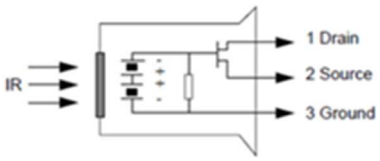
## 1. ABOUT THE SENSOR




The PIR sensor detects the change in level of IR radiations. For this purpose, we will be using RE200B as the PIR sensor. It comes with two balanced sensors/ IR detectors which are covered with a hermetically sealed metal can to improve noise/temperature/humidity immunity. The window made of IR-transmissive material lets IR waves pass through. When the sensor is idle, both slots detect the same amount of IR. When a warm body passes by, it first intercepts one half of the PIR sensor and the level of IR radiation of that half rises more than the other half, which causes a positive differential change between the two halves. When the warm body leaves the sensing area, the reverse occurs, and the sensor generates a negative differential change. It is then converted to a useful signal voltage by a JFET or an OpAmp.

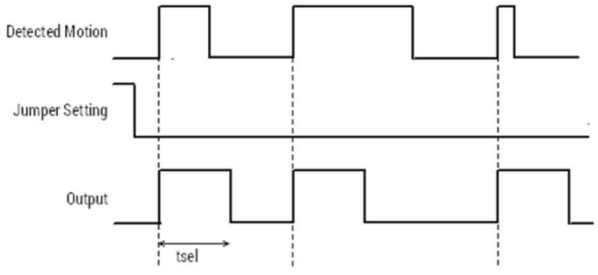
Note: When a pyroelectric layer interacts with IR radiation, it heats up and surface charge rises and when the radiation is switched off, a charge of opposite polarity originates.

## 2. MODES OF OPERATION

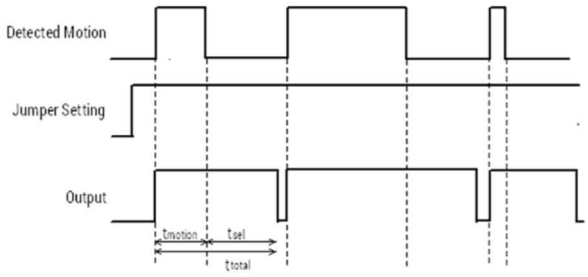
There are 2 modes of operation in the PIR sensor.

1. Single Trigger Mode
2. Repeat Trigger Mode

We can choose which mode to use depending on the purpose when needed.




Single trigger mode timing diagram




Repeat trigger mode timing diagram

### 2.1 Single Trigger Mode

To select Single Trigger mode, the jumper setting on the PIR sensor must be set on LOW. In this mode output goes HIGH when motion is detected. After a specific delay the output goes to LOW even if the object is in motion. The output is LOW for some time and again goes HIGH if the object remains in motion. This delay is provided by the user using the potentiometer.

### 2.2 Repeat Trigger Mode

To select Repeat Trigger mode, the jumper setting on the PIR sensor must be set on HIGH. In case of Repeat Triggered Mode, output goes HIGH when motion is detected. The output of the PIR sensor is HIGH until the object is in motion. When an object stops motion, or disappears from the sensor area, the PIR continues its HIGH state up to some specified delay. We can provide this delay by adjusting the potentiometer.

## 3. RANGE ADJUSTMENT OF THE SENSOR

### 3.1 Lens

To collect and focus IR radiation from the field of sensing, a Fresnel lens is used which is made up of IR transmissible material. The advantages of Fresnel lens over typical concave or Plano-concave lens are low weight, low IR absorption by the lens material, low price and less space for the lens.

### 3.2 Range

As the proximity of the detecting object determines the amount of IR collected by the lens, the voltage produced by the IR sensor varies. If the minimum voltage requirement for optimum operation is V, different ranges; 1m – 2m, 2m – 3m, 3m – 4m, 4m – 5m could be distinguished by connecting a potentiometer in series with the IR sensor to bring down the generated voltage to V and tuning it for the required range. The resistance values for different ranges are pre-determined by trial-and-error method.

## 4. CHANGING SENSITIVITY AND DELAY TIME

There are two potentiometers on PIR motion sensors board for sensitivity adjustment and time delay adjustment.

## 5. VOLTAGE REGULATION

The PIR sensor is powered from the 230V main supply, which is AC, but the PIR sensor operates in an input DC voltage in range 4.5V to 20V. We have planned to design our PIR sensor in such a way that it can be operated in 5V input voltage. So, we must step down the input AC supply, rectify it and finally regulate it to 5V to be supplied to our sensor. We have planned to use an appropriate step-down transformer, bridge rectifier IC and a 7805-voltage regulator IC for those purposes respectively.

## 6. LIGHT SENSITIVITY

The PIR sensor we design must work only in night or low light conditions. So, for this purpose we must sense the light of the environment and design our sensor in such a way that it works only when the intensity of light is lower than some threshold value. In order to do this, we have to sense the light intensity of the environment and we have planned to use a simple LDR (Light Dependent Resistor) to work this out.

## 7. INDICATING THE OUTPUT STATE

Buzzer and lamp both will be used to show the output state and the user can choose any one of them or both according to their application.

## 8. MANUFACTURING THE PCB

PCB will be manufactured by external sources. We are planning to use double layer since it will make the PCB much smaller.