Lesson 5 Motion Sensor

Introduction

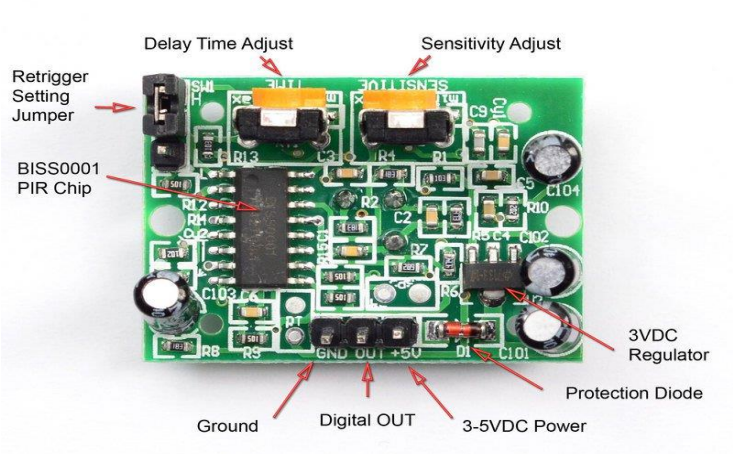
In this project, we will see how to implement a PIR Motion Sensor using Raspberry Pi by learning how to interface a PIR Sensor with Raspberry Pi. In this project, when the PIR Sensor detects any human motion, an LED is turned ON.

Component Required

- Raspberry Pi 3 Model B
- PIR Sensor
- LED
- Connecting Wires
- Mini Breadboard
- Power Supply

Principle

The PIR Sensor used in this project consists of a Pyroelectric Infrared Sensor, BISS0001 PIR Motion Detector IC, Fresnel lens and a few other components.
For connections, the PIR Sensor has three pins namely VCC, DATA and GND. Also, the PIR Sensor has two potentiometers: one for adjusting the sensitivity of the sensor (or rather the sensing distance of the sensor) and the other for adjusting the time for which the Output stays high upon detecting any human movement.
The Fresnel lens covering the Pyroelectric Sensor play an important role in focusing the infrared energy onto the sensor. With the help of this lens, the PIR Sensor can detect objects in 120^0 angle. The range of the sensor is 8 meters i.e. it can detect human movement up to 8 meters.



PIR Sensor Adjustments

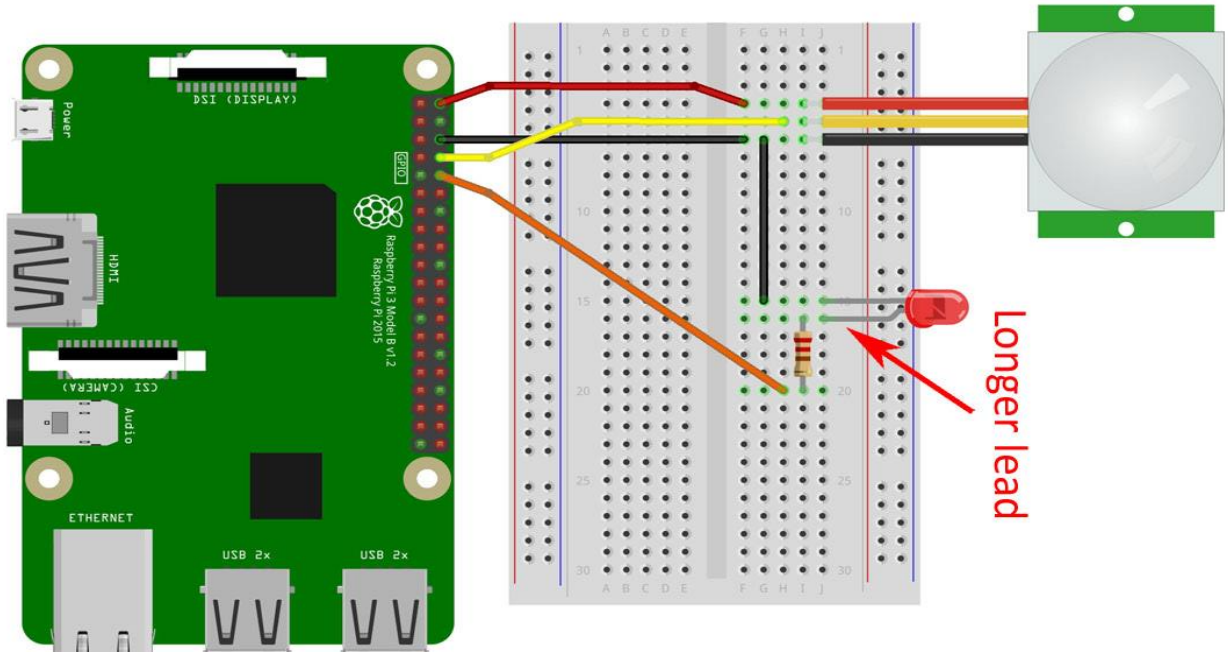
As mentioned earlier, there are two potentiometers for manually adjusting the sensitivity and output timing.
With the help of the first potentiometer, you can adjust the Sensitivity i.e. the Sensing Distance

of the PIR Sensor. The range can be adjusted from 3 meters up to 8 meters. To increase the sensing distance, turn the POT in clockwise direction and to decrease, turn it in anti-clockwise direction.

Coming to the second potentiometer, you can adjust the duration for which the Output of the PIR Sensor stays HIGH. It can be varied anywhere between 0.3s to 600s. To increase the time, turn the POT in clockwise direction and in anti-clockwise direction to decrease the time.

Hardware Setup

Connect the VCC and GND pins of the PIR Motion Sensor to +5V and GND pins of the Raspberry Pi. Connect the DATA Pin of the PIR Sensor to GPIO14 i.e. Physical Pin 8 of the Raspberry Pi. An LED is connected to GPIO15 i.e. Physical Pin 10 of the Raspberry Pi. The other pin of the LED is connected to GND.



Python Coding

```
import RPi.GPIO as GPIO

import time

sensor = 8

led = 10

GPIO.setmode(GPIO.BOARD)

GPIO.setup(sensor,GPIO.IN)
```

```
GPIO.setup(led,GPIO.OUT)

GPIO.output(led,False)

print "Initializing PIR Sensor......"

time.sleep(12)

print "PIR Ready..."

print " "

try:

   while True:

      if GPIO.input(sensor):

          GPIO.output(led,True)

          print "Motion Detected"

          while GPIO.input(sensor):

              time.sleep(0.2)

      else:

          GPIO.output(led,False)

except KeyboardInterrupt:

    GPIO.cleanup()
```

Output

The working of the PIR Motion Sensor using Raspberry Pi is very simple. If the PIR Sensor detects any human movement, it raises its Data Pin to HIGH.
Raspberry Pi upon detecting a HIGH on the corresponding input pin, will turn ON the LED.

Application

- Human body detection
- Object Movement detection