

PIR Sensor (#555-28027)

The PIR (Passive Infra-Red) Sensor is a pyroelectric device that detects motion by measuring changes in the infrared (heat) levels emitted by surrounding objects. This motion can be detected by checking for a sudden change in the surrounding IR patterns. When motion is detected the PIR sensor outputs a high signal on its output pin. This logic signal can be read by a microcontroller or used to drive a transistor to switch a higher current load.

Features

- Detection range up to 20 feet away
- Single bit output
- Jumper selects single or continuous trigger output mode
- 3-pin SIP header ready for breadboard or through-hole project
- Small size makes it easy to conceal
- Compatible with BASIC Stamp, Propeller, and many other microcontrollers



Key Specifications*

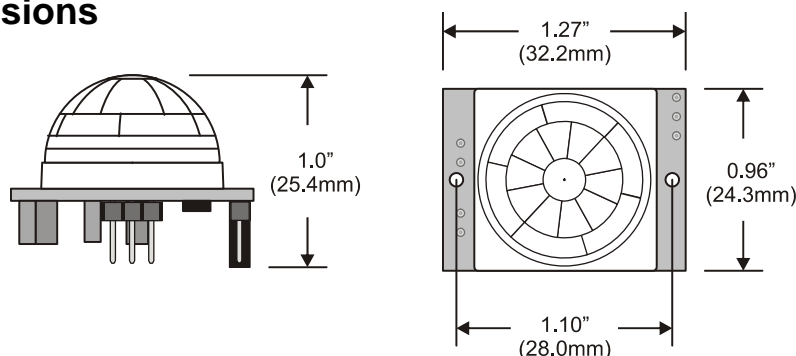
- Power requirements: 3.3 to 5 VDC; >3 mA (may vary)
- Communication: Single bit high/low output
- Operating temperature: 32 to 122 °F (0 to 50 °C)
- Dimensions: 1.27 x 0.96 x 1.0 in (32.2 x 24.3 x 25.4 mm)

* All specifications for this product are approximate and subject to change without notice

Application Ideas

- Motion-activated nightlight
- Alarm systems
- Holiday animated props

Module Dimensions



Device Information

Theory of Operation

Pyroelectric devices, such as the PIR sensor, have elements made of a crystalline material that generates an electric charge when exposed to infrared radiation. The changes in the amount of infrared striking the element change the voltages generated, which are measured by an on-board amplifier. The device contains a special filter called a Fresnel lens, which focuses the infrared signals onto the element. As the ambient infrared signals change rapidly, the on-board amplifier trips the output to indicate motion.

Pin Definitions and Ratings

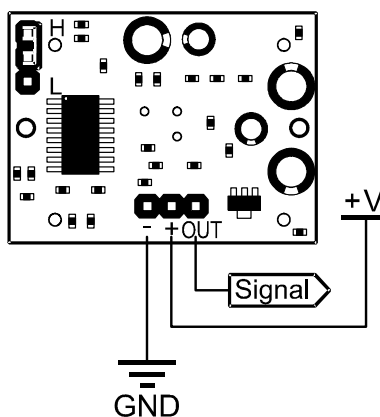
Pin	Name	Function
-	GND	Ground: 0 V
+	Vin	3.3 to 5 VDC
OUT	Output	Connect to I/O pin set to INPUT mode (or transistor/MOSFET)

Jumper Settings

Symbol	Description
H	Output remains HIGH when sensor is retriggered repeatedly. Output is LOW when idle (not triggered).
L	Output goes HIGH then LOW when triggered. Continuous motion results in repeated HIGH/LOW pulses. Output is LOW when idle.

Quick Start Circuit

Note: The sensor is active high when the jumper (shown in the upper left) is in either position. See the Jumper Settings table above for more information.



Connection and Testing

Connect the 3-pin header to your circuit so that the minus (-) pin connects to ground or V_{ss} , the plus (+) pin connects to V_{dd} and the OUT pin connects to your microcontroller's I/O pin. One easy way to do this would be to use a standard servo/LCD extension cable, available separately from Parallax (#805-00002). This cable makes it easy to plug sensor into the servo headers on our Board Of Education or Professional

Development Board. If you use the Board Of Education, be sure the servo voltage jumper (located between the 2 servo header blocks) is in the Vdd position, not Vin. If you do not have this jumper on your board you should manually connect to Vdd through the breadboard. You may also plug the sensor directly into the edge of the breadboard and connect the signals from there. Remember the position of the pins when you plug the sensor into the breadboard.

Calibration

The PIR Sensor requires a 'warm-up' time in order to function properly. This is due to the settling time involved in 'learning' its environment. This could be anywhere from 10-60 seconds. During this time there should be as little motion as possible in the sensors field of view.

Sensitivity

The PIR Sensor has a range of approximately 20 feet. This can vary with environmental conditions. The sensor is designed to adjust to slowly changing conditions that would happen normally as the day progresses and the environmental conditions change, but responds by making its output high when sudden changes occur, such as when there is motion. Note: This device is designed for indoor use. Operation outside or in extreme temperatures may affect stability negatively.

Source Code

Propeller P8X32A

The PIR.spin object is available for free download from the Sensors section of the Propeller Object Exchange: <http://obex.parallax.com>.

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This program will display the current status of the output pin from the PIR Sensor connected to P0 using the Debug Terminal.

```
' =====
' File..... PIR_Simple.bs2
' Purpose... Show Output State Of PIR Sensor
' Author.... Parallax, Inc.
' E-mail.... support@parallax.com
' Started... 12-14-2005
'   {$STAMP BS2}
'   {$PBASIC 2.5}
'
' -----[ Program Description ]-----
'
' This program displays the current state of the PIR Sensor connected to P0
' on the DEBUG screen.
'
' -----[ Program Code ]-----
Main:
DO
  DEBUG HOME, BIN1 IN0          ' Display Status Of P0 At Home Pos.
  PAUSE 100                    ' Small Delay
LOOP                          ' Repeat Forever
```

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This program will display the current status of the output pin from the PIR Sensor connected to P0 by lighting an active high LED connected to P1 when motion is detected.

```
' =====
' File..... PIR_Simple.bs1
' Purpose... Show Output State Of PIR Sensor
' Author.... Parallax, Inc.
' E-mail.... support@parallax.com
' Started... 12-14-2005
' {$STAMP BS1}
' {$PBASIC 1.0}
'
' -----[ Program Description ]-----
'
' This program displays the current state of the PIR Sensor connected to P0
' by lighting an active high LED connected to P1 when motion is detected.
'
' -----[ I/O Definitions ]-----
SYMBOL          PIR =   PIN0          ' I/O Pin For PIR Sensor
SYMBOL          LED =   PIN1          ' I/O Pin For LED
'
' -----[ Initialization ]-----
LET             DIRS =  %00000010     ' Set Pin Directions
'
' -----[ Program Code ]-----
Main:
  LET LED = PIR
  GOTO Main
```

SX28

If the product is compatible with the SX, if you want to you can include assembly and/or SX/B application code here.

```
' =====
'
' File..... PIR_Simple.SXB
' Purpose... Demonstrate Reading The PIR Sensor
' Author.... Parallax, Inc.
' E-mail.... support@parallax.com
' Started... 12-14-2005
'
' Program Description
' -----
'
' This program will display the status of the output of the PIR sensor
' connected to RC.7 by lighting an active high LED connected to RC.6 when
' motion is detected. Use a 220 or 330 ohm series resistor with the LED.
'
' Device Settings
' -----
DEVICE          SX28, OSC4MHZ, TURBO, STACKX, OPTIONX
FREQ            4_000_000
```

```

' IO Pins
' -----
PIR          VAR      RC.7          ' I/O Pin For PIR Sensor
LED          VAR      RC.6          ' I/O Pin For LED

' Program Code
' -----

Start:
  TRIS_C      =          %10111111  ' Set I/O Pin Directions

Main:
  LED = PIR          ' Make LED Follow PIR
  GOTO Main

```