PIR SENSOR

PASSIVE INFRARED SENSOR (PIR) :

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 detector.

OPERATING PRINCIPLES :

All objects with a temperature above absolute zero emit heat energy in the form of radiation. Usually this radiation isn't visible to the human eye because it radiates at infrared wavelengths, but it can be detected by electronic devices designed for such a purpose. The term *passive* in this instance refers to the fact that PIR devices do not generate or radiate energy for detection purposes. They work entirely by detecting infrared radiation (radiant heat) emitted by or reflected from objects.

PIR-BASED MOTION DETECTOR :

A PIR-based motion detector is used to sense movement of people, animals, or other objects. They are commonly used in burglar alarms and automatically-activated lighting systems. They are commonly called simply "PIR", or sometimes "PID", for "passive infrared detector" for passive infrared .

OPERATION :

An individual PIR sensor detects 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 human, 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.

PIN CONFIGURATION :

PIN NUMBER	PIN NAME	DESCRIPTION
1	vcc	Input voltage is +5V for typical applications. Can range from (4.5V – 12V).
2	High/low ouput (dout).	Digital pulse high (3.3V) when triggered (motion detected) digital low(0V) when idle(no motion detected.
3	Ground	Connected to ground of circuit.

PIR SENSOR FEATURES :

- Wide range on input voltage varying from 4.V to 12V (+5V recommended).
- Output voltage is High/Low (3.3V TTL) .
- It Can distinguish between object movement and human movement .
- It Has to operating modes - Repeatable(H) and Non- Repeatable(H) .
- Cover distance of about 120° and 7 meters .
- Low power consumption of 65mA .
- Operating temperature from -20° to +80° Celsius .

REPEATABLE(H) MODE :

In Repeatable(H) mode the output pin Dout will go high (3.3V) when a person is detected within range and goes low after a particular time (time is set by “Off time control” potentiometer). In this mode the output pin will go high irrespective of whether the person is still present inside the range or has left the area. The sensitivity can be set using the “sensitivity control” potentiometer.

NON- REPEATABLE(L) MODE :

In “ l “ mode the output pin Dout will go high (3.3V) when a person is detected within range and will stay high as long as he/she stays within the limit of the Sensors range. Once the person has left the area the pin will go low after the particular time which can be set using the potentiometer. The sensitivity can be set using the “sensitivity control” potentiometer.

PYROELECTRIC SENSOR AND FRESNEL LENSES :

There are two important materials present in the sensor one is the pyroelectric crystal which can detect the heat signatures from a living organism (humans/animals) and the other is a Fresnel lenses which can widen the range of the sensor. Yes the white colour things is just a lense that is used to widen the range of the sensor, if you remove the lense you can find the Pyroelectric sensor inside it covered inside a protective metal casing.

PIR Sensor Applications :

- Automatic Street/Garage/Warehouse or Garden Lights .
- Burglar Alarms .
- Security cams as motion detectors .
- Industrial Automation Control.