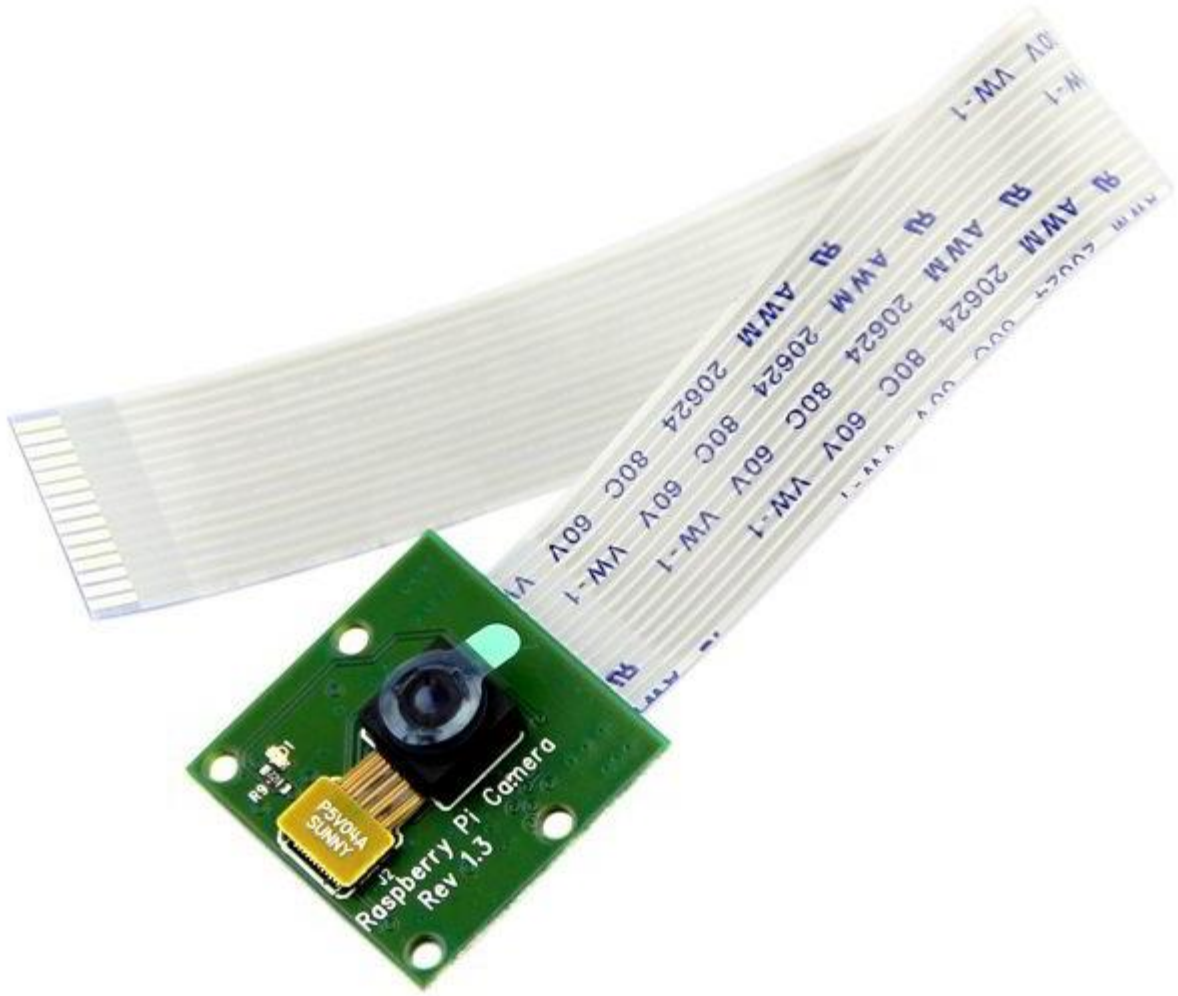
Practical : 8

Pi Camera Module Interface with Raspberry Pi using Python

Introduction



Pi Camera Module (v1.3)

Pi Camera module is a camera which can be used to take pictures and high definition video.

Raspberry Pi Board has CSI (Camera Serial Interface) interface to which we can attach PiCamera module directly.

This Pi Camera module can attach to the Raspberry Pi's CSI port using 15-pin ribbon cable.

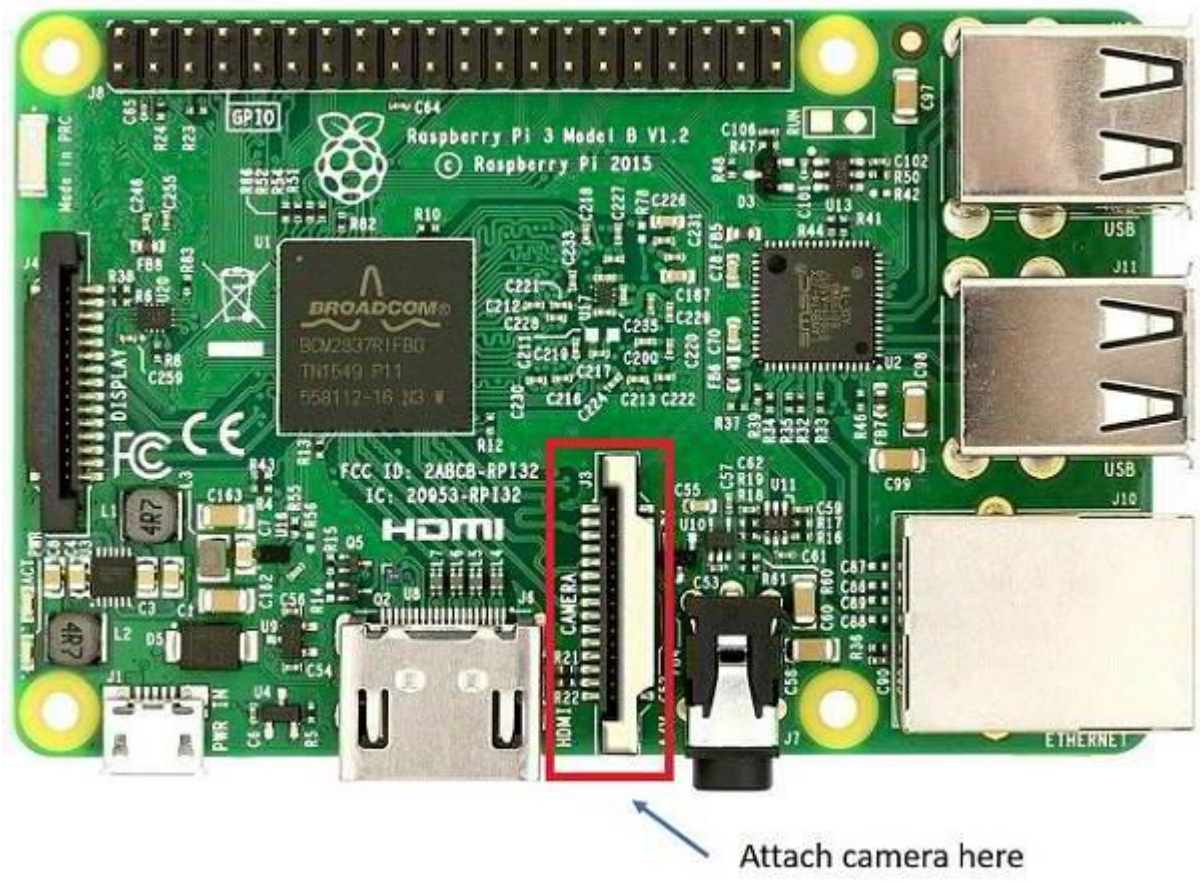
Features of Pi Camera

Here, we have used Pi camera v1.3. Its features are listed below,

- Resolution – 5 MP
- HD Video recording – 1080p @30fps, 720p @60fps, 960p @45fps and so on.
- It Can capture wide, still (motionless) images of resolution 2592x1944 pixels
- CSI Interface enabled.

How to attach Pi Camera to Raspberry Pi?

Connect Pi Camera to CSI interface of Raspberry Pi board as shown below,



Now, we can use Pi Camera for capturing images and videos using Raspberry Pi.

Before using Pi Camera, we need to enable camera for its working.

How to Enable Camera functionality on Raspberry Pi

For enabling camera in Raspberry Pi, open raspberry pi configuration using following command,

```
sudo raspi-config
```

then select **Interfacing options** in which select **camera** option to enable its functionality.

reboot Raspberry Pi.

Now we can access camera on Raspberry Pi.

Now we can capture images and videos using Pi Camera on Raspberry Pi.

Example

Capture images and save it to the specified directory.

We can capture images using Python. Here, we will write a Python program to capture images using Pi Camera on Raspberry Pi.

Here, we have used `picamera` package(library) which provides different classes for Raspberry Pi. Out of which we are mainly interested in `PiCamera` class which is for camera module.

Python Program for Image Capture

```
'''
'''
import picamera
from time import sleep

#create object for PiCamera class
camera = picamera.PiCamera()
#set resolution
camera.resolution = (1024, 768)
camera.brightness = 60
camera.start_preview()
#add text on image
camera.annotate_text = 'Hi Pi User'
sleep(5)
#store image
camera.capture('image1.jpeg')
camera.stop_preview()
```

Functions Used

To use `picamera` python based library we have to include it in our program as given below

```
import picamera
```

This `picamera` library has `PiCamera` class for camera module. So, we have to create object for **PiCamera** class.

PiCamera Class

To use Pi Camera in Python on Raspberry Pi, we can use PiCamera class which has different APIs for camera functionality. We need to create object for PiCamera class.

E.g. `Camera = picamera.PiCamera()`

The above PiCamera class has different member variables and functions which we can access by simply inserting a dot (.) in between object name and member name.

E.g. `Camera.resolution = (1080, 648)`

capture()

It is used to capture images using Pi Camera.

E.g. `Camera.capture("/home/pi/image.jpeg")`

The `capture()` function has different parameters which we can pass for different operations like resize, format, use_video_port, etc.

E.g. `Camera.capture("/home/pi/image.jpeg", resize=(720, 480))`

resolution= (width,height)

It sets the resolution of camera at which image captures, video records and preview will display. The resolution can be specified as **(width, height)** tuple, as a string formatted **WIDTHxHEIGHT**, or as a string containing commonly recognised display resolution name e.g. "HD", "VGA", "1080p", etc.

E.g.

```
Camera.resolution = (720, 480)

Camera.resolution = "720 x 480"

Camera.resolution = "720p"

Camera.resolution = "HD"
```

Annotate_text = "Text"

It is used to add text on image, video, etc.

E.g. `Camera.annotate_text = "Hi Pi User"`

start_preview()

It displays the preview overlay of default or specified resolution.

Example `Camera.start_preview()`

stop_preview()

It is used to close the preview overlay.

E.g. `Camera.stop_preview()`

Note: There are various APIs of PiCamera class. So, to know more API in detail you can refer PiCamera APIs.