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# فایل دیتاشیت محصول

# HC-SR501 PIR Motion Sensor

ماژول تشخیص حرکت مادون قرمز



| 5-20 V DC | 3-7 m | 3.3V / 0V | 65 mA |
|---|---|---|---|
| ولتاژ کاری | برد تشخیص حرکت | خروجی دیجیتال | جریان مصرفی |

**MODEL: HC-SR501**

این فایل شامل راهنمای کاربری و اطلاعات فنی محصول است

**User Guide**

# HC-SR501 Passive Infrared (PIR) Motion Sensor

This motion sensor module uses the LHI778 Passive Infrared Sensor and the BISS0001 IC to control how motion is detected.The module features adjustable sensitivity that allows for a motion detection range from 3 meters to 7 meters.The module also includes time delay adjustments and trigger selection that allow for fine tuning within your application. This user guide discusses the various functions and demonstrates how to integrate them to use with your Arduino boards.



## Brief Data:

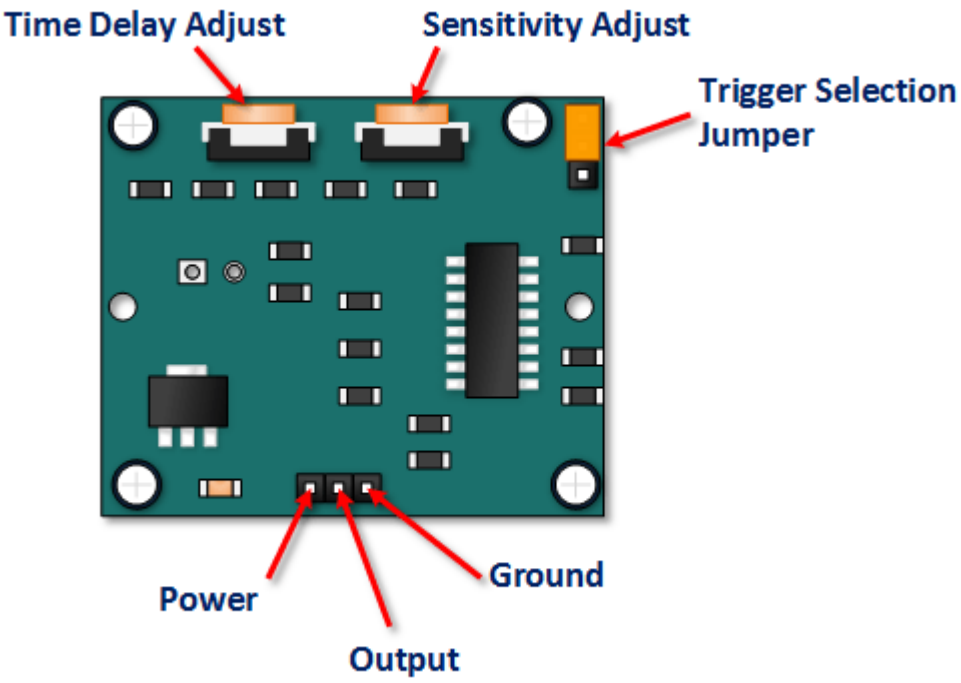
- Operating Voltage: 5~20Vdc.
- Power Consumption: 65mA.
- TTL Output: 3.3V/0V.
- Delay Time Adjustment: 0.3 ~ 5 mins.
- Lock Time: 0.2 sec.
- Trigger Method: L = Disable repeat trigger; H = enable repeat trigger.
- Sensing Range: < 120° within 7 meter.
- Temperature: -15℃ ~ +70°C.
- Dimension: 32 x 23 mm.
- Mounting Screw pitch: 28mm, M2 screw.
- Fresnel lens size: Ø23mm.

## HC-SR501 PIR Functional Description:

The SR501 will detect infrared changes and if interpreted as motion, will set its output low. What is or is not interpreted as motion is largely dependent on user settings and adjustments. The device requires nearly a minute to initialize. During this period, it can and often will

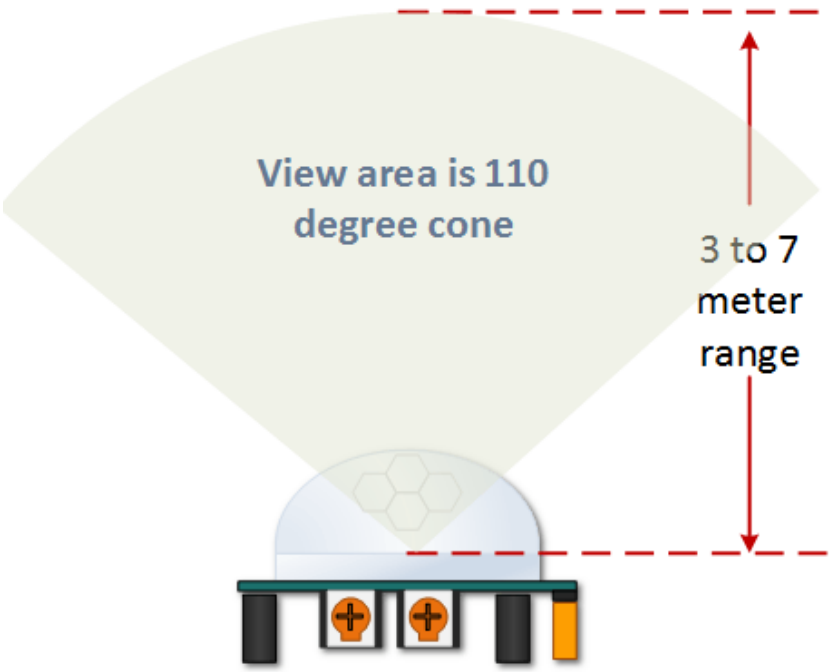
output false detection signals. Circuit or controller logic needs to take this initialization period into consideration.

## HC-SR501 Pin Outs and Controls:




| Pin or Control | Function |
|---|---|
| Time Delay Adjustment | Sets how long the output remains high after detecting motion.... Anywhere from 5 seconds to 5 minutes. |
| Sensitivity Adjust | Sets the detection range.... from 3 meters to 7 meters |
| Trigger Selection Jumper | Set for single or repeatable triggers. |
| Ground Pin | Ground input |
| Output Pin | Low when no motion is detected. High when motion is detected. High is 3.3V |
| Power Supply Pin | 5 to 20 VDC Supply input |

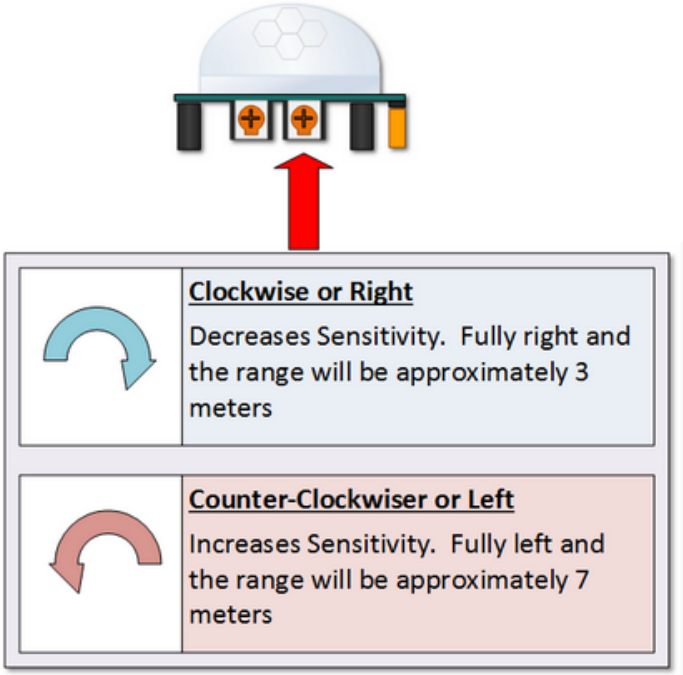
## Device Area of Detection:




The device will detect motion inside a 110 degree cone with a range of 3 to 7 meters.

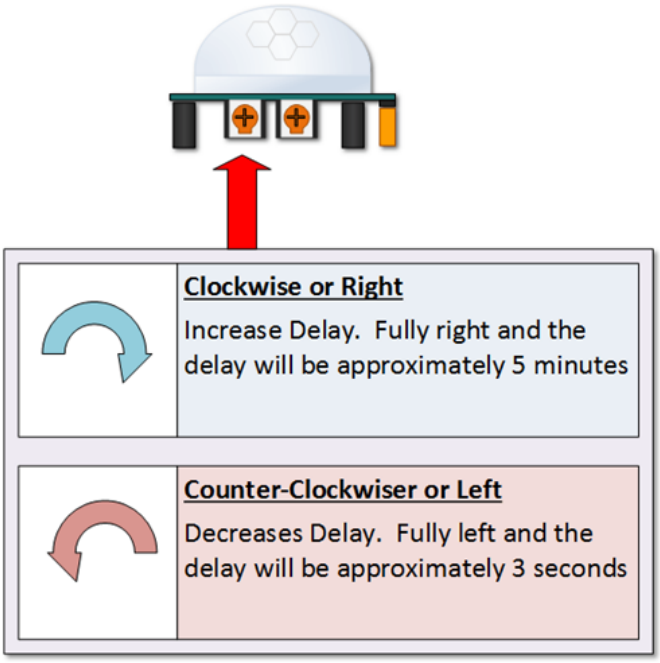
## PIR Range (Sensitivity) Adjustment:

As mentioned, the adjustable range is from approximately 3 to 7 meters. The illustration below shows this adjustment. You may click to enlarge the illustration.



## Time Delay Adjustment:

The time delay adjustment determines how long the output of the PIR sensor module will remain high after detection motion. The range is from about 3 seconds to five minutes. The illustration below shows this adjustment.




## 3 Seconds Off After Time Delay Completes – IMPORTANT

The output of this device will go LOW (or Off) for approximately 3 seconds AFTER the time delay completes. In other words, ALL motion detection is blocked during this three second period.

For Example:Imagine you're in the single trigger mode (see below) and your time delay is set 5 seconds.

- The PIR will detect motion and set it high for 5 seconds.
- After five seconds, the PIR will set its output low for about 3 seconds.
- During the three seconds, the PIR will not detect motion.
- After three seconds, the PIR will detect motion again and detected motion will once again set the output high and the output will remain on as dictated by the Time Delay adjustment and trigger mode selection.

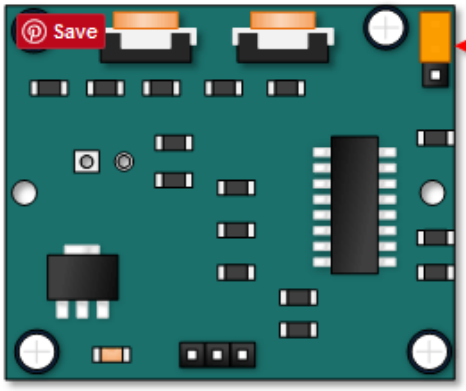
OVERRIDING THE TIME DELAY –If you're connecting your HC-SR501 to an Arduino, it is likely that you are going to take some sort of action when motion is detected. For example, you may wish to brighten lights when motion is detected and dim the lights when motion is no longer connected

Simply delay dimming within your sketch.

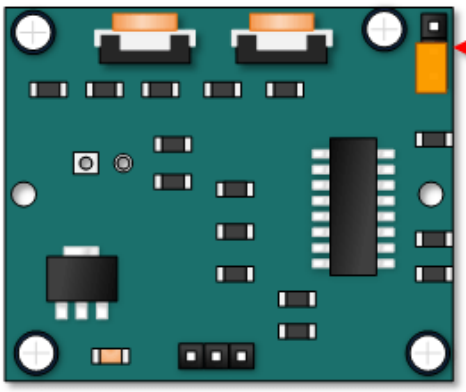
## Trigger Mode Selection Jumper:

The trigger mode selection jumper allows you to select between single and repeatable triggers. The effect of this jumper setting is to determine when the time delay begins.

- SINGLE TRIGGER – The time delay begins immediately when motion is first detected.
- REPEATABLE TRIGGER – Each detected motion resets the time delay. Thus the time delay begins with the last motion detected.




**Single Trigger Mode –** Time Delay is started immediately upon detecting motion. Continued detection is blocked

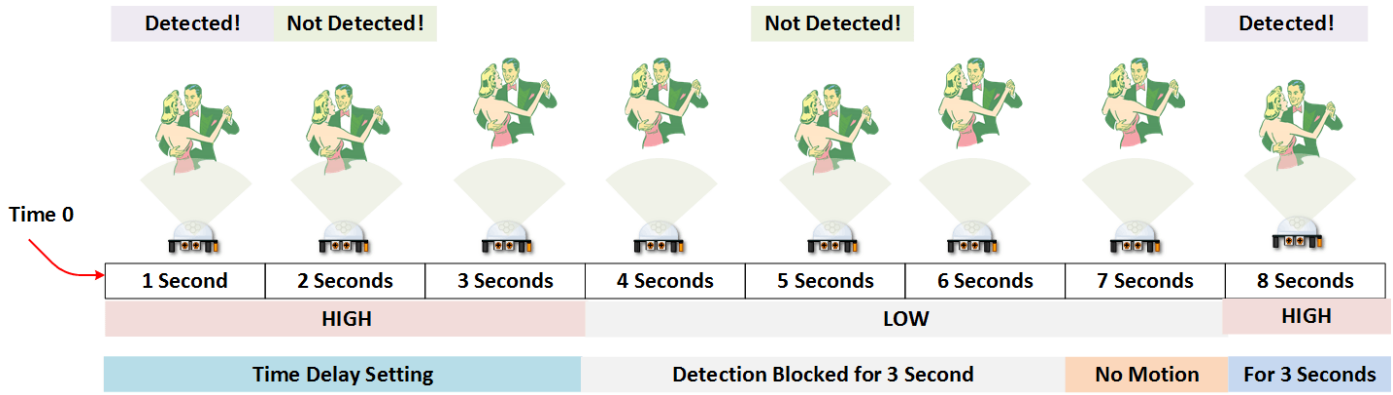


**Repeatable Trigger Mode –** Time Delay is re-started every time motion is detected.

## HC-SR501 Dance Floor Application Examples:

**Example 1:**

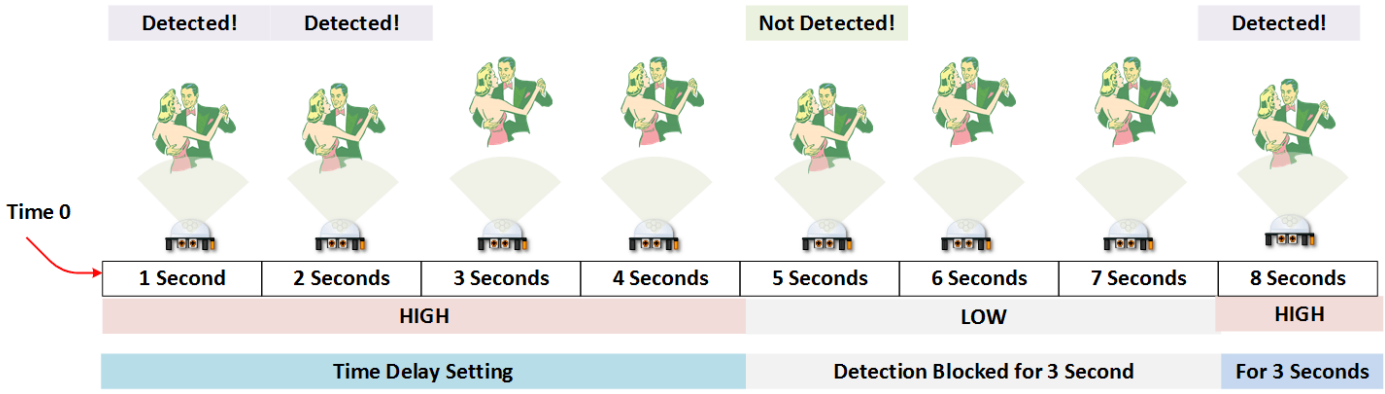
In this first example, the time delay is set to 3 seconds and the trigger mode is set to single. As you can see in the illustration below, the motion is not always detected. In fact, there is a period of about 6 seconds where motion cannot be detected.



**Example 2:**

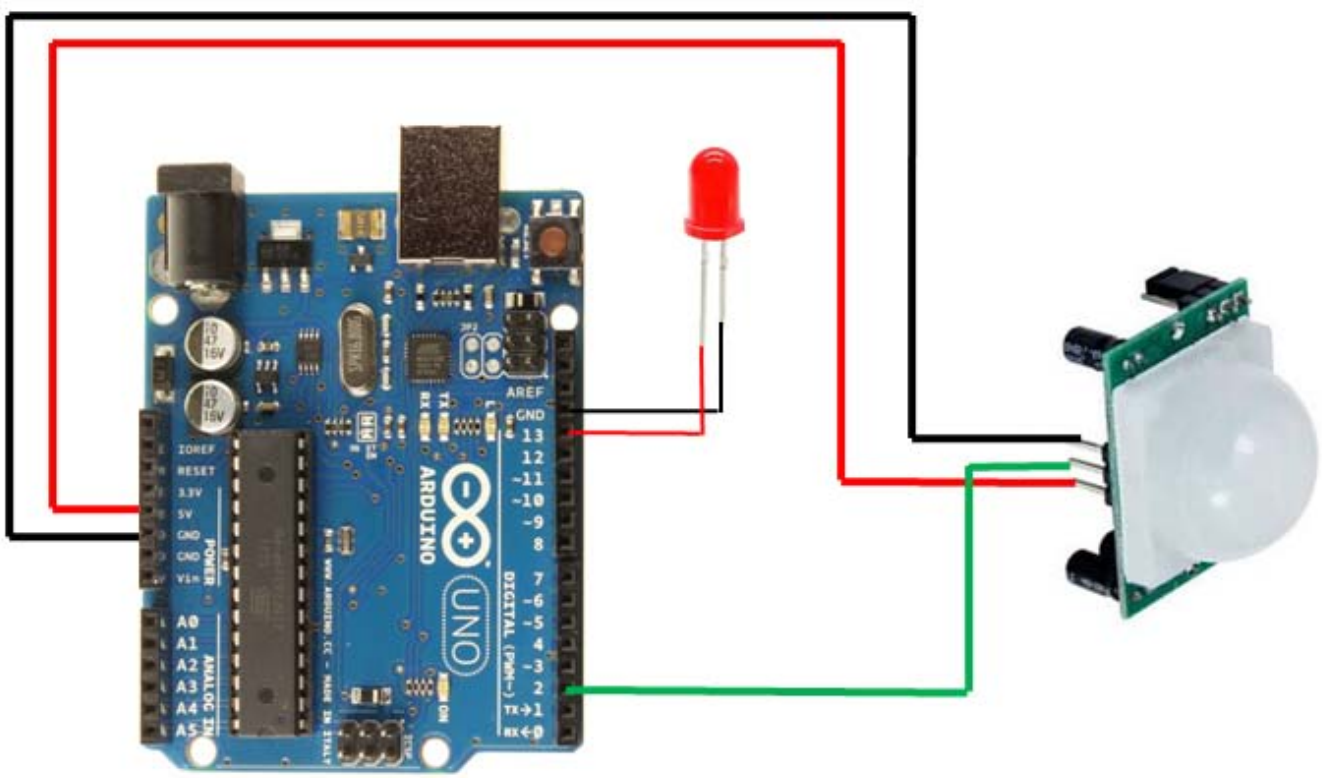
In the next example, the time delay is still at 3 seconds and the trigger is set to repeatable. In the illustration below, you can see that the time delay period is restarted. However, after that 3 seconds, detection will still be blocked for 3 seconds.

As mentioned previously, you could override the 3 second blocking period with some creative code, but do give that consideration. Some of the electronics you use may not like an on and then off jolt. The 3 seconds allows for a little rest before starting back up.




## Arduino HC-SR501 Motion Sensor Tutorial:

Connect Your Arduino to the HC-SR501.This only requires three wires.



## Copy, Paste and Upload the Tutorial Sketch:

The sketch simply turns on Your Arduino LED connected to Pin 13 whenever motion is detected. Be sure to beware of and somehow handle the 1 minute initialization in whatever application you develop.

```
/*
   Arduino with PIR motion sensor
   For complete project details, visit: http://RandomNerdTutorials.com/pirsensor
   Modified by Rui Santos based on PIR sensor by Limor Fried
*/

int led = 13;                // the pin that the LED is atteched to
int sensor = 2;              // the pin that the sensor is atteched to
int state = LOW;             // by default, no motion detected
int val = 0;                 // variable to store the sensor status (value)

void setup() {
  pinMode(led, OUTPUT);      // initalize LED as an output
  pinMode(sensor, INPUT);    // initialize sensor as an input
  Serial.begin(9600);        // initialize serial
}

void loop(){
  val = digitalRead(sensor);   // read sensor value
  if (val == HIGH) {           // check if the sensor is HIGH
    digitalWrite(led, HIGH);   // turn LED ON
    delay(100);                // delay 100 milliseconds

    if (state == LOW) {
      Serial.println("Motion detected!");
      state = HIGH;       // update variable state to HIGH
    }
  }
```

```
  else {
    digitalWrite(led, LOW); // turn LED OFF
    delay(200);             // delay 200 milliseconds

    if (state == HIGH){
      Serial.println("Motion stopped!");
      state = LOW;       // update variable state to LOW
   }
  }
}
```

## Schematic Diagram:

