

PIR -- Overview

Human Movement Detection Using PIR Sensor



OBJECTIVES

After performing this lab exercise, learner will be able to:

- Program Arduino board to detect movement.
- Interface PIR (Passive Infrared) Sensor with Arduino
- Measure MAXIMUM amplitude of the captured signal using inbuilt functions of the scope.

EQUIPMENT

To carry out this experiment, you will need:

- TBS1KB - Digital Oscilloscope from Tektronix
- Arduino Duemilanve or Uno board
- Voltage probe (provided with oscilloscope) / BNC cables
- Breadboard and connecting wires
- PIR(Passive Infrared) Sensor

THEORY

- PIR Motion detector module can detect human movement by detecting infrared emitted by human body.
- PIR motion detector module will output a high or low level or open collector signal when it detects human movement. So it is widely used on the motion activated lightening, security system, automatic sensory device and more.
- **Maximum Value:** Value of highest amplitude point in the acquired signal, measured in volts.

ARDUINO CODE

```
void setup()  
{  
  Serial.begin(9600);  
  pinMode(2, INPUT);  
  pinMode(13, OUTPUT);  
}
```

```
void loop()
```

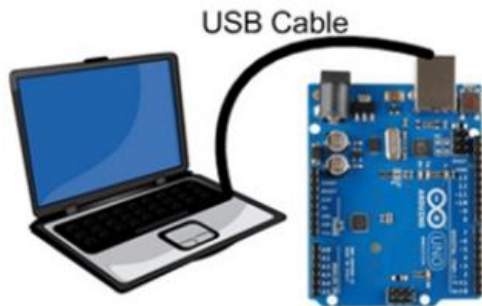
```
{  
  int senseVal = digitalRead(2);  
  Serial.println(senseVal);  
  digitalWrite(13, senseVal);  
}
```

PIR -- Procedures

Step 1

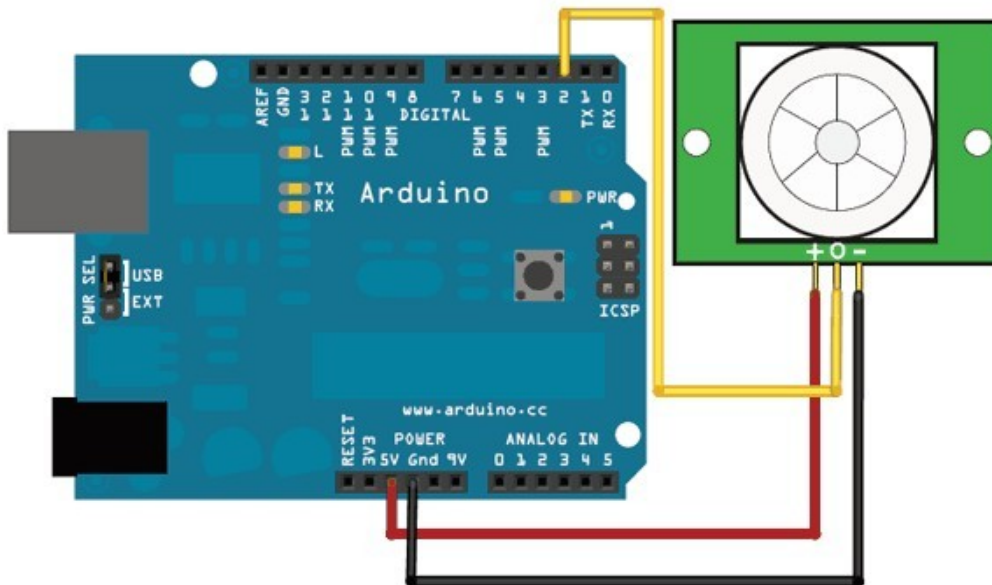
DUT / SOURCE SETUP

- Ensure you have Arduino IDE (software to program the Arduino boards) installed on your computer.
- Connect the Arduino board to PC using USB cable to program it



Step 2

- Make the PIR sensor connection with Arduino as shown below



Step 3

MEASUREMENT / SCOPE SETUP

- Power ON the oscilloscope

- Connect the Channel 1 probe of the oscilloscope to PIR sensor output (digital pin 2 of Arduino)
- Acquire the signal(s) from circuit on oscilloscope

Step 4

- Do the Autoset on the scope to efficiently capture and view the signal
- If AUTOSSET feature is not enabled, then manually set the horizontal and vertical scale, and trigger condition to view waveform without any clipping.
- Mostly we would be working on larger timebase ~ 20-50 ms/div

Step 5

- From the measurement menu, configure MAXIMUM measurement on acquired channel

Step 6

- Upload the code and check for human movement - without movement the signal will be low. When movement is detected, signal goes high and LED on pin 13 lights up.

