

LilyPad Light Sensor V2 Hookup Guide

Introduction

The LilyPad Light Sensor is a sewable breakout board with an ALS-PT19 light sensor on it. To use the light sensor, you will need to connect to a LilyPad Arduino or other microcontroller to read the sensor values and use them in your code.

The LilyPad Light Sensor outputs voltage between **0V** and **3.3V** depending on the level of ambient light shining on it. As more light is applied on the sensor, more current will flow from the board through the signal tab to the microcontroller you connect the sensor to. If the sensor receives no light, no current will flow through it. In a typical indoor lighting situation, the sensor will output around 1 to 2V.



LilyPad Light Sensor

© DEV-14629

Product Showcase: Lilypad Light Sensor



This sensor is also used on the LilyPad ProtoSnap Plus and LilyMini ProtoSnap.



LilyPad ProtoSnap Plus

● DEV-14346



LilyPad LilyMini ProtoSnap

● DEV-14063

To follow along with the code examples, we recommend:

LilyPad Light Sensor V2 Hookup Guide Wishlist SparkFun Wish List



LilyPad Light Sensor

DEV-14629

This is a simple to use light sensor that outputs an analog value from 0 to 5V. With exposure to daylight, this senso...



Alligator Test Leads - Multicolored (10 Pack)

PRT-12978

Alligator clips (or Crocodile clips, if you prefer) are likely to be the most useful thing on your workbench besides the...



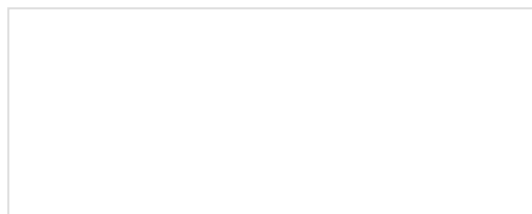
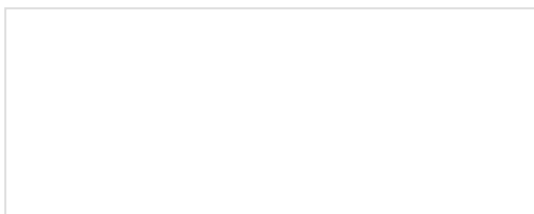
LilyPad Arduino USB - ATmega32U4 Board

DEV-12049

The LilyPad Simple just got a whole lot... simpler. We've updated the Simple board to create the LilyPad USB by re...

Suggested Reading

To add this sensor to a project, you should be comfortable sewing with conductive thread and uploading code to a LilyPad Arduino. Here are some tutorials to review before working with this sensor:





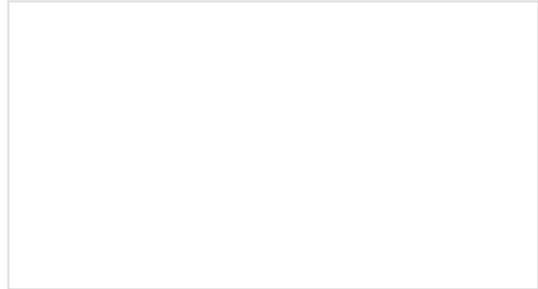
What is a Circuit?

Every electrical project starts with a circuit. Don't know what a circuit is? We're here to help.



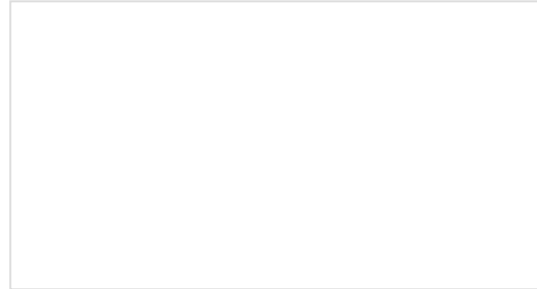
Serial Terminal Basics

This tutorial will show you how to communicate with your serial devices using a variety of terminal emulator applications.



LilyPad Basics: E-Sewing

Learn how to use conductive thread with LilyPad components.



Getting Started with LilyPad

An introduction to the LilyPad ecosystem - a set of sewable electronic pieces designed to help you build soft, sewable, interactive e-textile projects.

Attaching to a LilyPad Arduino

The LilyPad Light Sensor has three sew tabs - **Power (+)**, **Ground (-)**, and **Signal (S)**. Next to each tab is a white label on the top and bottom of the board for reference. The signal tab should be connected to an analog tab (marked with an 'A') on a LilyPad Arduino.

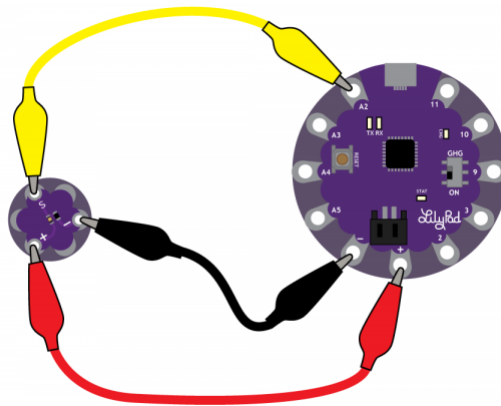


Top



Bottom

To follow along with the code examples in this tutorial, connect the light sensor to a LilyPad Arduino as shown below. Use alligator clips to temporarily connect **Signal** to **A2** on a LilyPad Arduino, (-) to (-) on the LilyPad, and (+) to (+). When you are finished prototyping, replace the alligator clips with conductive thread traces for permanent installation in your project.

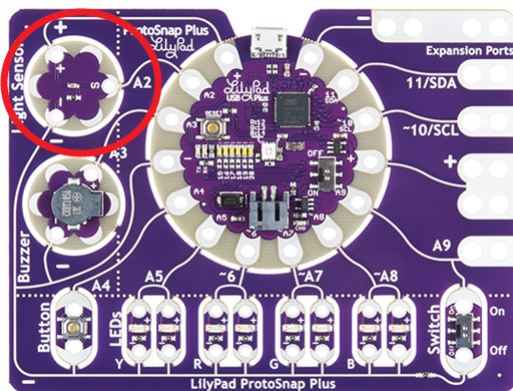


Connecting to a LilyPad Arduino USB

Please Note:

If following along with a LilyPad ProtoSnap Plus, the light sensor is pre-wired to **Pin A2**. The light sensor on the ProtoSnap is a slightly different version than the catalog item, but functions the same.

If following along with the LilyMini ProtoSnap, the light sensor is pre-wired to **Pin 1**. Again, the light sensor on the LilyMini ProtoSnap is a slightly different version than the catalog item, but functions the same.



LilyPad Light Sensor location circled on a LilyPad ProtoSnap Plus board



LilyPad Light Sensor location circled on a LilyMini ProtoSnap board

Reading Values in Serial Monitor

Note: This example assumes you are using the latest version of the Arduino IDE on your desktop. If this is your first time using Arduino, please review our tutorial on installing the Arduino IDE.

After connecting the light sensor, let's take a look at the values it reads under different lighting conditions. For this we'll use `analogRead()` and `Serial.print()`.

Upload the following code to your LilyPad Arduino, making sure to select the correct LilyPad board from the Tools->Board drop down menu. Choose **LilyPad Arduino USB** if using a LilyPad Arduino USB. The LilyPad Arduino Simple, LilyPad Arduino, LilyPad Development Board, and Development Board Simple all use a **LilyPad ATmega 328**. Select **LilyPad USB Plus** if following along with the LilyPad USB Plus or LilyPad ProtoSnap Plus. Don't forget to select the Serial Port that your LilyPad is connected to.

Note the following potential code changes:

- If prototyping with a LilyPad ProtoSnap Plus, change **sensorPin** to A2.
- If prototyping with a LilyMini ProtoSnap, change **sensorPin** to 1.

Copy the following code and upload it to your LilyPad.

```

/*****

LilyPad Light Sensor Example
SparkFun Electronics

This example code reads the input from a LilyPad Light Sensor and displays in
the Serial Monitor.

Light Sensor connections:
  * S tab to A2
  * + tab to +
  * - tab to -

*****/

// Set which pin the Signal output from the light sensor is connected to
int sensorPin = A2;
// Create a variable to hold the light reading
int lightValue;

void setup()
{
  // Set sensorPin as an INPUT
  pinMode(sensorPin, INPUT);

  // Initialize Serial, set the baud rate to 9600 bps.
  Serial.begin(9600);
}

void loop()
{
  // Get the current light level
  lightValue = analogRead(sensorPin);

  // Print some descriptive text and then the value from the sensor
  Serial.print("Light value is:");
  Serial.println(lightValue);

  // Delay so that the text doesn't scroll too fast on the Serial Monitor.
  // Adjust to a larger number for a slower scroll.
  delay(200);
}

```

Once your code is uploaded, open the serial terminal in the IDE and observe the output. Numbers should begin to stream by. Note how the numbers change as the ambient light changes. Use your hand to cover the sensor or a flashlight to shine more light on it. Next we'll be using these values to control behaviors in our code.

Using Values to Trigger Behaviors

Next, we'll make some decisions in the code based on the light sensor's readings. This example code creates a simple automatic night light that turns on an LED when it's dark.

We'll use the `analogRead()` function to get data from the light sensor and compare it to a variable we set for darkness level. When the readings from the light sensor fall below our threshold set for dark, it will turn on the LED.

You can hook up a LilyPad LED to sew tab 5 or use the built-in LED attached to pin 13.

```
/******
```

LilyPad Light Sensor Trigger - Automatic Night Light
SparkFun Electronics

Adapted from Digital Sandbox Experiment 11: Automatic Night Light

This example code reads the input from a LilyPad Light Sensor compares it to a set threshold named 'dark'. If the light reading is below the threshold, an LED will turn on.

Light Sensor connections:

- * S tab to A2
- * + tab to +
- * - to -

Connect an LED to pin 5 or use the built-in LED on pin 13

```
*****/
```

```
// The dark variable determines when we turn the LEDs on or off.
```

```
// Set higher or lower to adjust sensitivity.
```

```
const int darkLevel = 50;
```

```
// Create a variable to hold the readings from the light sensor.
```

```
int lightValue;
```

```
// Set which pin the Signal output from the light sensor is connected to
```

```
int sensorPin = A2;
```

```
// Set which pin the LED is connected to.
```

```
// Set to 5 if you'd rather hook up your own LED to the LilyPad Arduino.
```

```
int ledPin = 13;
```

```
void setup()
```

```
{
```

```
  // Set sensorPin as an INPUT
```

```
  pinMode(sensorPin, INPUT);
```

```
  // Set LED as outputs
```

```
  pinMode(ledPin, OUTPUT);
```

```
  // Initialize Serial, set the baud rate to 9600 bps.
```

```
  Serial.begin(9600);
```

```
}
```

```
void loop()
```

```
{
```

```
  // Read the light sensor's value and store in 'lightValue'
```

```
  lightValue = analogRead(sensorPin);
```

```
  // Print some descriptive text and then the value from the sensor
```

```
  Serial.print("Light value is:");
```

```
  Serial.println(lightValue);
```



```
// Compare "lightValue" to the "dark" variable
if (lightValue <= darkLevel) // If the reading is less than 'darkLevel'
{
  digitalWrite(ledPin, HIGH); // Turn on LED
}
else // Otherwise, if "lightValue" is greater than "dark"
{
  digitalWrite(ledPin, LOW); // Turn off LED
}

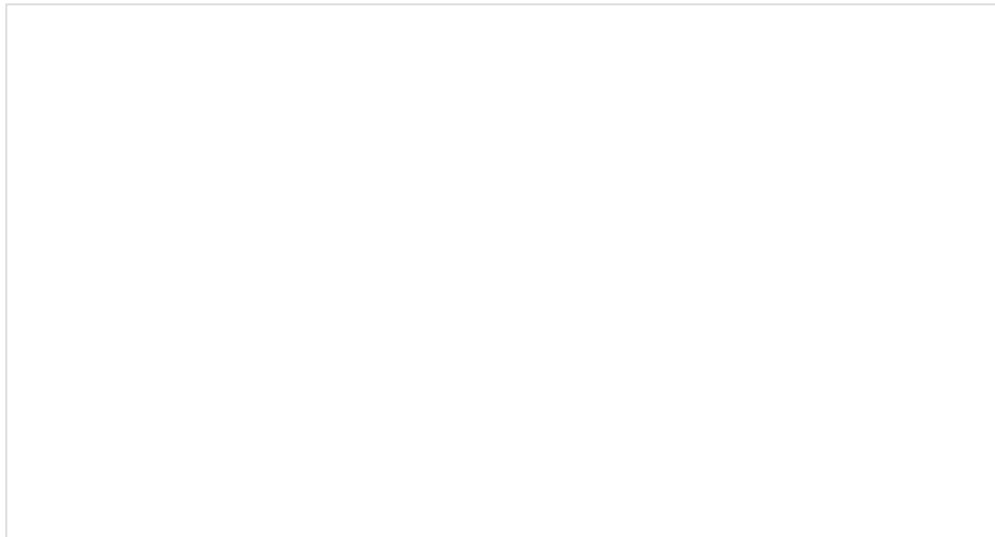
// Delay so that the text doesn't scroll to fast on the Serial Monitor.
// Adjust to a larger number for a slower scroll.
delay(100);
}
```

If your light sensor isn't triggering correctly, check the output of the Serial Monitor to see if there's a better value for the dark variable than what is set in the example code.

Sewing into a Project

Once you are finished prototyping your project using the LilyPad Light Sensor, you can replace any temporary connections with conductive thread.

For an overview of sewing with conductive thread, check out this guide:

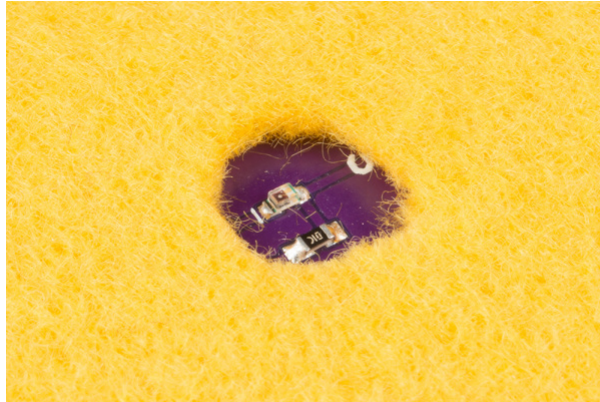


LilyPad Basics: E-Sewing

DECEMBER 17, 2016

Learn how to use conductive thread with LilyPad components.

To hide the sensor in your project, you can cover with a material making sure to leave an opening for the sensor to be exposed to light. Cutting a hole above the sensor in fabric is one way to do this.



Project Examples

LilyPad Light Sensor Example Projects



Light Sensitive Hat

Let your geek shine with this hat that blinks when the lights go down.



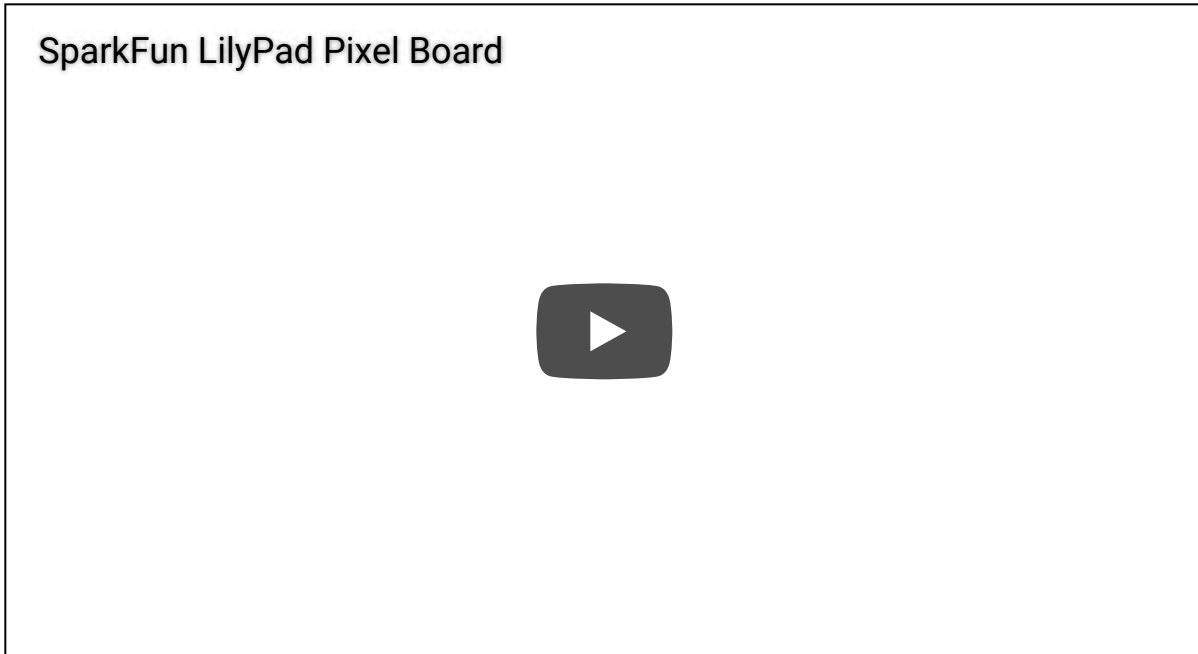
Musical Bracelet

Combining the sensor with a LilyPad Buzzer can create interesting interactive projects, for example this wearable light-controlled musical instrument or Opto-Theremin. Control tones on the buzzer by covering the LilyPad Light Sensor.



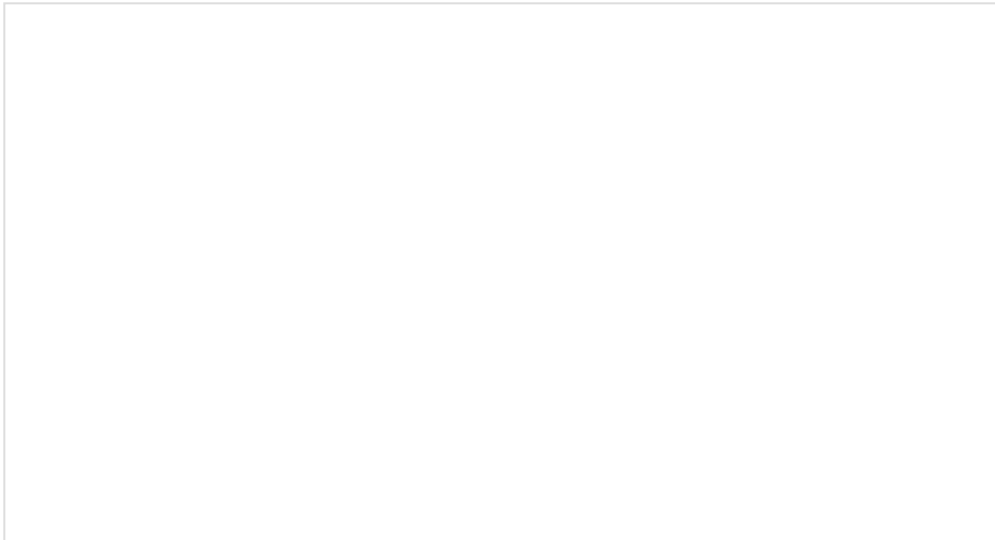
Twinkling Prom Dress

The prom dress project featured in this video uses an initial threshold setting and light sensor to trigger some LilyPad Pixel Boards.



LilyPad Safety Scarf

Create a scarf that lights up when it gets dark with LilyPad and sewable LED ribbon.



LilyPad Safety Scarf

NOVEMBER 21, 2017

This scarf is embedded with a ribbon of LEDs that illuminate when it gets dark out, making yourself more visible to vehicle and other pedestrians.

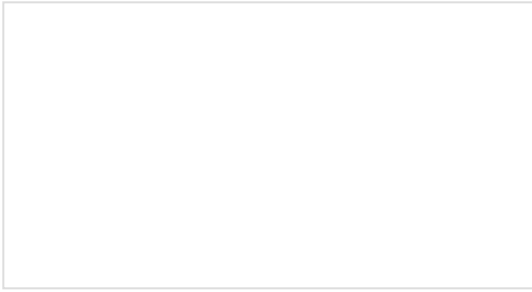
Resources and Going Further

Here are some resources for e-textiles and planning a project with the light sensor:

- [LilyPad Light Sensor GitHub](#)
- [LilyPad Landing Page](#)

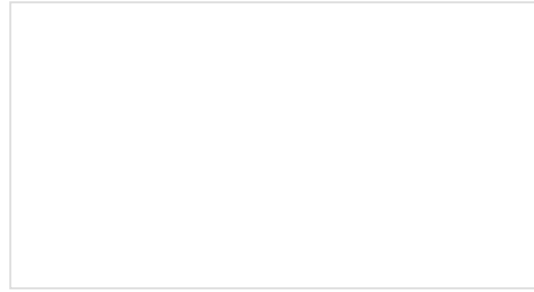
- [Planning a Wearable Electronics Project](#)
- [Insulation Techniques for e-Textiles](#)
- [Makerspace for Education with LilyPad](#)

Or, you can check out these other great light-based tutorials:



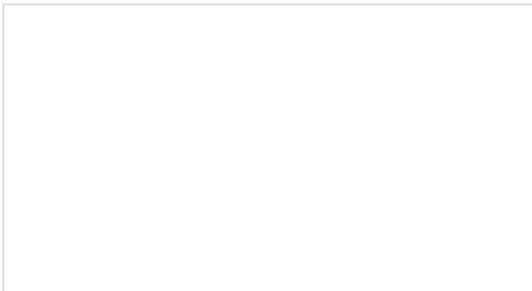
Bubble Display Hookup Guide

Need a small, cheap, and easy display? These bubble displays are what you've been looking for. Learn how to use them in this hookup guide.



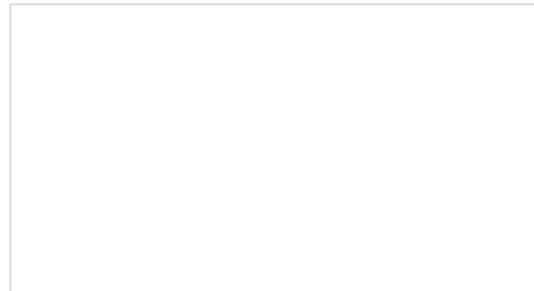
LilyPad Light Sensor Hookup Guide

How to hook up the LilyPad Light Sensor as well as some project ideas and example code.



Building a Safe Cracking Robot

How to crack an unknown safe in under an hour.



LilyPad Tri-Color LED Hookup Guide

Learn how to hook up the LilyPad Tri-Color LED and use a common cathode RGB LED in e-textile projects.