Home Security using PIR and Raspberry PI Gateway.

**Aim:**
To detect the movement using Passive Infrared (PIR) sensor using Raspberry pi board using Python for home security system

**Task:**
Construct a “Motion Detector” using PIR sensor and Raspberry pi board using Python near the doorstep/Intruder detection using pir sensor and raspberry pi microcontroller.

Abstract :

In recent years, the proliferation of smart home technologies has led to an increased demand for robust and intelligent security solutions. This paper introduces a novel approach to home security through the integration of Passive Infrared (PIR) sensors with a Raspberry Pi gateway. PIR sensors are employed as an effective means of intruder detection due to their ability to detect changes in infrared radiation within their field of view.

The proposed system utilizes PIR sensors strategically placed around the perimeter of a home, forming a comprehensive network that constantly monitors for any movement. Upon detecting a potential intrusion, the PIR sensors send real-time signals to a Raspberry Pi gateway, which serves as the central processing unit for the entire security system.

The Raspberry Pi gateway processes the incoming data, analyzes patterns of movement, and triggers appropriate security measures in response to a verified threat. These measures may include activating alarms, notifying homeowners through mobile applications, or interfacing with other smart home devices for an integrated response.

Furthermore, the integration of the Raspberry Pi gateway adds a layer of versatility to the system, allowing users to customize and expand the security features based on their specific needs. The gateway can also facilitate remote monitoring and control, enabling homeowners to manage their security system from anywhere with an internet connection.

The experimental results demonstrate the effectiveness of the proposed PIR sensor-based intruder detection system, showcasing its ability to accurately identify and respond to potential security breaches. The integration with a Raspberry Pi gateway not only enhances the system's intelligence but also provides a flexible platform for future advancements in smart home security. This research contributes to the ongoing efforts in developing cost-effective and scalable solutions for ensuring the safety and well-being of homeowners in the era of smart living.

Working :

The working of the PIR sensor-based intruder detection system integrated with a Raspberry Pi gateway involves several key steps:

1 )PIR Sensor Detection:

Passive Infrared (PIR) sensors are strategically placed around the perimeter of the home. These sensors detect changes in infrared radiation within their designated field of view.

PIR sensors are designed to be highly sensitive to the heat radiated by living organisms, such as humans. When an intruder enters the monitored area, the sensor detects the change in infrared radiation and triggers an event.

2) Signal Transmission:

Upon detecting a potential intrusion, the PIR sensor sends a signal to the Raspberry Pi gateway. This signal typically includes information about the location and nature of the detected movement.

3 )Raspberry Pi Gateway Processing:

The Raspberry Pi serves as the central processing unit for the security system. It receives the signals from the PIR sensors and processes the incoming data.

The processing involves analyzing the patterns of movement, checking for consistency across multiple sensors to reduce false alarms, and determining the severity of the potential threat.

4 )Decision Making:

Based on the analysis, the Raspberry Pi gateway makes decisions regarding the appropriate security measures to be taken. This can include sounding alarms, sending notifications to homeowners through mobile applications, or activating other integrated security devices.

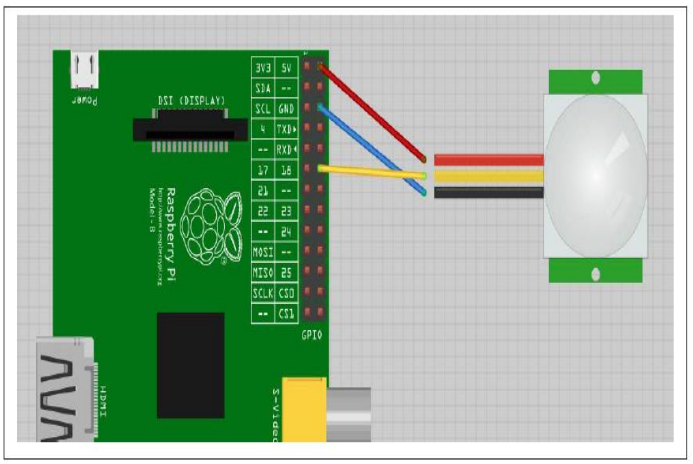
5 )Security Measures:

The system is designed to trigger security measures in response to a verified threat. Alarms can be activated to alert the occupants and potentially scare off intruders. Notifications can be sent to homeowners via mobile apps, providing real-time information about the security breach.

6) Integration with Smart Home Devices:

The Raspberry Pi gateway can be integrated with other smart home devices. For example, it may interface with smart locks to initiate lockdown procedures or turn on smart lighting to deter intruders.

**Pin & Circuit Diagram:**


## Algorithm:

step 1-Make hardware connections to the specified GPIO pins (pin 11 for the PIR sensor and pin 3 for the output)

step 2 - Import necessary libraries (RPi.GPIO for controlling GPIO pins and time for time-related functions).

step 3 -Disable warnings from the GPIO library, which can be useful to avoid unnecessary console output.

step 4-Set the GPIO mode to use board pin numbering (GPIO.BOARD). This makes it easier to refer to pins by their physical numbers on the Raspberry Pi board.

step 5-Set up GPIO pin 11 as an input with a pull-down resistor. The pull-down resistor is used to ensure that the input is grounded when the PIR sensor is not active.

step 6-Set up GPIO pin 3 as an output, which can be used to control an external device, like an LED.

step 7-Start an infinite loop to continuously monitor the input from the PIR sensor.

step 8 -Read the value of pin 11 (0 or 1), which indicates whether motion is detected or not.

If no motion is detected (i == 0), print a message, turn off the output (e.g., an LED), and wait for 3 seconds.

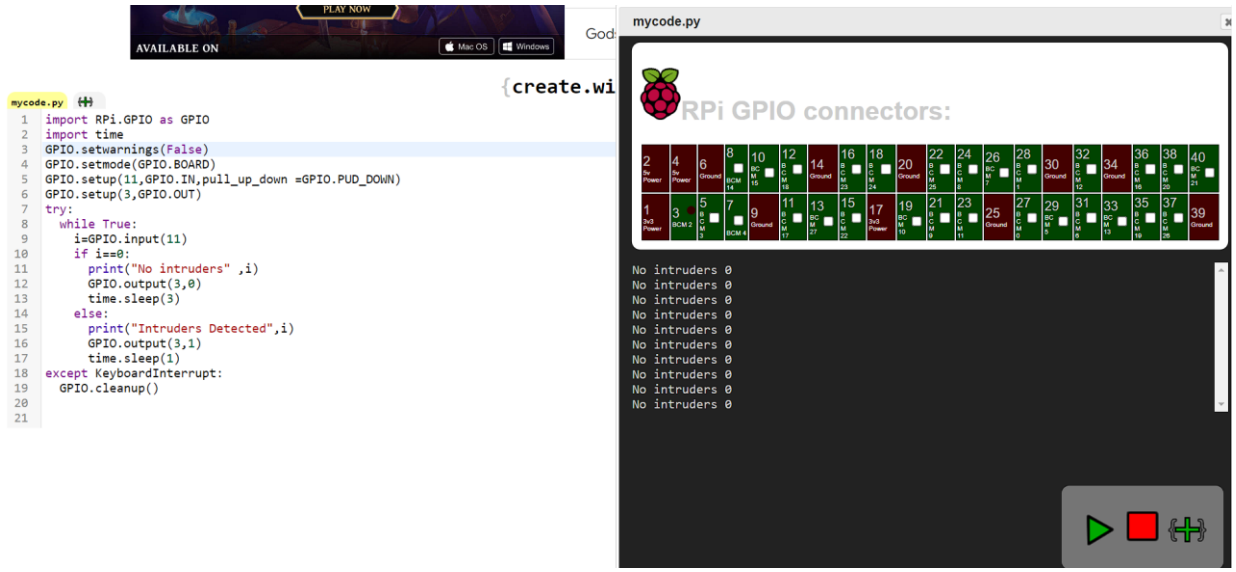
If motion is detected (i == 1), print a message, turn on the output, and wait for 1 second.

**Program:**

```
import RPi.GPIO as GPIO
import time
GPIO.setwarnings(False)
GPIO.setmode(GPIO.BOARD)
GPIO.setup(11,GPIO.IN,pull_up_down =GPIO.PUD_DOWN)
GPIO.setup(3,GPIO.OUT)
try:
  while True:
    i=GPIO.input(11)
    if i==0:
      print("No intruders" ,i)
      GPIO.output(3,0)
      time.sleep(3)
    else:
      print("Intruders Detected",i)
      GPIO.output(3,1)
      time.sleep(1)
except KeyboardInterrupt:
  GPIO.cleanup()
```

**Output:**

Simulation:


PLAY NOW
AVAILABLE ON
Mac OS
Windows
{create.wi
mycode.py
1 import RPi.GPIO as GPIO
2 import time
3 GPIO.setwarnings(False)
4 GPIO.setmode(GPIO.BOARD)
5 GPIO.setup(11,GPIO.IN,pull_up_down =GPIO.PUD_DOWN)
6 GPIO.setup(3,GPIO.OUT)
7 try:
8 while True:
9 i=GPIO.input(11)
10 if i==0:
11 print("No intruders" ,i)
12 GPIO.output(3,0)
13 time.sleep(3)
14 else:
15 print("Intruders Detected",i)
16 GPIO.output(3,1)
17 time.sleep(1)
18 except KeyboardInterrupt:
19 GPIO.cleanup()
20
21
mycode.py
RPi GPIO connectors:
No intruders 0
No intruders 0
No intruders 0
No intruders 0
No intruders 0
No intruders 0
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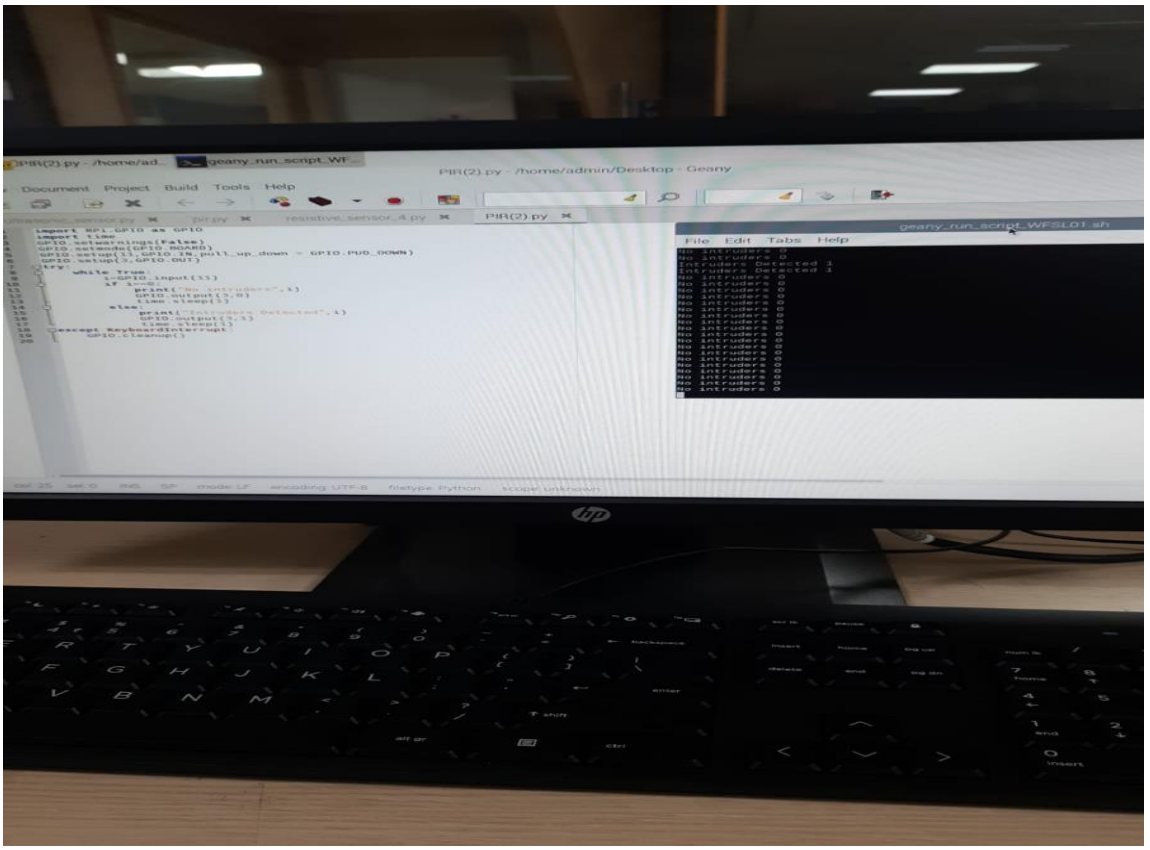
No intruders 0

Hardware :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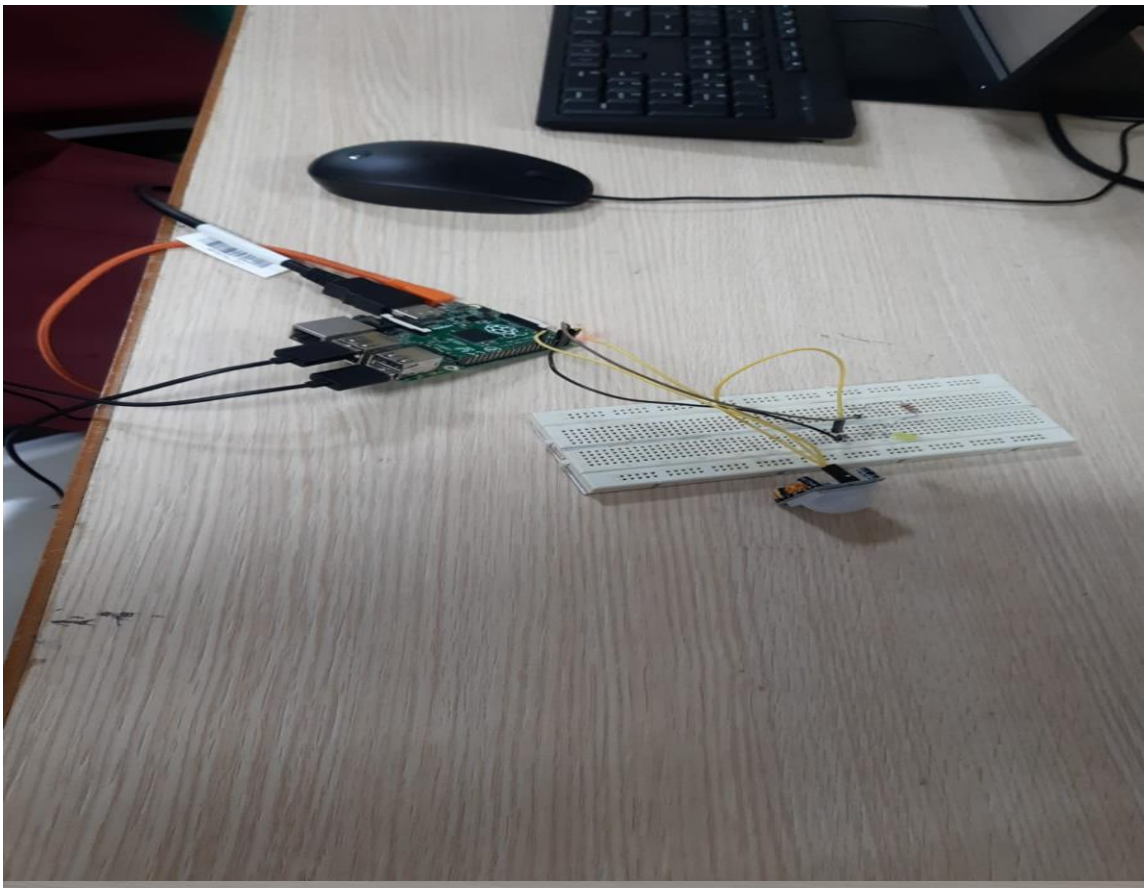
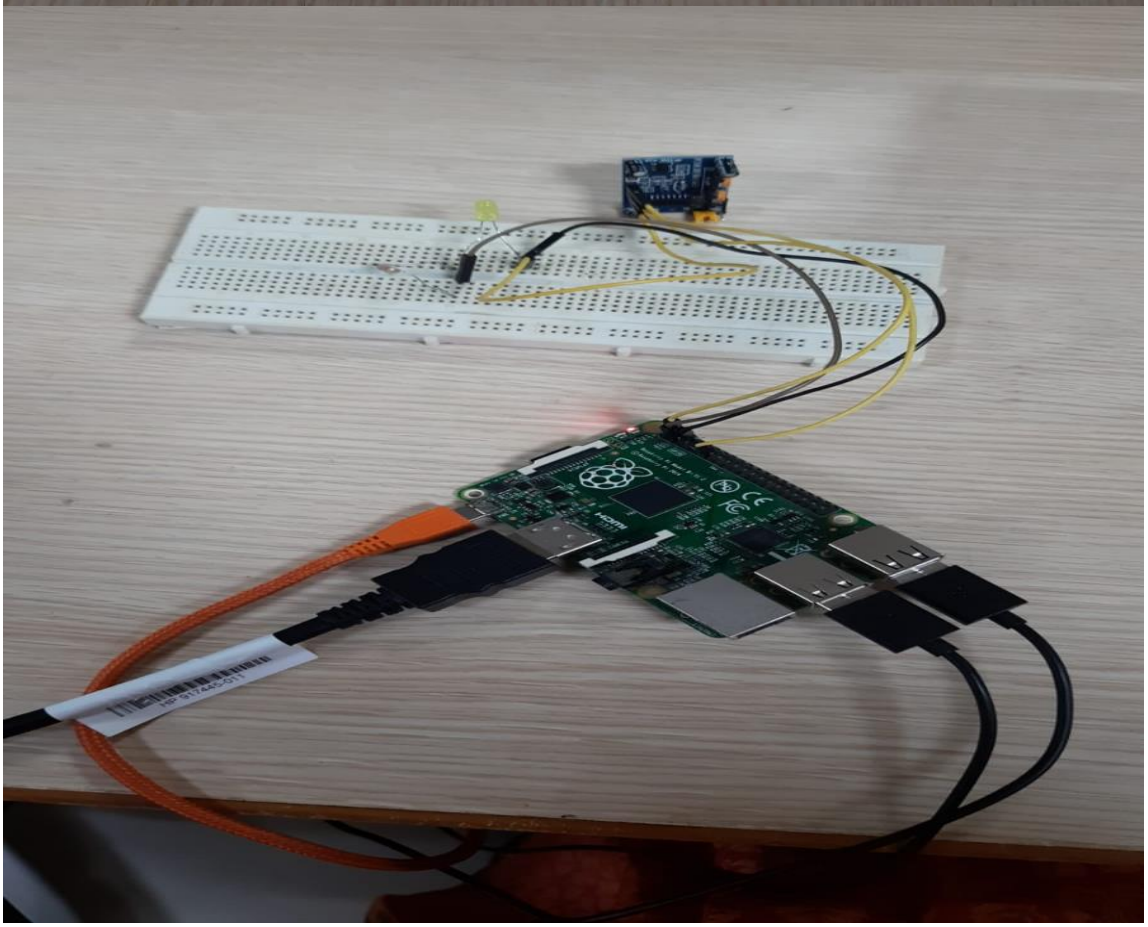
Document Project Build Tools Help
geany_run_script_WFSL01.sh
File Edit Tabs Help





**Result : Home Security using PIR sensor has been established.**