

Heating Pad Hand Warmer Blanket a learn.sparkfun.com [tutorial](#)

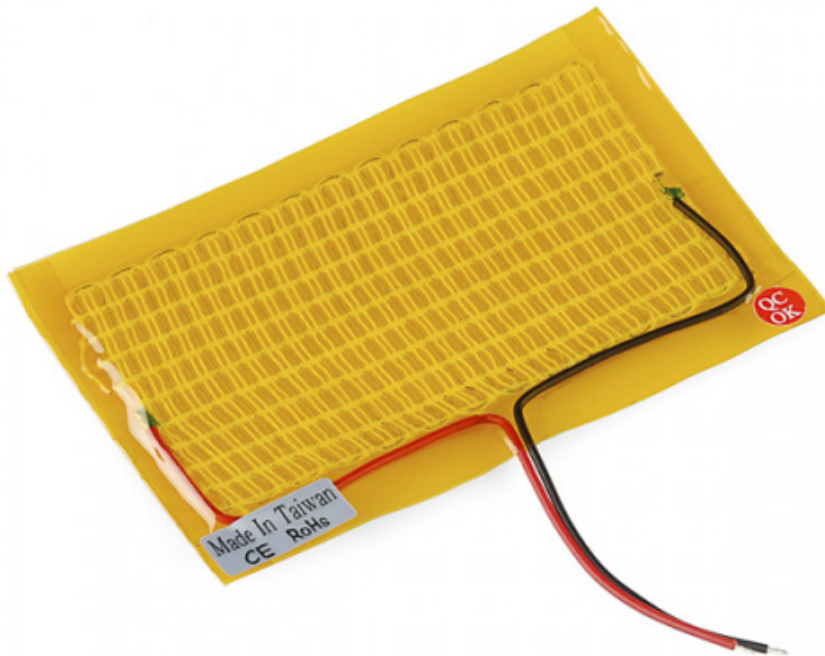
Available online at: <http://sfe.io/t20>

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What Are Heating Pads Good For?

There are a lot of great projects you can use heating pads ([5x10cm](#) and [5x15cm](#)) in, ranging from warming gloves, slippers, a blanket, or anything you want to keep nice and warm. Got a [beard mask](#) you want to make toasty? Do beards need to be warmer? Not sure. Would it be a fun project? Definitely.



[Heating Pad - 5x10cm](#)

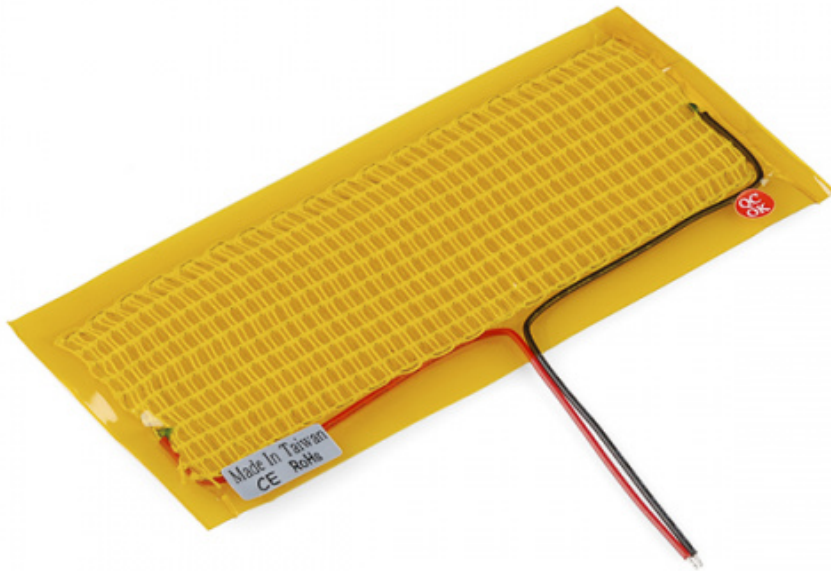
COM-11288

\$4.50

1

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[Wish List](#)



[Heating Pad - 5x15cm](#)

COM-11289

\$5.50

11

[Favorited Favorite](#) 54

[Wish List](#)

What Parts Should You Consider Getting for Your Project?

You can go as simple as getting the appropriate power supply and a heating pad. One heating pad is rated for **5V**, and draws about **600mA**. If you want to add a form of logic or control to your circuit, such as interfacing with sensors, the easiest way is to add a microcontroller/development board to your project. You will also need some wire and transistor to control the heating pad if you are using a microcontroller. Check the wishlist in the next section for more details on the products used in this tutorial.

Warning! Please make sure to use the appropriate power requirements when operating this heating pad. We do not recommend this product for beginners.

Tools

You will need sewing needles, a soldering iron, solder, and [general soldering accessories](#).



[Solder Lead Free - 100-gram Spool](#)

TOL-09325

\$9.95

8

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[Wish List](#)



[Needle Set](#)

TOL-10405

\$2.10

[Favorited Favorite](#) 12

[Wish List](#)



[Weller WLC100 Soldering Station](#)

TOL-14228

2 **Retired**

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[Wish List](#)

Suggested Reading

If you aren't familiar with the following concepts, we recommend checking out these tutorials before continuing.

- [Basic LilyPad Tutorial](#)
- [Beginning LilyPad Arduino](#)
- [Planning a Wearable Electronics Project](#)
- [LilyPad Basics:E-Sewing](#)

- [Transistors](#)

DIY Project Idea: Hand Warmer Blanket







A blanket project with two heating pads to keep your hands warm when you are on the computer/notebook/tablet/phone/playing chess/all other activities.

Required Materials

There are a lot of parts on this list that can be exchanged for alternate parts, or that aren't needed at all, depending on what type of setup you want. To follow along with this project, you will need the following materials. You may not need everything though depending on what you have. Add it to your cart, read through the guide, and adjust the cart as necessary.

Custom Hand Warmer Blanket v2.0 SparkFun Wish

List

-  **LilyPad LED Blue (5pcs)**
DEV-14012
This is a simple pack of five Blue LilyPad LEDs that are still attached to one another, letting you snap the LEDs apart at your leisure...
-  **Resistor 10k Ohm 1/6th Watt PTH**
COM-08374
1/6th Watt, +/- 5% tolerance PTH resistors. Commonly used in breadboards and perf boards, these 10K resistors make excellent pu...
-  **USB Micro-B Cable - 6 Foot**
CAB-10215
USB 2.0 type A to micro USB 5-pin. This is a new, smaller connector for USB devices. Micro USB connectors are about half the heig...
-  **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 replacing the class...
-  **Wall Adapter Power Supply - 5V DC 2A (Barrel Jack)**
TOL-12889
This is a high quality switching 'wall wart' AC to DC 5V 2000mA Barrel Jack wall power supply manufactured specifically for SparkF...
-  **SparkFun Solder-able Breadboard - Mini**
PRT-12702
This is the Mini SparkFun Solder-able Breadboard. A bare PCB that is the exact size as our mini modular breadboards with the sam...

Note: If you do not want to sew or use conductive thread, exchange the LilyPad LEDs and LilyPad button for through-hole components and solder on a bigger protoboard instead.

You could use a 3.7 LiPo battery to power both the LilyPad USB board and the heating pads. Remember: You will still need a MOSFET, because having two heating pads will draw more current than the LilyPad pins can handle. This option is nice, since you can use the LilyPad to charge the LiPo battery when the heating pad isn't in use. The draw back to using a 3.7v LiPo battery is that the heating pads won't get as warm as they would with a 5v (or higher) power supply.

In this setup, we use the LilyPad USB, because you won't have to get an extra FTDI basic for an USB connection.

Directions

The first step is to select your fabric. When picking a fabric, you want to consider the following:

- Is the pattern on the fabric going to work, or look out of place? If you are going Snuggie style, will you need to

add extra fabric for the arms?

- On what level of awesome is the fabric you are selecting? Meaning, how fast are you going to get sick of looking at it?
- Is the fabric thick, cozy, and going to keep the rest of your body warm? Sheer, light fabrics don't help to keep you warm during the winter months.

In the video below, you'll see that you can get as weird as you want when customizing your blanket:

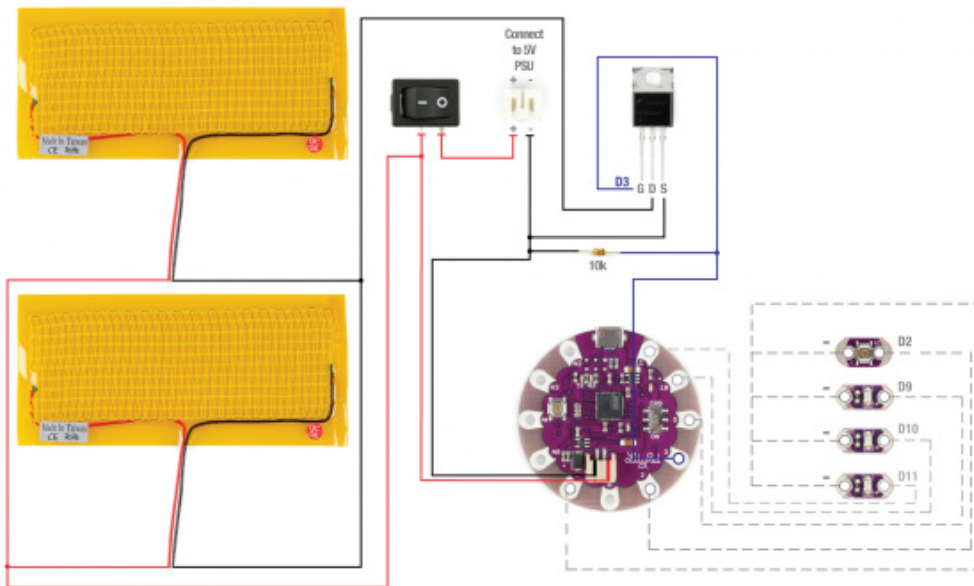
For the example in the video, extra fabric and button snaps were sewn on the back of the blanket for easy removal for washing.



If you don't have a sewing machine, or don't want to sew, you can do a No-Sew blanket and be creative when adding a pouch that holds your heating pads and circuit. [No-Sew blanket tutorials](#)

Circuit

Here is a diagram of the circuit setup:



Having a hard time seeing the circuit? [Click the image for a closer look.](#)

Note: As you can see, the LilyPad LEDs and LilyPad Button were sewn into the fabric, but you can easily switch these for normal, through-hole LEDs, and a button soldered on a protoboard with the other soldered components.

Warning! Make sure to solder hook-up wire to your heating pad connections. DO NOT try to use conductive thread to connect the two heating pads.

Example Code

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.](#)

```
language:c
/*
```

```
Heating Pad Hand Warmer Blanket Code Example
SparkFun Electronics, Pamela, 1/24/2013
Beerware License
```

```
Hardware Connections:
```

```
-led1 = D9;
-led2 = D10;
-led3 = D11;
-button = D2;
-Mofset = D3;
```

```
Usage:
```

```
Hit the switch to power, hit the button to adjust how warm the heating elements get, and three LEDs will indicate low, medium, and high levels.
*/
```

```
int btnPin = 2;
boolean btnPressed = false;
int fetPin = 3;
int led1 = 9;
int led2 = 10;
int led3 = 11;
int mode;
```

```
void setup() {
  // initialize the digital pin as an output.
  pinMode(btnPin, INPUT_PULLUP); //set internal pull-up resistor for button
```

```

pinMode(fetPin, OUTPUT);
pinMode(led1, OUTPUT);
pinMode(led2, OUTPUT);
pinMode(led3, OUTPUT);
}

// the loop routine runs over and over again forever:
void loop() {
  //Increment mode on depress, unless mode = 3, then reset to 0
  if (btnPressed && digitalRead(btnPin) == LOW)
    mode = mode == 3 ? 0 : mode + 1;
  //Assign button state
  btnPressed = digitalRead(btnPin);
  switch (mode)
  {
  case 0:
    analogWrite(fetPin, 0); //off
    digitalWrite(led1, LOW);
    digitalWrite(led2, LOW);
    digitalWrite(led3, LOW);
    break;
  case 1:
    analogWrite(fetPin, 85); //33% duty cycle
    digitalWrite(led1, HIGH);
    digitalWrite(led2, LOW);
    digitalWrite(led3, LOW);
    break;
  case 2:
    analogWrite(fetPin, 170); //66% duty cycle
    digitalWrite(led1, HIGH);
    digitalWrite(led2, HIGH);
    digitalWrite(led3, LOW);
    break;
  case 3:
    analogWrite(fetPin, 255); //100% duty cycle
    digitalWrite(led1, HIGH);
    digitalWrite(led2, HIGH);
    digitalWrite(led3, HIGH);
    break;
  }
}

```

There you go! As with any DIY project, you should always customize and tweak what you want for maximum awesomeness.

Warning: Make sure when using heat pads, not to leave unattended!

Resources and Going Further

For more information about the heating pads, check out the resources below:

- [Datasheet for 5x10cm & 5x15cm Heating Pads](#)
- [SparkFun Product Showcase: Stress Testing the Heating Pads](#)
- [SparkFun Valentine's Day Gift Guide!](#)

Need some inspiration for your next project? Check out some of these related tutorials:

[21st Century Fashion Kit: Electrochromatic Circuits](#)

Diana Eng walks you through a magically appearing design made with an thermochromatic pigment.
[Favorited Favorite](#) 8

[DIY Heated Earmuffs](#)

Embedded with heating pads and four Neopixel rings, these earmuffs do more than your average winter accessory to keep you warm while still looking good.

[Favorited Favorite](#) 5

Or try controlling [thermochromatic pigment](#) with the heating pads.

[Engineering Roundtable - DIY Heated Seats](#)

[December 16, 2013](#)

[Favorited Favorite](#) 0

[Responsive Wearables: The 21st Century Mood Ring](#)

[July 25, 2017](#)

[Favorited Favorite](#) 3

If you liked this project, we recommend checking out our older tutorials related to e-textiles:

- [Twinkling Fairy Wings](#)
- [LilyFlyer](#)

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