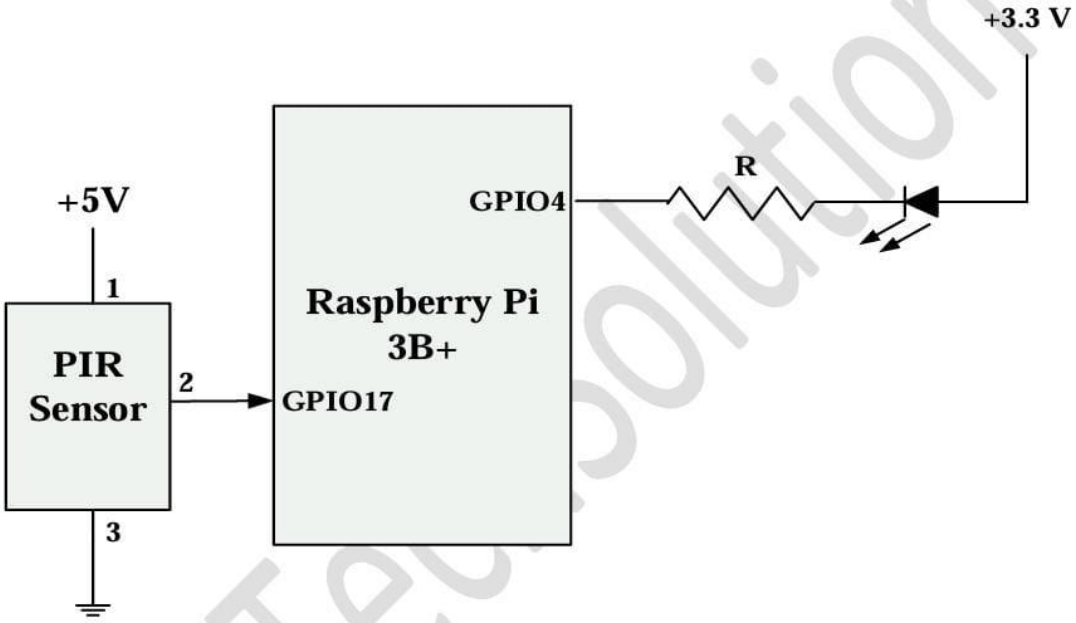
Assignment No: 1

Circuit Diagram:

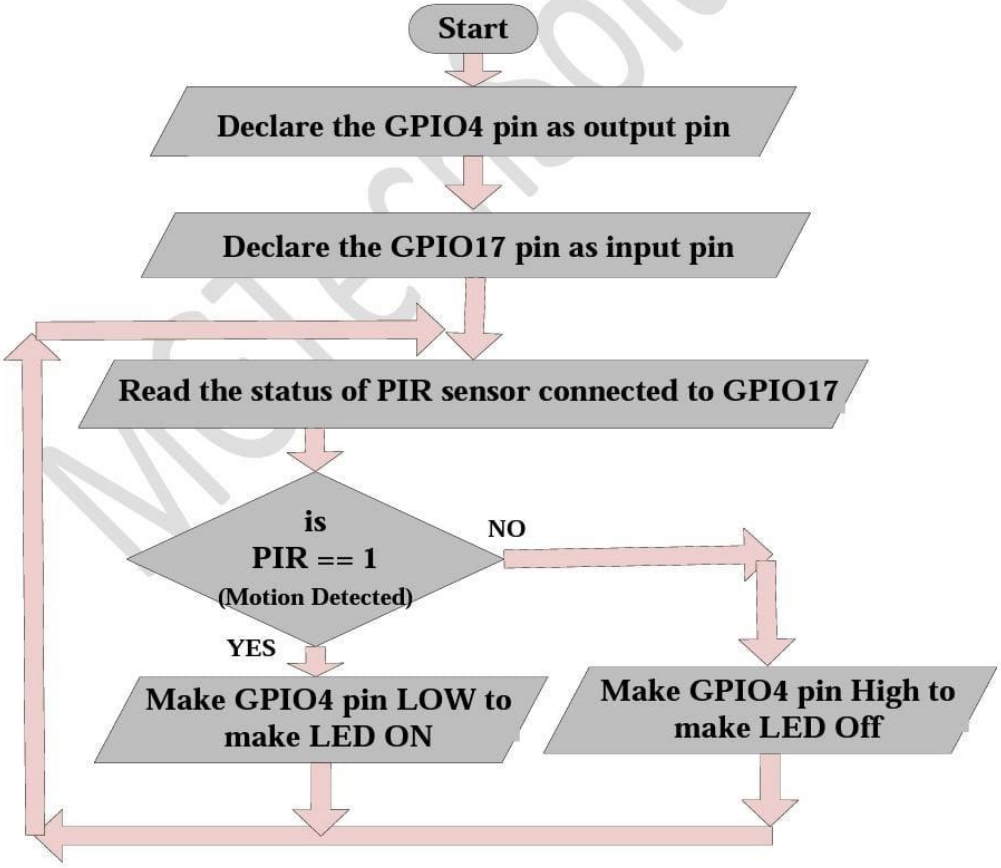


Theory:

A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors. PIR sensors are commonly used in security alarms and automatic lighting applications. PIR sensors detect general movement, but do not give information on who or what moved.

A PIR sensor can detect changes in the amount of infrared radiation impinging upon it, which varies depending on the temperature and surface characteristics of the objects in front of the sensor. When an object, such as a person, passes in front of the background, such as a wall, the temperature at that point in the sensor's field of view will rise from room temperature to body temperature, and then back again. The sensor converts the resulting change in the incoming infrared radiation into a change in the output voltage, and this triggers the detection. Objects of similar temperature but different surface characteristics may also have a different infrared emission pattern, and thus moving them with respect to the background may trigger the detector as well.

Flowchart:

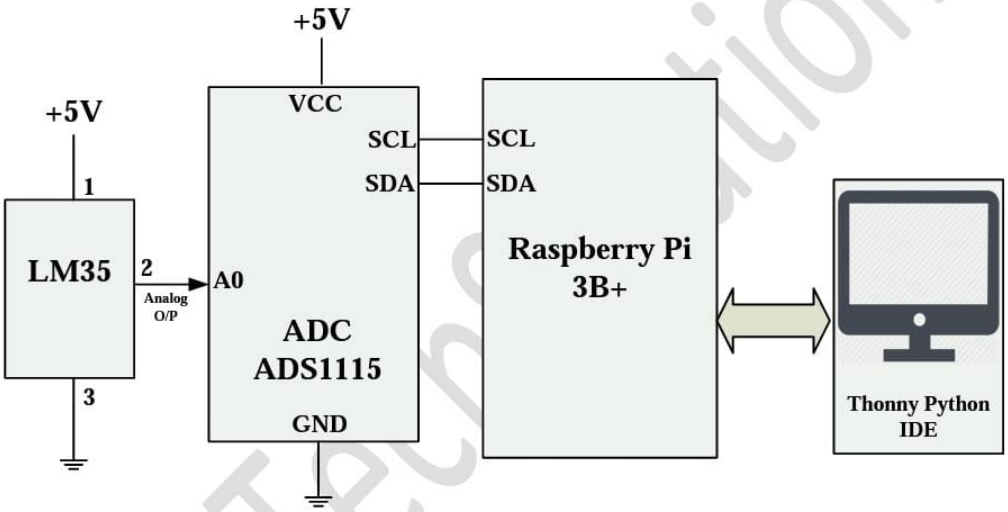

Start
Declare the GPIO4 pin as output pin
Declare the GPIO17 pin as input pin
Read the status of PIR sensor connected to GPIO17
is
PIR == 1
(Motion Detected)
NO
YES
Make GPIO4 pin LOW to make LED ON
Make GPIO4 pin High to make LED Off

Program:

```
import RPi.GPIO as GPIO
import time

GPIO.setmode(GPIO.BCM)
GPIO.setup(17, GPIO.IN)
GPIO.setup(4, GPIO.OUT)

while True:
  button_state = GPIO.input(17)
  if  button_state == True:
     GPIO.output(4, False)
     print('Motion Detected...')
     while GPIO.input(17) == True:
     time.sleep(0.2)

  else:
     GPIO.output(4, True)
```

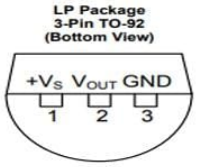

Assignment No: 2

Circuit Diagram:



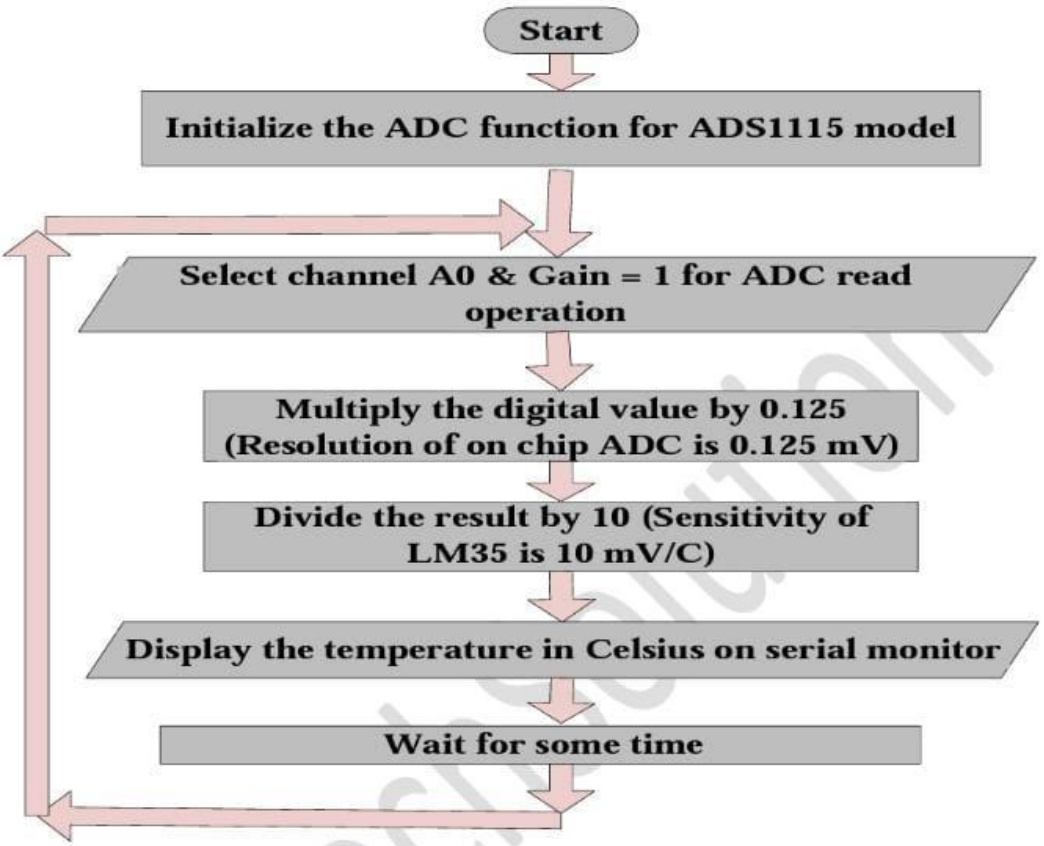
Theory:

The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly proportional to the Centigrade temperature. The LM35 device does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full −55°C to 150°C temperature range. Lower cost is assured by trimming and calibration at the wafer level. The low-output impedance, linear output, and precise inherent calibration of the LM35 device makes interfacing to readout or control circuitry especially easy. This sensor has sensitivity of 10mv/oC, operates from 4 V to 30 V.



Pin Diagram of LM 35 Sensor

Flowchart:



Program:

```
import time
import Adafruit_ADS1x15
adc = Adafruit_ADS1x15.ADS1115()
GAIN = 1
while True:
  values = [0]*1
  for i in range(1):
    values[i] = adc.read_adc(i, gain=GAIN)
    temp = values[i] * 0.125
    temp = temp / 10

  print('Analog o/p = {0:>6}'.format(*values))
```

```
  print('Temp. in C = {0:>6}'.format(temp))
  time.sleep(2)
```

Assignment No: 3

```
import RPi.GPIO as GPIO
import picamera
from time import sleep
GPIO.setwarnings(False)
GPIO.setmode(GPIO.BCM)
GPIO.setup(17, GPIO.IN, pull_up_down=GPIO.PUD_UP)
GPIO.setup(4, GPIO.IN, pull_up_down=GPIO.PUD_UP)
#create object for PiCamera class
camera = picamera.PiCamera()
#set resolution
camera.resolution = (1024, 768)
camera.brightness = 60
#store image
while True:
    button_state2 = GPIO.input(4)
    if  button_state2 == False:
        camera.start_preview()
        #add text on image
        camera.annotate_text = 'Hi Pi User'


    button_state1 = GPIO.input(17)
    if  button_state1 == False:
        camera.capture('image4.jpeg')
        camera.stop_preview()
```