

Lesson 4 IR Sensor

Introduction

In this tutorial we will learn how we can **Interface an IR sensor with Raspberry pi**. These sensors are most commonly use in small robots like [line follower robot](#), [Edge avoiding robot](#) etc.. Simply putting, it can detect the presence of objects before it and also differentiate between white and black color.

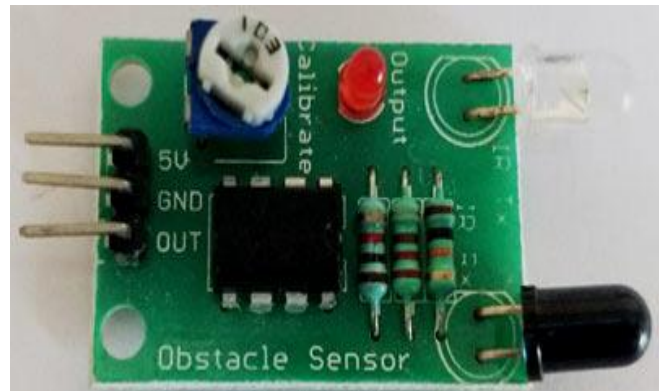
So, let's learn how to interface this sensor with Raspberry Pi. In this project, when there is no object in front of IR sensor then the Red LED remains turned on and soon as we put something in front of IR sensor then red LED turns off and Green LED turn on. This circuit can also serve as [Security Alarm Circuit](#).

Components Required

- Raspberry Pi 3 (any model)
- IR sensor Module
- Green and Red LED lights
- Breadboard
- Connecting wires

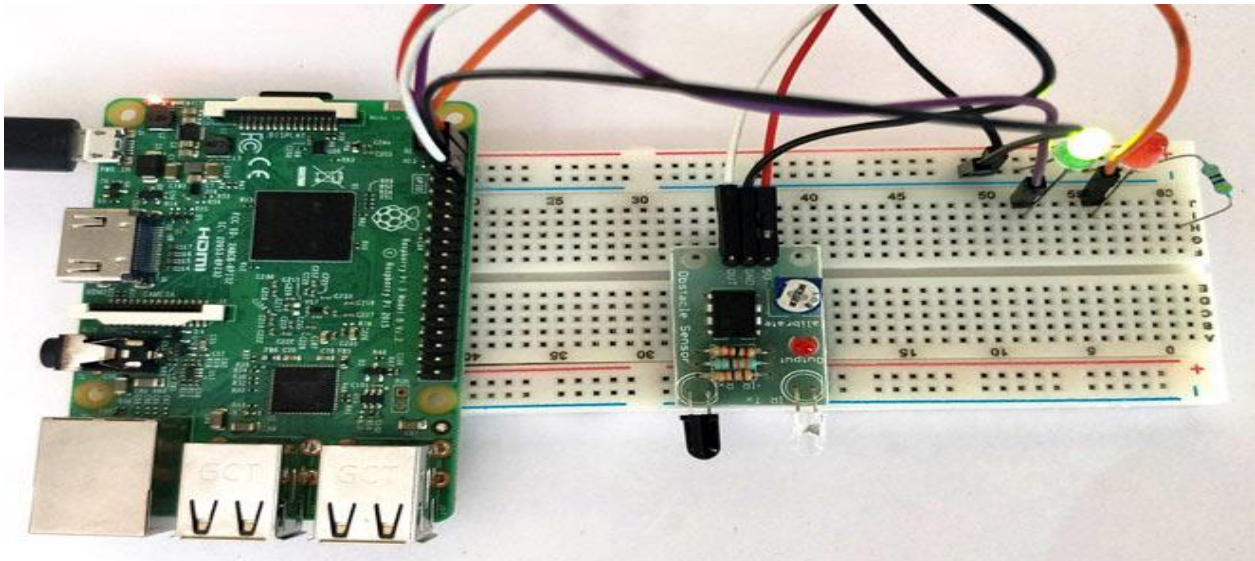
Principle

IR sensors (Infrared sensor) are modules which detect the presence of objects before them. If the object is present it gives 3.3V as output and if it is not present it gives 0 volt. This is made possible by using a pair of **IR pair** (transmitter and receiver), the **transmitter (IR LED)** will emit an IR ray which will get reflected if there is an object present before it. This IR ray will be received back by the **receiver (Photodiode)** and the output will be made high after amplified using an op-amp link **LM358**. You can learn more about [IR Sensor Module Circuit](#) here.



Hardware Setup

The IR Sensor used in this project is shown above. Like all IR sensor it has three pins which are 5V, Gnd and Out respectively. The module is powered by the 5V pin from Raspberry Pi and the out pin is connected to GPIO14 of Raspberry Pi. The potentiometer on top of the module can be



used to adjust the range of the IR sensor.

Python Coding

```
import RPi.GPIO as IO
import time

IO.setwarnings(False)
IO.setmode(IO.BCM)

IO.setup(2,IO.OUT) #GPIO 2 -> Red LED as output
IO.setup(3,IO.OUT) #GPIO 3 -> Green LED as output
IO.setup(14,IO.IN) #GPIO 14 -> IR sensor as input
#Connect all GND to pin 6 on pi

while True:

    if(IO.input(14)==True): #object is far away

        IO.output(2,True) #Red led ON

        IO.output(3,False) # Green led OFF

    if(IO.input(14)==False): #object is near

        IO.output(3,True) #Green led ON

        IO.output(2,False) # Red led OFF
```

Output

You should also see the red color LED going high when there is no object in front of the sensor as shown in hardware setup.

Now, bring something close to the IR led and you should notice the red LED turning off and the Green turning on.

Application

- **The human body detection for Security**
- Object Detection
- Black and White color detection for line follower Bot