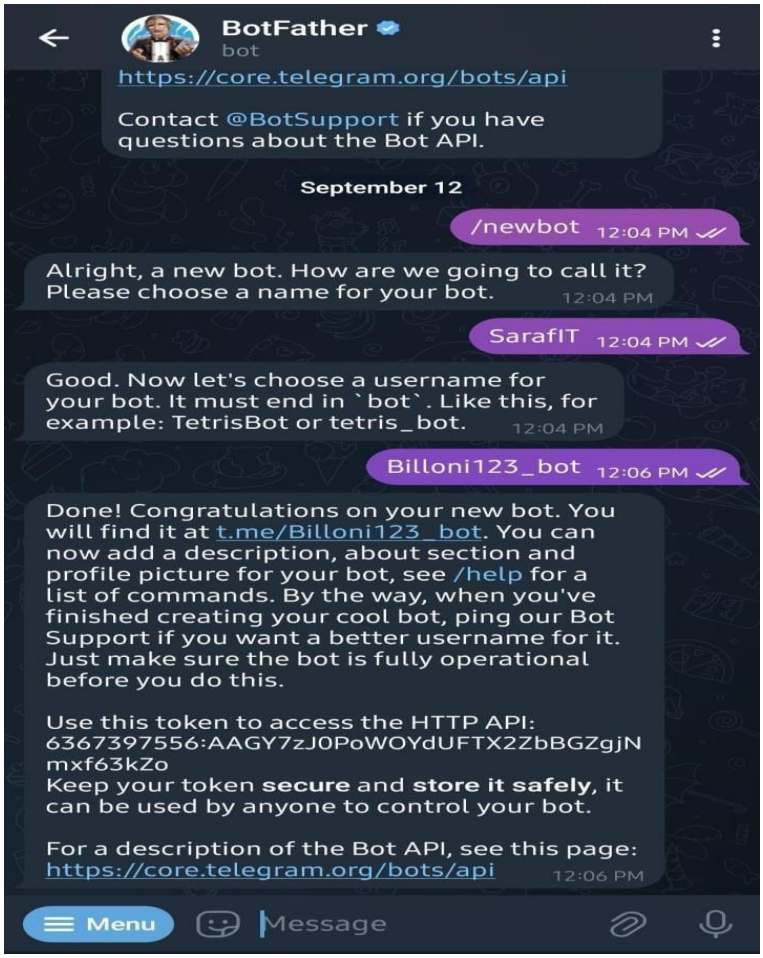
<u>PRACTICAL 7:</u> Controlling Raspberry Pi with Telegram.

Required Components:
Raspberry Pi - 1
Power Supply 12 V/2 Amp - 1
HDMI Port - 1
USB Keyboard - 1
USB Mouse - 1
Micro SD Card - 1
LED Module - 1
Jumper (F to F) - 2
Connection:
Connect Pin no.3 (GPIO 2) to LED1 of LED module
Connect Pin no.6 (GND) to GND of LED module

Step 1: Install Telegram Bot on Raspberry Pi.

- sudo apt-get update
- sudo apt-get upgrade
- sudo apt-get install python-pip
- sudo pip install telepot

Step 2: Create a Bot in your Telegram App.



Code:

```
import time,datetime
import RPi.GPIO as GP
import telepot
import sys
def on(pin):
GP.output(pin, GP.HIGH)
def off(pin):
GP.output(pin, GP.LOW)
return
GP.setmode(GP.BOARD)
GP.setwarnings(False)
GP.setup(3, GP.OUT)
def handle(msg):
chat id = msg['chat']['id']
command = msg['text']
print ('Got command: %s' % command)
if command == '/on':
bot.sendMessage(chat_id, on(3))
elif command == '/off':
bot.sendMessage(chat_id, off(3))
bot = telepot.Bot('Enter_your_bot_token_here')
bot.message_loop(handle)
print ("I am Listening...")
while 1:
try:
time.sleep(10)
except KeyboardInterrupt:
print ('Program interrupted')
GP.cleanup()
exit()
except:
print ‘Other error’)
GP.cleanup()
```

Output:


September 12
/start 12:38 PM
On 12:38 PM
/start 12:44 PM
On 12:44 PM
Off 12:44 PM
/start 12:48 PM
On 12:48 PM
Off 12:48 PM
/start 5:04 PM
Message