

**DEPARTMENT OF
ELECTRONICS AND COMMUNICATION ENGINEERING
College of Engineering and Technology
SRM Institute of Science and Technology**

MINI PROJECT REPORT

ODD Semester, 2022-2023

Lab code & Sub Name : **18ECO109J- EMBEDDED SYSTEM USING RASPBERRY PI**

Year & Semester : 3rd Year / 5th Semester

Project Title : Motion Detection using PIR Sensor

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Particulars	Max. Marks	Marks Obtained
		Name:
		Register No :
Program and Execution	20	
Demo verification & viva	15	
Project Report	05	
Total	40	

MOTION DETECTION USING PIR SENSOR

OBJECTIVE:

To build a system using a PIR sensor to detect the motion of a human being.

ABSTRACT:

The objective of this project is to develop a motion sensor based on a Passive Infra-Red (PIR). This project aims to build a sensor system which can transmit and receive the signal. This project is about motion detection using Infra-Red sensor in wirelessly. Besides that, it also acted as an auto power switching system. When the sensor is triggered, the signal will transmit wirelessly to take further action. For this project, we relate this sensor system with an auto power light switching system. Which means when the sensor is triggered, light in a room will automatically switch ON. In order to transmit the signal wirelessly, this project will use a radio frequency module to transmit the signal. For the controller circuit part, this project will use Programmable Interface Controller (PIC) to control the circuit, because it is cheaper and easier to program. The objective of this project is tending to switch ON the light automatically and fan based on the temperature. Besides that, signal transmit wirelessly can avoid the circuit malfunction because of the wire broken. After doing some research from the internet and advice from the lecturer, tools and equipment are identified to complete the project. Current temperature will show on a LCD display.

INTRODUCTION:

Motion detection using a PIR sensor circuit can be used for providing security to home, shopping malls etc, as the PIR sensor used in this system detects the motion of humans around this circuit. With the help of a RaspberryPi, we can identify the motion of a human which was detected by the sensor. This system can be used at any place where security is needed. Security is needed by everyone in society now-a-days to protect their property or confidential information from others which is sensor sense a human motion and then transmit the signal wirelessly. However, this project will relate to auto power ON light and fan system. When the sensor senses a human motion in the sensor's detection area, sensor will be triggered and then the room's light will automatically switch ON. It is useful for us when we cannot find the switch in the dark condition. For the fan's function, it is depends on the room temperature, when the temperature is higher, fan will run when the PIR had detect motion in the detection area. When the room temperature is low, fan will not run. Degree of temperature is measure by the temperature sensor and temperature will show on a LCD display (2x16). Light and fan will automatically OFF when the user was going out from the room. As long as PIR sensor does not detect motion in the detection area, light and fans are not function and the fan is depends on the room temperature. Once the sensor is triggered, system will have around 2 minutes to run the function. After 2 minutes and sensor does not detect any motion, light and fans will be switched OFF automatically

HARDWARE/SOFTWARE REQUIREMENTS:

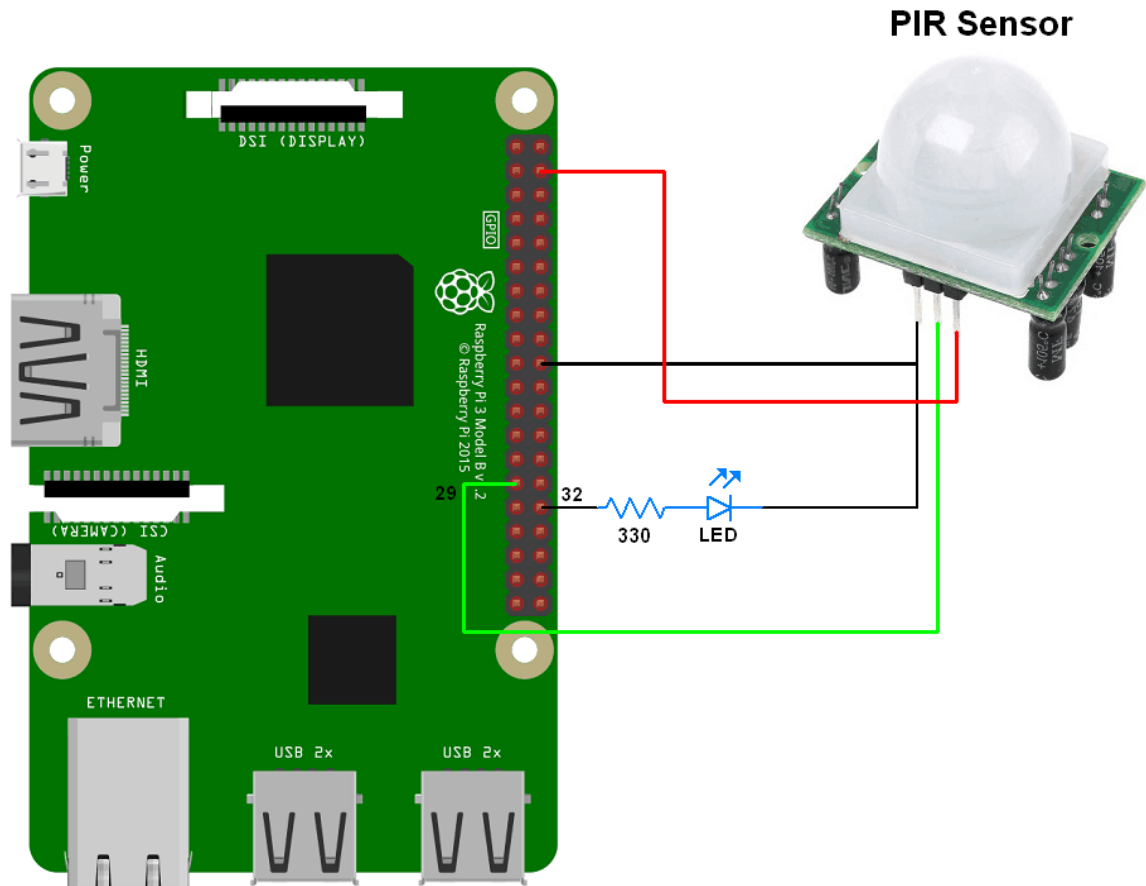
Hardware-

- Raspberry Pi
- PIR Sensor
- Bread board
- Connecting cable
- Resistor

Software

- Python 3
- GPIO Module
- Time module

BLOCK DIAGRAM



CONCEPTS/WORKING PRINCIPLE

The passive infrared sensor does not radiate energy to space. It receives the infrared radiation from the human body to make an alarm. Any object with temperature is constantly radiating infrared rays to the outside world. The surface temperature of the human body is between 36°C - 27°C and most of its radiant energy is concentrated in the wavelength range of $8\text{ }\mu\text{m}$ - $12\text{ }\mu\text{m}$.

Passive infrared alarms classified into **infrared detectors** (infrared probes) and alarm control sections. The most widely used infrared detector is a pyroelectric detector. It uses as a sensor for converting human infrared radiation into electricity. If the human infrared radiation is directly irradiated on the detector, it will, of course, cause a temperature change to output a signal. But in doing all this, the detection distance will not be more. In order to lengthen the detection distance of the detector, an optical system must be added to collect the infrared radiation. Usually, plastic optical reflection

systems or plastic **Fresnel lens** used as a focusing system for infrared radiation.

In the detection area, the lens of the detector receives the infrared radiation energy of the human body through the clothing and focused on the pyroelectric sensor. When the human body moves in this surveillance mode, it enters a certain field of view in sequence and then walks out of the field of view. The **pyroelectric sensor** sees the moving human body for a while and then does not see it, so the infrared radiation of human body constantly changes the temperature of the pyroelectric material. So that it outputs a corresponding signal, which is the alarm signal.

PROGRAMS:

```
import RPi.GPIO as GPIO
import time

GPIO.setwarnings(False)
GPIO.setmode(GPIO.BOARD)
GPIO.setup(11, GPIO.IN)      #Read output from PIR motion sensor
GPIO.setup(3, GPIO.OUT)     #LED output pin

while True:
    i=GPIO.input(11)
    if i==0:                  #When output from motion sensor is LOW
        print("No Motion",i)
        GPIO.output(3, 0)    #Turn OFF LED
        time.sleep(0.5)
    elif i==1:                #When output from motion sensor is HIGH
        print("Motion detected",i)
        GPIO.output(3, 1)    #Turn ON LED
        time.sleep(0.3)
```

ALGORITHM:

- import Rpi.GPIO as GPIO and time
- Assign required variables
- Setmode to GPIO.BOARD
- Set pins to input and output as per requirement
- Declare variables
- Give GPIO.output(led2, GPIO.HIGH)
- if input is false
 - No motion

REALISTIC CONSTRAINTS:

- Due to the absence of RaspberryPI instruments cannot implement it on device.
- Due to the absence of the PIR sensor unable to test it on RaspberryPi board.

CONCLUSIONS:

Hereby we come to an end of our project “MOTION DETECTOR USING PIR SENSOR”. This project gives us an idea to detect the motion. This project can be used anywhere either at home or offices. This is also cost efficient. Thus by this attempt our circuit can be used as a protecting device and can be used for security also. It can be used as a kind of antitheft device. It is very much cost efficient and can be used easily and efficiently.

REFERENCES:

- <https://www.azosensors.com/article.aspx?ArticleID=382>
- <https://www.techwalla.com/articles/how-does-a-motion-sensor-work>
- <https://media.digikey.com/pdf/Data%20Sheets/Panasonic%20Electric%20Works%20PDFs/AMN%20Design%20Manual.pdf>