

1. Blinking of LED using Raspberry Pi.

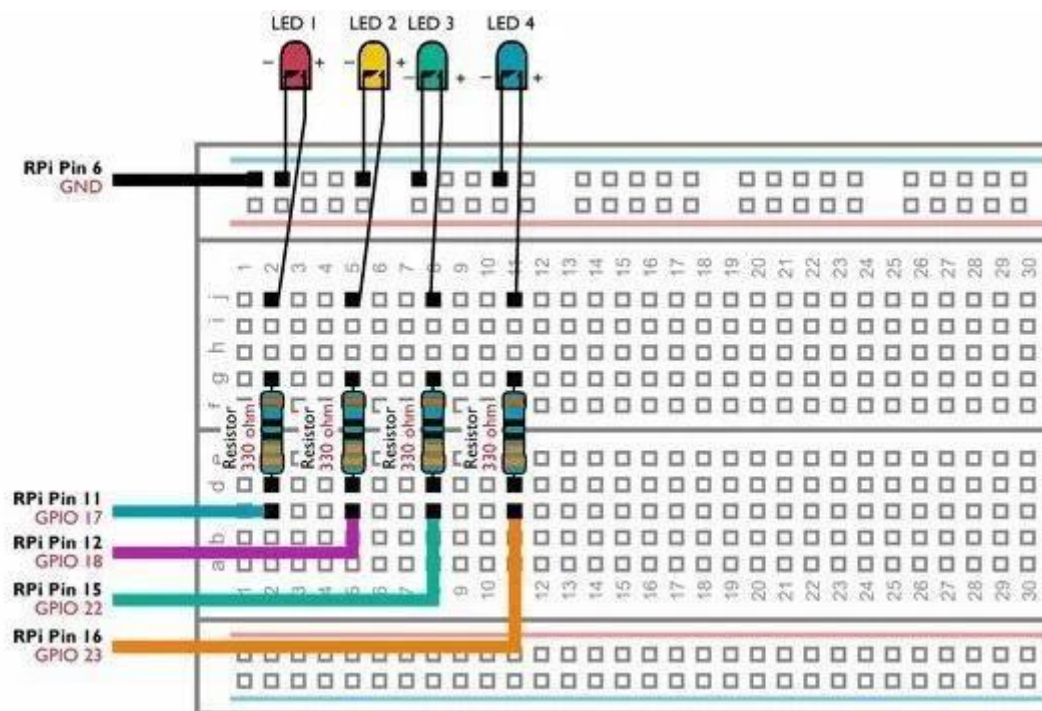
Circuit Diagram:

connect positive terminal of LED in to pin no 7 connect
negative terminal of LED into pin no 9

Code.

B) Blink 4 LEDs in pattern.

Circuit Diagram:



Code:

2. Displaying Time over 4-Digit 7-Segment Display Using Raspberry Pi.

Hardware Requirements:-

- Raspberry Pi Model A/B/B+
- 4 digit 7 Segment Display
- Jumper wires (Female to Female)

Pin Configuration:-

Connect your 4 digit 7 segment display with Raspberry Pi's GPIO Pins.

Board Pin	Function	RPI Physical Pin	Raspberry Function
GND	Ground	14	GND
VCC	+ 5V Power	4	5V
DI0	Data In	18	GPIO 24
CLK	Clock	16	GPIO 23

Step 1: Open terminal and Download Python Script.

```
wget https://raspberrytips.nl/files/tm1637.py
```

Step 2: Write Python Script to display Time and save as 7seg.py

Code.

Step 3: Start the script with following command.

```
python 7seg.py
```



3. Sensor interfacing with Raspberry Pi.

Hardware Requirements:-

- Raspberry Pi Model A/B/B+
- Fingerprint Module
- Serial USB Converter

- Jumper Wires

Pin Configuration:-

Fingerprint Module	USB Serial Converter
5V	5.0 V
GND	GND
TXD	RXD
RXD	TXD

Step 1: Connect fingerprint module to Raspberry Pi USB port by using USB to Serial converter.

Step 2: To install this library, root privileges are required. So login with root user.

```
sudo bash
```

Step 3: Download some required packages using wget command.

```
wget -O - http://apt.pm-codeworks.de/pm-codeworks.de.gpg | apt-key add -  
wget http://apt.pm-codeworks.de/pm-codeworks.list -P  
/etc/apt/sources.list.d/
```

Step 4: Update the Raspberry Pi

```
apt-get update
```

Step 5: Install the downloaded finger print sensor library

```
apt-get install python-fingerprint -yes
```

Step 6: To return to the normal shell (under the Pi user).

```
exit
```

Step 7: Now go to the examples directory.

```
cd /usr/share/doc/python-fingerprint/examples/
```

Step 8: Run example_enroll.py script to store new fingerprint

```
sudo python example-enroll.py
```

Note:

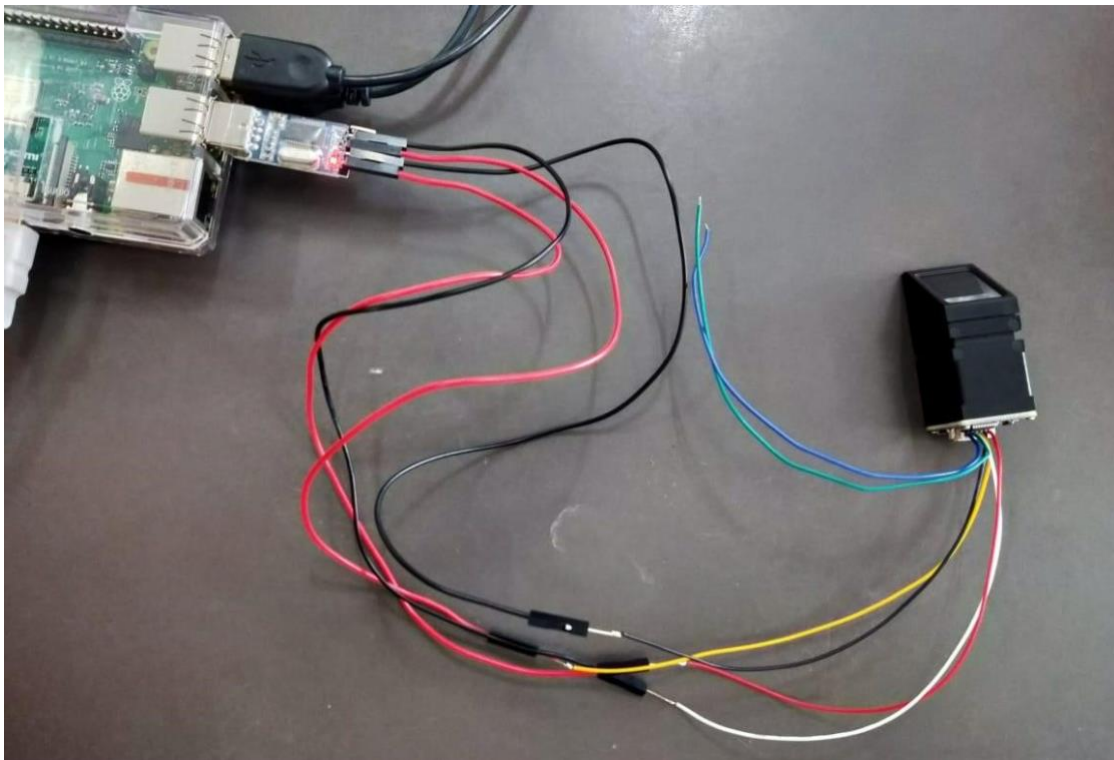
Put your finger on the fingerprint sensor, wait for the instruction in the terminal and remove your finger as soon as it is written there. Afterwards you have to put your finger a second time for the verification and the imprint is stored in the next number.

Step 9: Run example_search.py script to see whether our finger is recognized.

```
sudo python example-search.py
```

Note:

Put the same finger on glass surface. If the fingerprint is detected, it displays found message. If fingerprint is not detected, then gives "No match Found" message.



4. Image with Raspberry Pi and Pi Camera.

Hardware Requirement:

- Raspberry Pi
- Pi Camera

Connection:



Step 1: Write a Python Script to capture images and save them in folder.

```
from time import sleep from picamera import PiCamera
```

```
camera=PiCamera()  
camera.resolution=(1280,720)  
camera.start_preview() sleep(10)  
camera.capture('/home/pi/Pictures/img.jpg')  
camera.stop_preview()
```

Methods used:

- camera.capture() is used to capture the still pictures. Provide Path (where to save) and image name as parameter.
- camera.start_preview() is used to start live display of the camera's input.

5. Record Videos with Raspberry Pi and Pi Camera

Hardware Requirement:

- Raspberry Pi
- Pi Camera

Connection:



Step 1: Write a Python Script to record video and save them in folder.

```
from time import sleep from picamera import PiCamera
```

```
camera=PiCamera() camera.resolution=(1280,720)
camera.start_preview()
camera.start_recording('/home/pi/Videos/video.h264') sleep(10)
camera.stop_recording()
camera.stop_preview()
```

To play the video, need to open a terminal window. Type the command `omxplayer videonme.h264`

And Press Enter to play the video.

Methods used:

- `start_recording()` is used to start the recording of the videos. Provide Path (where to save) and video name as parameter. Raspberry Pi' video supports .ht64 as extension.
- `stop_recording()` is used to stop the recording.

6. Raspberry Pi using Telegram

Hardware Requirements:

- Raspberry Pi Model A/B/B+

- LED
- Breadboard
- Jumper Wires

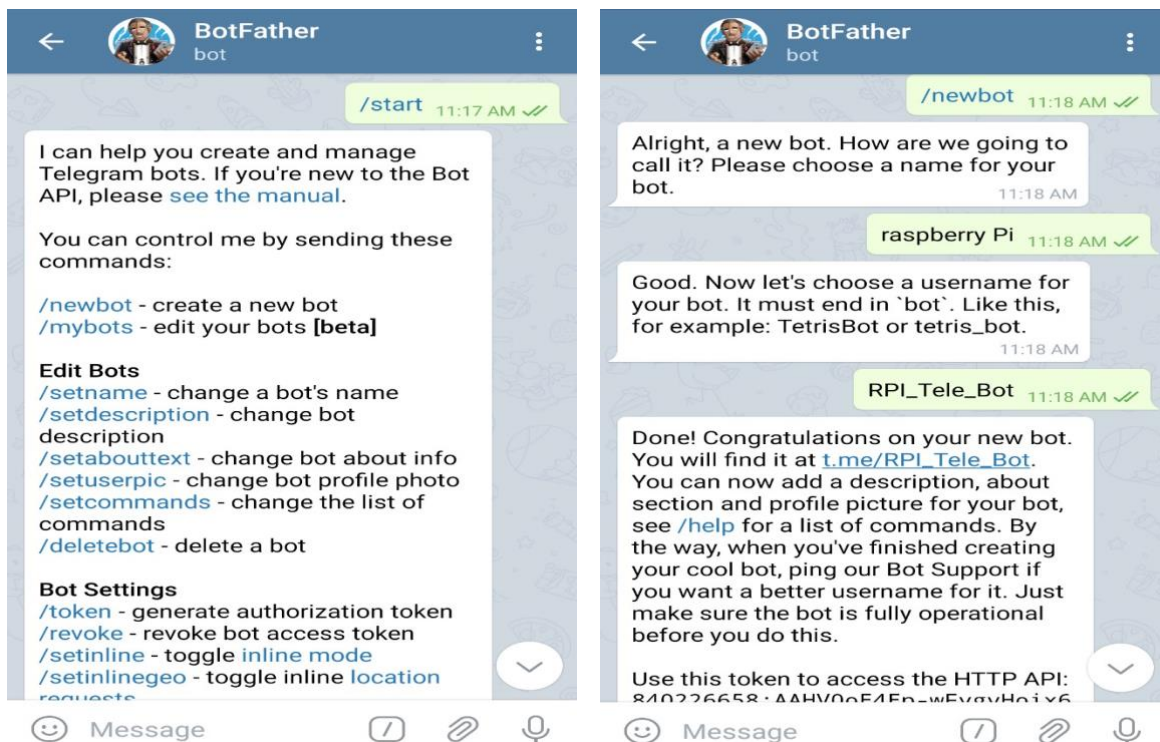
Steps:-

1. Connect LED with Raspberry Pi's GPIO Pins.

LED terminal	Pin Number	GPIO Number
+ve Terminal	Pin 31	GPIO 6
-ve Terminal	Pin 9	GND

2. Install Telegram App in Mobile. Follow process to obtain access token:

- Open Telegram. Request Bot Father to create a new Bot
- Search “Bot Father” and Click on Start.
- Create new bot using /newbot
- Provide a name for your bot (E.g. raspberry pi)
- Then, provide username for your bot (E.g. RPI_Tele_Bot)
- After this process the BotFather will give you a Token for access.



3. Install Telegram Bot on Raspberry Pi `sudo apt-get install python-pip`

`sudo pip install telepot`

Write Python Script to blink LED with Telegram Bot (E.g. tele.py)
Code.

5. Now, run the example code as follows: python
tele.py



7. Pi based Oscilloscope

Hardware Requirements

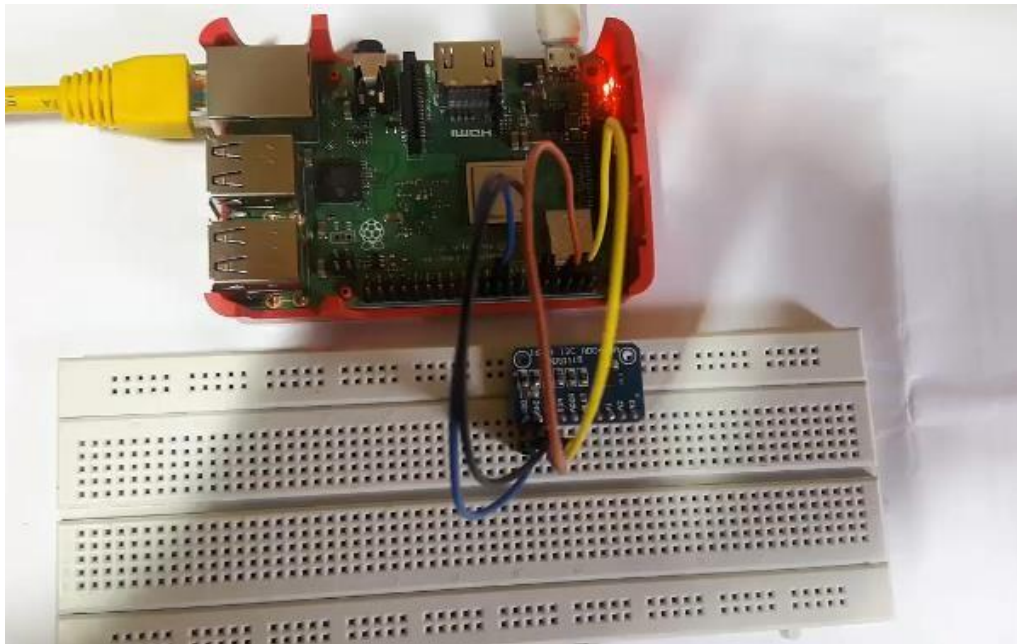
- Raspberry Pi Model A/B/B+
- ADS1115 ADC
- Breadboard
- Jumper Wires

Software Requirements

1. Raspbian Stretch OS
2. Adafruit module for interfacing with the ADS1115 ADC chip
3. Python Module matplotlib used for data visualization

Connect ADC with Raspberry Pi's GPIO

ADS1115 ADC	Pin Number	GPIO Number
VDD	Pin 17	3.3v
GND	Pin 9	GND
SCL	Pin 5	GPIO 3
SDA	Pin 3	GPIO 2



1. Update and Upgrade Raspberry Pi
`sudo apt-get update sudo apt-get upgrade`

2. Enable Raspberry Pi I2C interface
`sudo raspi-config`

3. Install the Adafruit ADS1115
library for ADC `sudo apt-get install
build-essential python-dev python-smbus
git git clone
https://github.com/adafruit/Adafruit_Python_ADS1x15.git sudo python setup.py
install`

5. Install Matplotlib
`sudo apt-get install python-matplotlib`

6. Write python code (Eg- `osci.py`)

Code.

7. Save the code and run using python

osci.py

