IOT Practicals

Rasberry Pi Pin Diagram

3V3 power	① ②	5V power
GPIO 2 (SDA)	③ ④	5V power
GPIO 3 (SCL)	⑤ ⑥	Ground
GPIO 4 (GPCLK0)	⑦ ⑧	GPIO 14 (TXD)
Ground	⑨ ⑩	GPIO 15 (RXD)
GPIO 17	⑪ ⑫	GPIO 18 (PCM_CLK)
GPIO 27	⑬ ⑭	Ground
GPIO 22	⑮ ⑯	GPIO 23
3V3 power	⑰ ⑱	GPIO 24
GPIO 10 (MOSI)	⑲ ⑳	Ground
GPIO 9 (MISO)	㉑ ㉒	GPIO 25
GPIO 11 (SCLK)	㉓ ㉔	GPIO 8 (CE0)
Ground	㉕ ㉖	GPIO 7 (CE1)
GPIO 0 (ID_SD)	㉗ ㉘	GPIO 1 (ID_SC)
GPIO 5	㉙ ㉚	Ground
GPIO 6	㉛ ㉜	GPIO 12 (PWM0)
GPIO 13 (PWM1)	㉝ ㉞	Ground
GPIO 19 (PCM_FS)	㉟ ㊱	GPIO 16
GPIO 26	㊲ ㊳	GPIO 20 (PCM_DIN)
Ground	㊴ ㊵	GPIO 21 (PCM_DOUT)

NOTE : To install modules use either pip3 or pip which is working

Pins:

- **Ground :** 6, 9, 14, 20, 25, 30, 34, 39
- **+3.3V VCC :** 1, 17
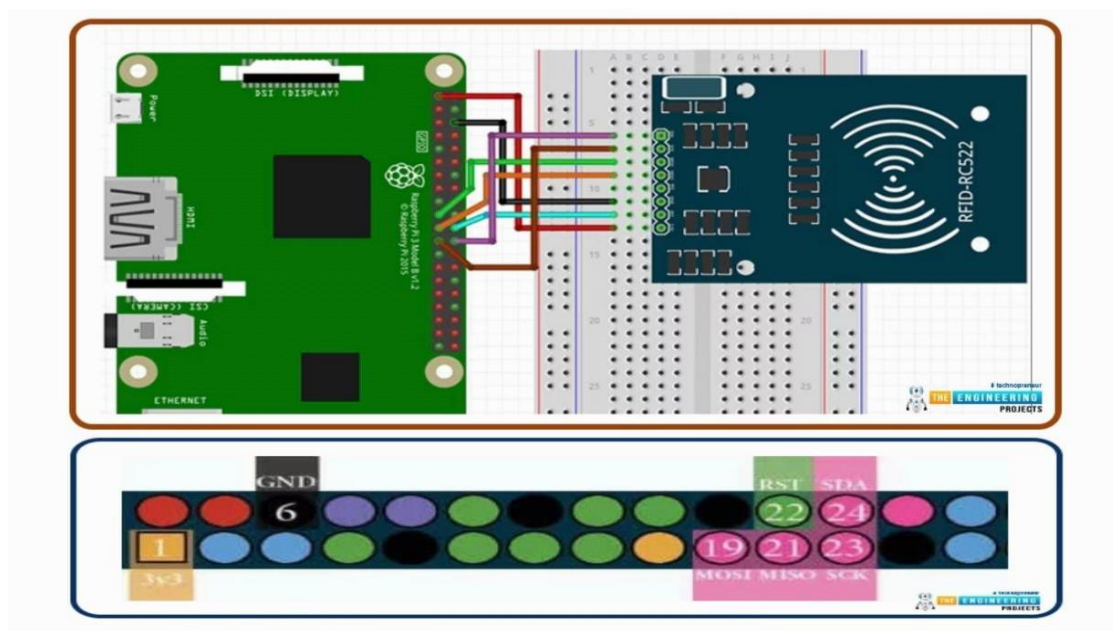- **+5V VCC :** 2, 4

1. Interfacing Raspberry Pi with RFID.

Modules : mfrc522
Imports : mfrc522 => SimpleMFRC522

RFID	RPi Pin
3V3	1
GND	9
SCK	23
SDA	24
MISO	21
MOSI	19
RST	22

Installation :

```
1. pip install mfrc522
2. sudo raspi-config
```

3. Select the "Serial" option To access the login shell over serial communication, Select "No" option.

Code :

```python
import RPi.GPIO as GPIO
from mfrc522 import SimpleMFRC522

GPIO.setwarnings(False)
reader = SimpleMFRC522()

while True:
 try:
  id, text = reader.read()
  print(id)
  print(text)
 finally:
  GPIO.cleanup()
```

Tutorial : https://www.youtube.com/watch?v=niaTCyYKI7w

2. LED Blinking.

Connection:
- In the raspberry Pi development board kit, there is an LED module.
- The LED Module has 7 male pins at the left hand side and 2male pins at the RHS.
- The LHS is the positive terminal and RHS is negative terminal.
- Connect the raspberry Pi to positive terminal and negative terminal

```python
import RPi.GPIO as GPIO
from time import sleep

GPIO.setmode(GPIO.BOARD)
r= [3,15,8,11,13,26,29,22]
GPIO.setup(r, GPIO.OUT)

while True:
 for i in r:
  GPIO.output(i, GPIO.HIGH)
  sleep (0.1)
  GPIO.output(i, GPIO.LOW)
```

```
sleep (0.1)
```
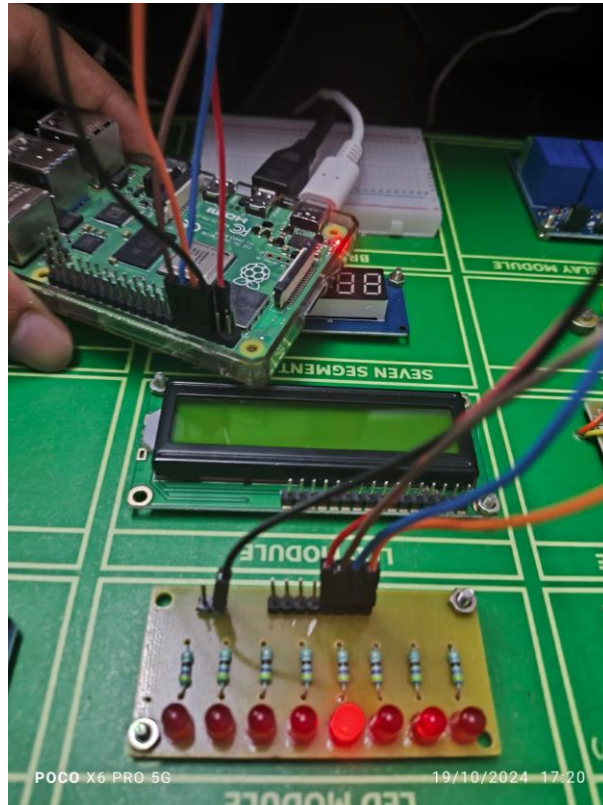

Ground (black wire) - 6

Led pins - 3,8,10,12

3. Camera

Modules : picamera
Imports : picamera => PiCamera

Connection:
- To connect the PiCamera, Insert the Ribbon cable of PiCamera into camera slot, slightly pull up the tabs of the connector at RPi board and insert the Ribbon cable into the slot, then gently push down the tabs again to fix the ribbon cable.
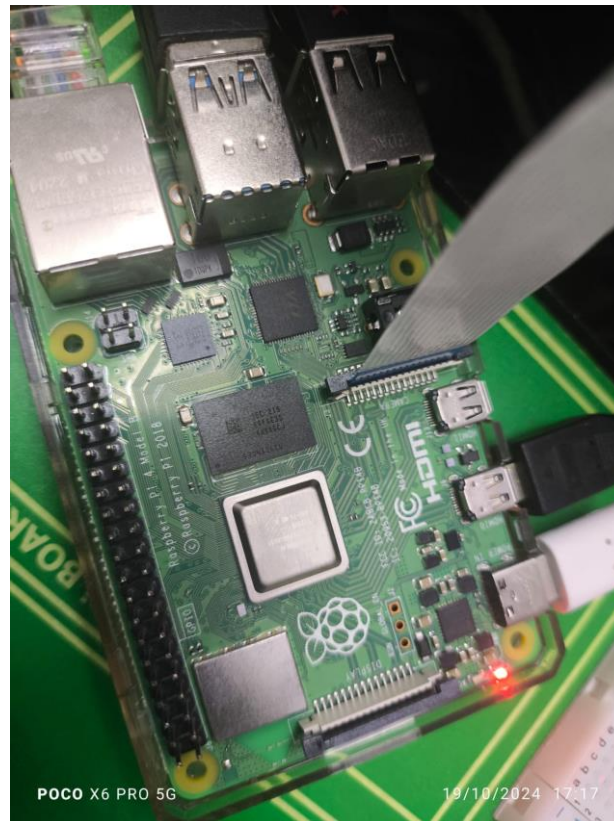
Installation:
```
1. pip install picamera
```

```
2. sudo apt-get install python3-picamera
```
```
3. sudo raspi-config
```
4. Select Enable camera and Enable it sudo reboot.
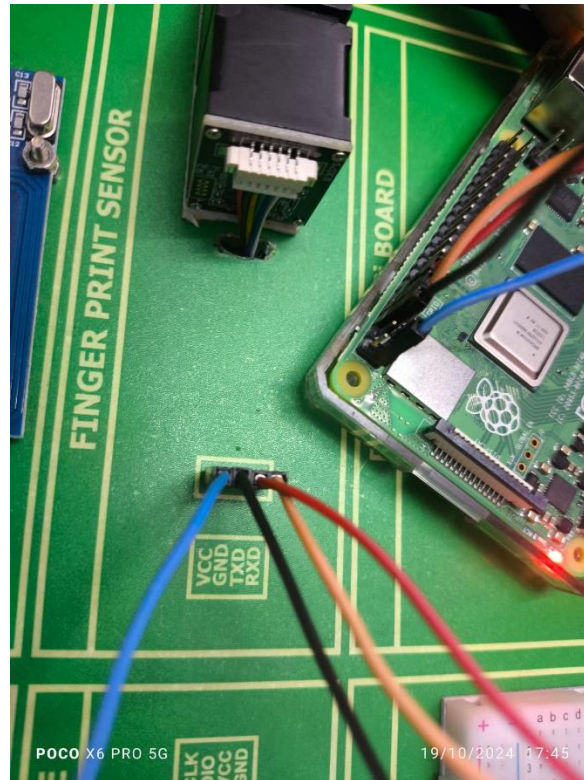5. Check with raspistill -o test.

4. Fingerprint

Modules : board, busio, digitalio, adafruit-fingerprint
Imports : digitalio => DigitalInOut, Direction

Fingerprint Module	RPi Pin
VCC	2
GND	9
TxD	15
RxD	14

5. Telegram Bot

Modules : telepot (or pyTelegramBotAPI)
Imports : telepot.loop => MessageLoop

Pins :
- Blue – 7
- Yellow – 13
- Red – 11

6. Displaying Time over 4-Digit 7-Segment Display using Raspberry Pi.

Modules : raspberrypi-tm1637 => tm1637

TM1637 Module	Function	RPi Pin
GND	Ground	14
VCC	+5V power	4
DIO	Data In	18
CLK	Clock	16

```python
import tm1637
import time
from datetime import datetime

tm=tm1637.TM1637(clk=18, dio=17)
clear= [0,0,0,0]
tm.write(clear)
time.sleep(1)
s='This is pretty cool'
tm.scroll(s, delay=250)
time.sleep(0)
tm.write(clear)
time.sleep(0)

while True:
 now=datetime.now()
 hh=int(datetime.strftime(now,'%H'))
 mm=int(datetime.strftime(now,'%M'))
 tm.numbers(hh,mm,colon=True)
 time.sleep(1000)
 tm.write(clear)
```