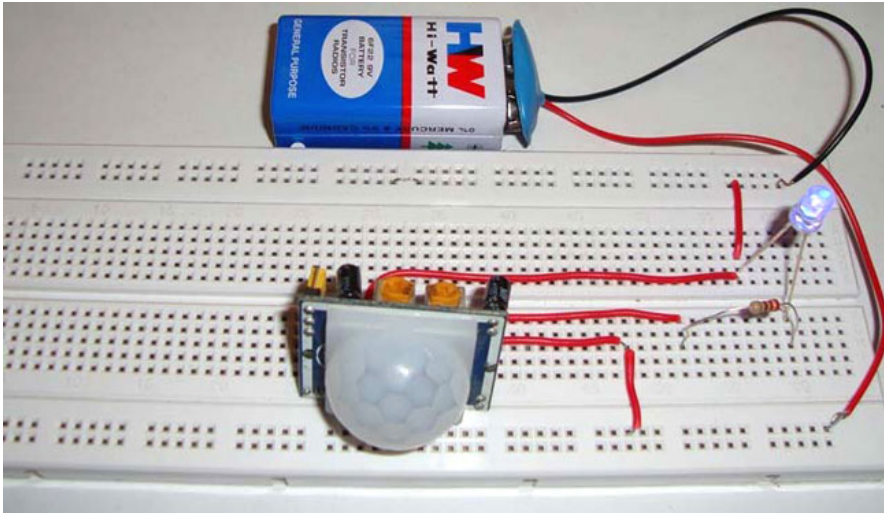


## PIR Sensor Based Motion Detector/Sensor Circuit (/electronic-circuits/pir-sensor-based-motion-detector-sensor-circuit)

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PIR Sensor Based Simple Motion Detector/Sensor

**Passive Infrared Sensor (PIR)** is very useful module, used to build many kinds of **Security Alarm Systems** and **Motion Detectors**. It is called passive because it receives infrared, not emits. Basically PIR sensor detects any change in heat, and whenever it detects any change, its output PIN becomes HIGH. They are also referred as Pyroelectric or IR motion sensors.

Here we should note that every object emits some amount of infrared when heated. Human also emits infrared because of body heat. **PIR sensors** can detect small amount of variation in infrared. Whenever an object passes through the sensor range, it produces infrared because of the friction between air and object, and get caught by PIR.

The main component of PIR sensor is **Pyroelectric sensor** shown in figure (rectangular crystal behind the plastic cap). Along with this, [BISS0001 \("Micro Power PIR Motion Detector IC"](http://www.ladyada.net/media/sensors/BISS0001.pdf) (<http://www.ladyada.net/media/sensors/BISS0001.pdf>)), some resistors, capacitors and other components used to build PIR sensor. BISS0001 IC take the input from sensor and does processing to make the output pin HIGH or LOW accordingly.



Pyroelectric sensor divide in two halves, when there is no motion, both halves remain in same state, means both senses the same level of infrared. As soon as somebody enters in first half, the infrared level of one half becomes greater than other, and this causes PIRs to react and makes the output pin high.

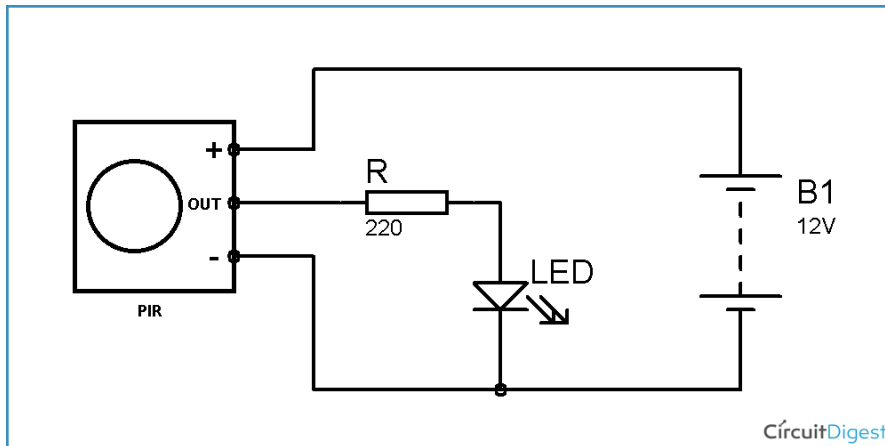
Pyroelectric sensor is covered by a plastic cap, which has array of many Fresnel Lens inside. These lenses are curved in such a manner so that sensor can cover a wide range.

We have built a **very simple Motion detector circuit** here. We are using a HC-SR501 PIR Sensor, an LED (which will glow whenever there is a motion in front of the sensor) and resistor. Vcc PIN of PIRs connected to the positive terminal of the 9v battery, GND pin is connected to negative terminal of battery and Output pin of PIR is connected to LED with a resistor of 220 Ohm. When there is any motion in the range of PIRs, LED will start blinking.

### Circuit Components

- PIR Sensor (we used HC-SR501)
- Resistor 220ohm (any resistor below 1k ohm)
- LED
- Battery (5-9V)

## Circuit Diagram and Explanation



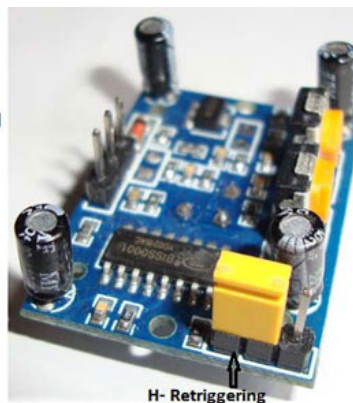
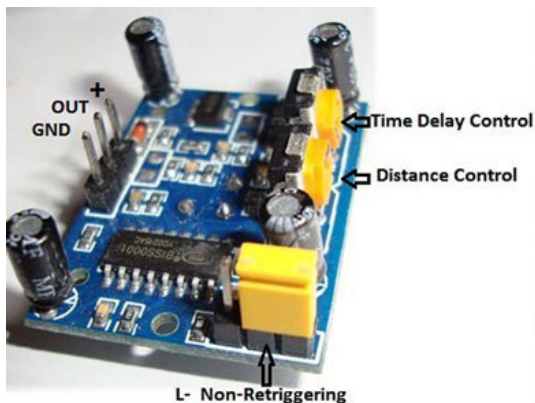
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[i=circuitdiagram/PIR-Motion-Detector-Circuit.gif](http://circuitdigest.com/fullimage?i=circuitdiagram/PIR-Motion-Detector-Circuit.gif))

PIRs takes some time to stable itself according to surrounding conditions, so you can find, LED turn ON and OFF randomly for about 10-60 seconds.

Now when we find the LED blinking whenever there is any motion, look back of the PIR, you will find a jumper which is placed between outer corner PIN and middle PIN (see diagram above). This is called "non-retriggering" Or "**Non-repeatable trigger**" and jumper said to be in L position. In this position LED will blink continuously until there is motion.

Now if you connect this jumper between inner corner PIN and middle PIN, then LED will stay on all the time till there is any motion. This one is called "retriggering" or "**Repeatable trigger**" and jumper said to be in H position.



There are two potentiometers (shown in above figure), used to set the time delay and distance range. Time delay is the duration in which the LED will remain ON (out pin HIGH). In Non repeatable triggering, OUTPUT will become low automatically after the time delay. In Repeatable triggering OUTPUT will also become low after time delay, but if there is a continuous human activity; OUTPUT will remain HIGH even after the time delay.

Turn the **Distance Adjustment potentiometer** clockwise rotation, increased sensing distance (about 7 meters), on the other hand, the sensing distance decreases (about 3 meters).

Turn the Time delay potentiometer clockwise rotation sensor the delay lengthened (600S, 10 minutes), on the opposite side, shorten the delay (0.3 second).

Generally PIR detects infrared of 8 to 14 micrometre of wavelength and has range of 3-15 meters with a field of view less than 180 degrees. This range can vary upon different models. Some ceiling PIRs can cover 360 degrees. PIRs generally operate at 3-9V DC.

## Video: