Connecting the Soft Fabric Potentiometer Kit to a Lilypad Arduino

The kit is composed of conductive resistive knitted fabric and a metal ring. It can be used in many ways to create a variable resistor. As the ring slides along the conductive fabric, the resistivity changes. The longer the fabric, the greater the resistivity. This is a tutorial about connecting our soft potentiometer to a Lilypad Arduino.

Please read all the instructions before you begin. Start by cutting a piece of tape. The piece you will cut will be connected to the sliding cursor of the potentiometer, as the “handle”. About 8-9 inches is usually adequate for most applications. But you can select any length you like.

Connect one end of the piece you have cut by inserting it in the larger ring as indicated in the picture, taking care to wrap the fabric two times around the ring for better conductivity.

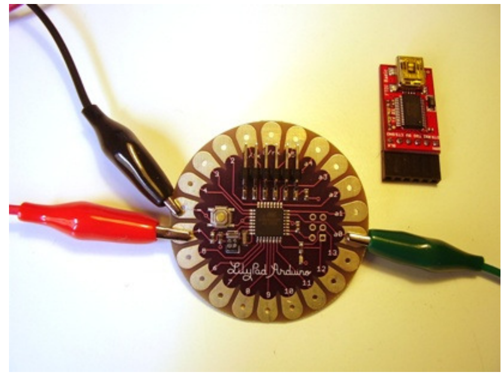
Then sew it tightly:

Until you obtain this:

Now insert the other longer piece of fabric in the small ring. That would be the part on which the cursor will slide:

Connect three alligator clip cables at the three free extremities of the fabrics. It is better if you connect a red and a black cables for the long piece and a cable of a different color for the short piece. It does not matter which way you connect the black and the red cable to the long piece.

Now connect them to the Lilypad as follows:



In this case we connected the potentiometer central point (green) to pin a0 because we will be using a sketch that uses pin a0 as analog input.

Connect your FTDI breakout board to the Lilypad and upload the following sketch:

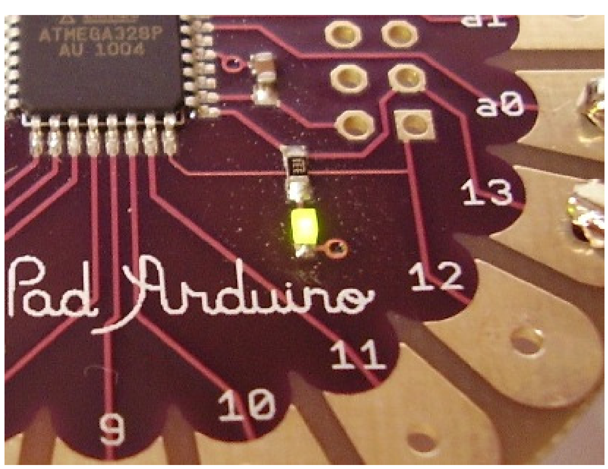
```
int softPot = 0;    // this line selects the input pin a0 for the potentiometer cursor
int ledPin = 13;      // this line selects the pin 13 for the LED
int tempPot = 0;  // variable to store the value coming from the sensor

void setup() {
  // this line declares the ledPin as an OUTPUT:
  pinMode(ledPin, OUTPUT);
}

void loop() {
  // read the value from the soft potentiometer
  tempPot = analogRead(softPot);
  // it turns the LED on
  digitalWrite(ledPin, HIGH);
  // stop the program for <tempPot> milliseconds:
  delay(tempPot);
  // turn the LED off:
  digitalWrite(ledPin, LOW);
  // stop the program for for <tempPot> milliseconds:
  delay(tempPot);
}
```

You do not need to connect an LED to pin 13 to test this sketch because pin13 has a built-in LED:

By sliding the ring up and down on the fabric (like a zipper) you should see the LED blinking at a different rate:



Theory

Let's now see more in detail how it works. A microcontroller analog input is able to detect a variable voltage. Analog means that it is not just a mere HIGH or LOW value, 0 V or 5 V, like in digital inputs, but it can be anything between 0V or 5V. As the world around us is analog and not digital having the possibility of reading continuous values, it is very handy.

Sometimes, instead of a measuring sensor, we want to be the ones that create an analog signal, maybe to control the volume of our headphones, or to adjust the light level of our room. How do we achieve this? With a potentiometer. A potentiometer is just a long resistor with a sliding cursor able to touch the resistor in one point only. This point can be moved, giving different readouts.

A potentiometer has three terminals (see right part of the picture), one (1) must be connected to i.e. 5V, one (2) to 0V and the terminal connected to the sliding point to the input of the microcontroller (3). This is where we will measure the variable voltage. Now when we slide the cursor along the resistor very close to the terminal connected to 5V we will get voltage values close to 5V, when we will slide the cursor close to the terminal connected to 0V on the third terminal we will get voltages near 0V.
In the picture we suppose to have a resistor with a total resistance of 15Kohm. According how we place the cursor we can obtain a situation where, for example, we have one resistor of 5Kohm and one of 10kohm.

We will now consider the current flowing into the Lilypad equal to zero through its input pin, and as a result both resistors pass the same amount of current. Applying Ohm's Law we calculate the current flowing I = 5V / 15k Ohm = 0.0003 Amp. The voltage drop across R1 will then be V = R1 * I = 5000 * 0.0003 = 1.66 V. That means that our input pin will be at 5V - 1.66V = 3.34 V.