

Parallax 4-Directional Tilt Sensor KickStart (#28036)

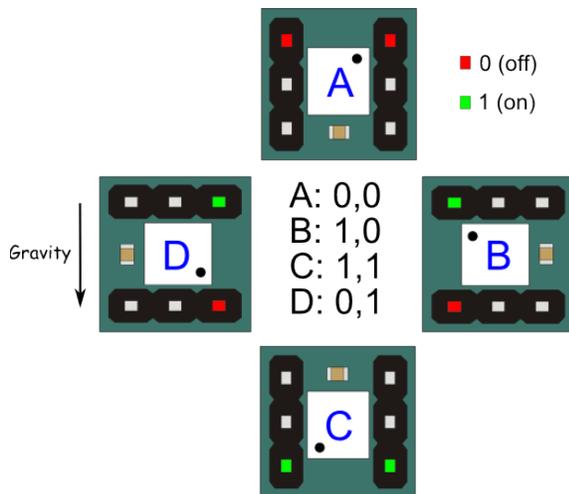


What It Can Do

- Measures rotation position in four directions
- Basic tilt sensing when accelerometer is not required
- Easy interface with two digital on/off outputs

The 4-Directional Tilt Sensor indicates rotational position. Two digital (on/off) outputs indicate which side of the sensor is pointing down: the top, bottom, left, or right. The tilt sensor is an economical alternative to more expensive accelerometers, when precise angular feedback isn't necessary.

The sensor provides two independent outputs, labeled *Out 1* and *Out 2*, which together indicate which side of the device (top, bottom, left, right) is facing the ground. Inside the 4-Directional Tilt Sensor is a small captive ball that alternately blocks or allows light to strike a pair of photodetectors. Because this ball is sensitive to both gravity and very fast motion, the tilt sensor is best when attached to stationary or slower-moving objects.

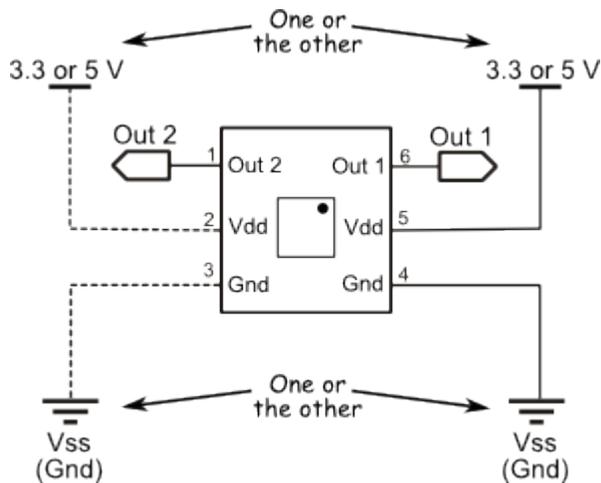


The tilt sensor indicates rotational position in a single plane only. You can get rotational position in two planes by adding a second tilt sensor. Orient this sensor so that it's at a right angle to the first.

Parts List

- 4-Directional Tilt Sensor
 - BASIC Stamp 2 HomeWork board, Propeller Board of Education, Propeller QuickStart, or Arduino Uno microcontroller (solderless breadboard as needed)
 - 22 gauge solid conductor hookup wire
-

Basic Wiring



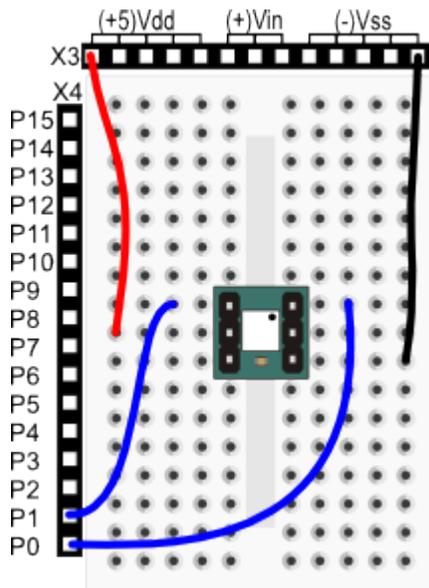
- Power requirements: 3 to 5.5 VDC
 - Communication: 2-pin high/low output for four sensor states
 - Dimensions: 0.42 x 0.32 x 0.49 in (1.07 x 0.81 x 1.24 cm)
-

Program KickStarts

The example programs display the current Out 1 and Out 2 values of the 4-Directional Tilt Sensor in a terminal/debug window. The program is set to repeat indefinitely. Demonstrate the operation of the module by slowly rotating it on its four sides.

For all microcontrollers the values displayed in the window represent whether each output is off (0 is displayed) or on (1 is displayed).

BASIC Stamp HomeWork Board



```
' {$STAMP BS2}
' {$PBASIC 2.5}
```

```
PAUSE 500      ' Brief wait at start
```

```
DO
```

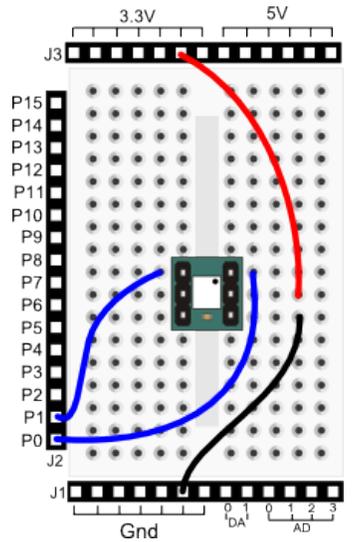
```
  DEBUG HOME, "Phototransistor 1: ", BIN1 IN0, CR,
  "Phototransistor 2: ", BIN1 IN1
```

```
  PAUSE 250  ' Wait 1/4 second
```

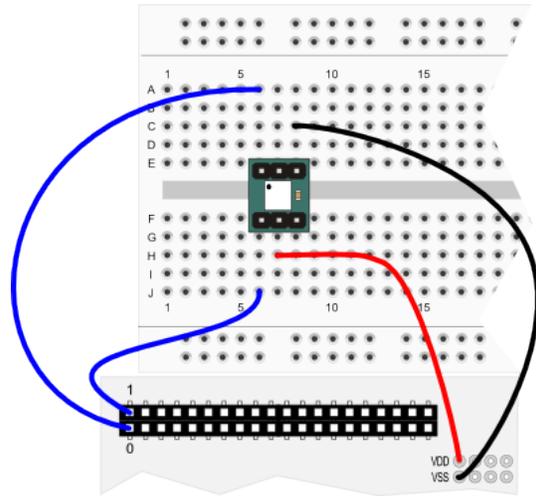
```
LOOP
```

Note: When this program is run the BASIC Stamp Debug window will automatically open.

Propeller BOE and Propeller QuickStart



Propeller BOE Wiring Diagram



Propeller QuickStart Wiring Diagram

OBJ

```
pst : "Parallax Serial Terminal.spin"
```

CON

```
_clkmode = xtall + PLL16X  
_xinfreq = 5_000_000
```

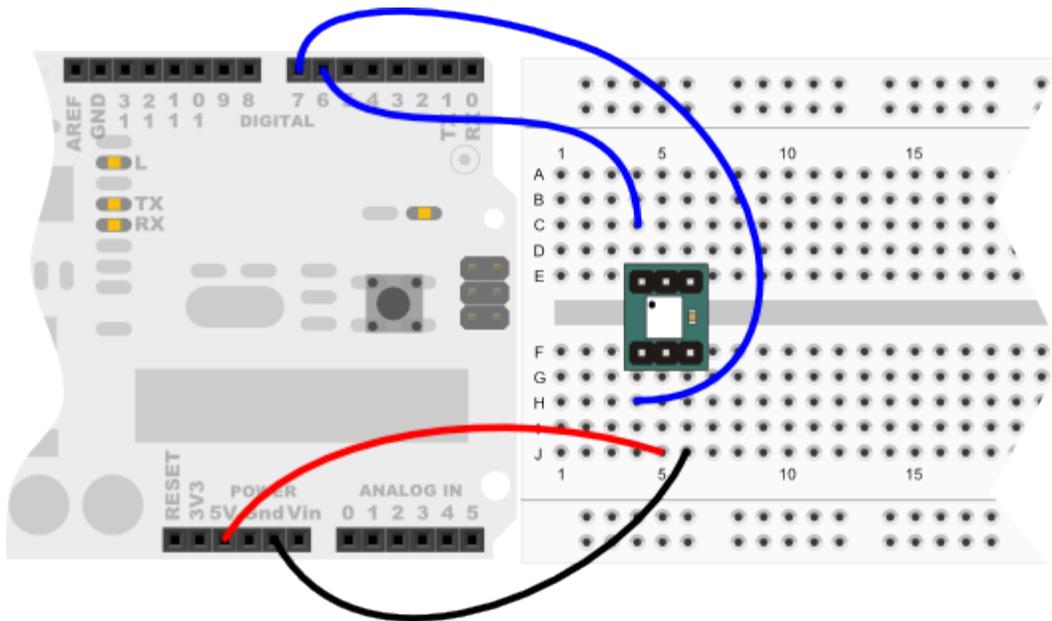
PUB Main

```
dira[0..1]~      ' Set pins 0 and 1 to inputs  
pst.Start(115_200) ' Parallax Serial Terminal at 115,200 baud  
  
repeat  
  pst.Home  
  pst.str(string("Phototransistor 1: "))  
  pst.bin(ina[0], 1)  ' Display value for Out 1  
  pst.NewLine  
  pst.str(string("Phototransistor 2: "))  
  pst.bin(ina[1], 1)  ' Display value for Out 2  
  waitcnt(clkfreq / 4 + cnt) 'Wait 1/4 second
```

Note: This program uses the Parallax Serial Terminal object, which is included with the Propeller Tool software download.

Note: To view the results of the demonstration, after uploading is complete run the Parallax Serial Terminal from the Run menu, or press F12. Momentarily depress the Reset button on the Propeller QuickStart board to restart the program.

Arduino Uno



```
void setup() {  
  Serial.begin(9600);  
}  
  
void loop() {  
  Serial.print("Photo 1: ");  
  Serial.print(digitalRead(6), DEC); // Display Out 1 value  
  Serial.print("; ");  
  Serial.print("Photo 2: ");  
  Serial.println(digitalRead(7), DEC); // Display Out 2 value  
  delay(250); // Wait 1/4 second  
}
```

Note: To view the results of the demonstration, after uploading is complete click the Serial Monitor icon in the Arduino IDE. This displays the Serial Monitor window. Momentarily depress the Reset button on the Arduino board to restart the sketch.

For More Information

- Visit the full documentation for the [4-Directional Tilt Sensor \(#28036\)](#).
- For precise tilt angles use an accelerometer, such as [Memsic 2125 Dual-axis Accelerometer \(#28017\)](#).