

Pressure Sensor Easter Egg Hunt Instruction Sheet



During our investigation into sensors we found the pressure sensor to work best with our giant Easter egg.

Note: We have a lot going on with this template so follow our build steps carefully as you build your own pressure sensor circuit.

Step 1 – Supplies:



Image 1



Image 2

1.1 You need to print your circuit template using landscape orientation with double sided printing, flipped on the short edge. **Image 1** above shows the front and back of the template printed separately only to show you what both sides look like. The above image also shows the template with the stand cut off which you will do in step 3.1 below.

1.2 You will also need 4 flashing LEDs, a coin cell battery, a 3/4" piece of foam tape, and around 34" of copper foil tape with conductive adhesive (**Image 2**).

We're using flashing LEDs again, but your kids can choose any colors available. It's always more fun for the kids when they can add a little of their own style to these projects.

Step 2 – Testing:

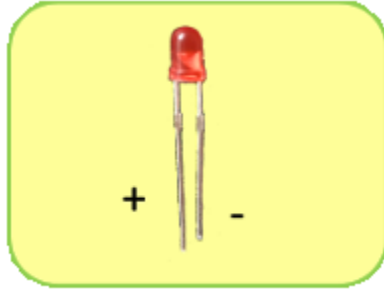


Image 3



Image 4

2.1 Test your battery and LEDs. The longer leg of the LED is positive, and the shorter leg is negative (**Image 3**). You can also use the flat side of your LED to determine which leg is negative as it's the leg closest to that side. We had a hard time finding the flat side during our investigation though, so we always looked at the leg length when testing.

2.2 Polarity is important with LEDs so be sure to place the positive leg on the positive side of the battery and the negative leg on the negative side. If both the battery and LED are working you should see the LED light up (**Image 4**).

If the LED doesn't light up, try switching the direction of the LED legs. If it still doesn't work, you either need a new battery or a new LED. It's a lot easier to replace a bad battery or LED now before you start the project, so these tests are very useful.

Step 3 – Build:

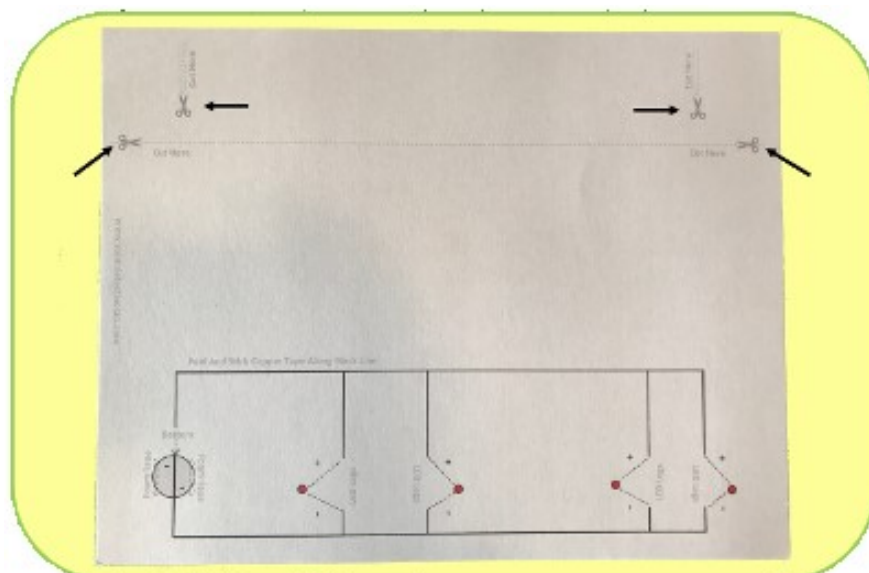


Image 5

3.1 The back of the template has four scissor symbols that show you where you need to cut the template. Cut along the horizontal dotted line first. This section will be used as a stand for your completed project, so cut carefully. Fold this strip in half and cut out the rectangular sections marked with the scissor symbols at the same time, forming identical groove marks to set your finished template in (**Image 5**).

3.2 Let's take a closer look at this circuit so you have a better idea of what you will be building:

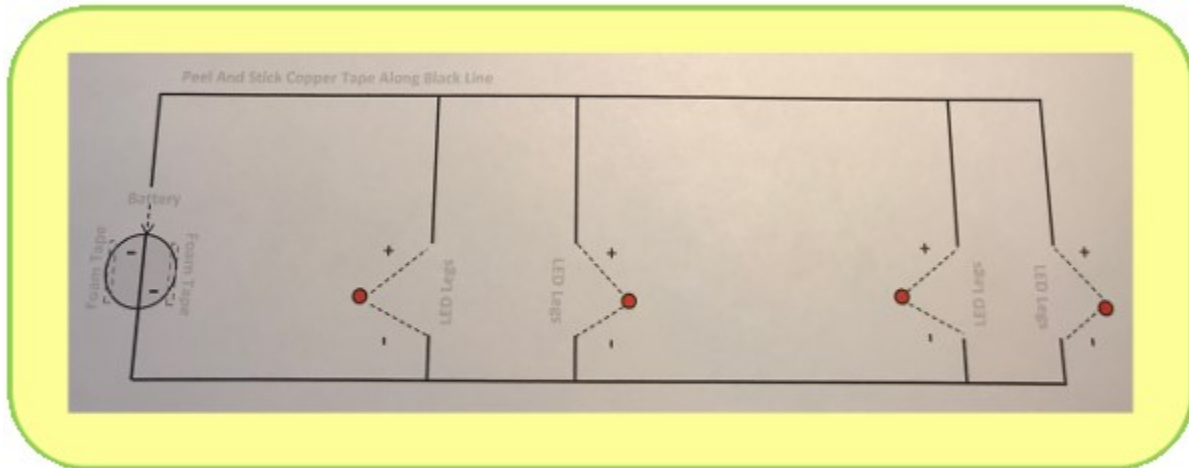


Image 6

This pressure sensor circuit is very similar to the parallel circuit tutorial from our [Valentine Paper Circuit](#) post. The difference is located at the power source, and how we designed the sensor used to close the circuit.

The two thin strips of foam tape, at the far left of the circuit, act as spacers to prevent the copper tape from touching the battery. The circuit will only close when you firmly press the giant Easter egg from the front. When pressed, the copper tape will make contact with the negative side of the battery. The positive side of the battery will already be connected to the copper tape pathway, so no other steps will be needed to close the circuit and light the LEDs. As soon as you stop pressing the giant egg the circuit will open and the LEDs no longer flash.

The solid black lines mark the paths for the copper tape. The small red circles represent the placement of the LEDs, with the attached dotted lines showing the position of the positive and negative LED legs. The gray circle located at the far left of the circuit represents the battery position, and the small dotted rectangles on each side of the circle are where you will place the foam tape spacers (**Image 6**).

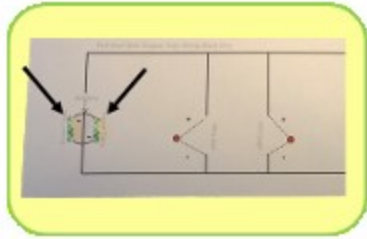


Image 7

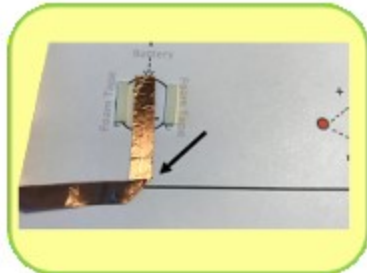


Image 8

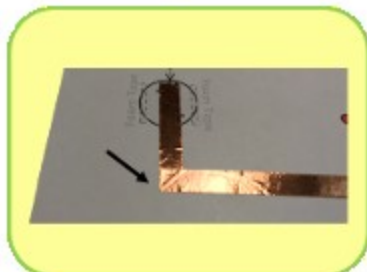


Image 9



Image 10



3.3 Attach two small slivers of foam tape to the rectangle boxes located on either side of the gray circle. Be sure to stay within the areas marked. If the spacers are placed inside the circle they could interfere with the pressure sensor (**Image 7**).

3.4 Attach the copper tape to the outer solid black line, peeling the backing off as you go. Start in the gray circle marked with the '-' sign and follow the black line counter clockwise (**Image 8**).

Note: During our investigation we found that if you remove the backing all at once the copper tape will twist and stick to itself.

3.5 Corners can be tricky but we're using copper tape that's conductive on both sides. A little twist in the tape at the corners should be just fine.

3.6 When you reach a corner the trick is to bend the copper tape in the opposite direction from where you want to go first, creating a diagonal fold (**Image 8**).

3.7 Hold this folded section in place with your finger as you bend the copper tape back over the fold to continue going in the right direction. You should see a nice corner formed but don't worry if it's messy. It gets easier with practice (**Image 9**).

Note: We found it easier to create cleaner corners by removing the excess white backing material before we folded the corners.

3.8 Finish placing the copper tape along the outer black line. When you reach the LED gap use your fingers to cut the tape and then continue placing the tape along the outer line on the other side of the gap (**Image 10, arrow on the right**).

3.9 Stop attaching the copper tape when you reach the end of the outer black line where you see the Battery label (**Image 10, arrow on the left**).

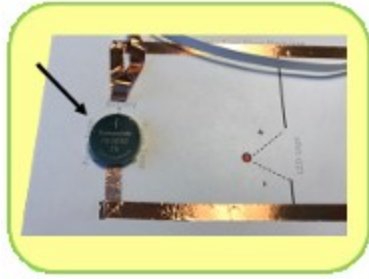


Image 11

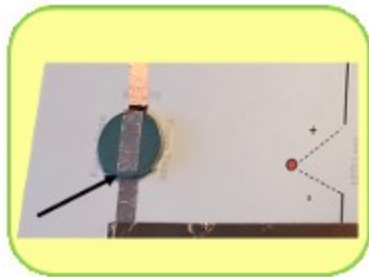


Image 12

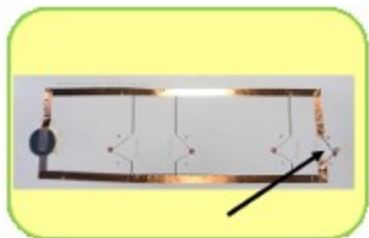


Image 13

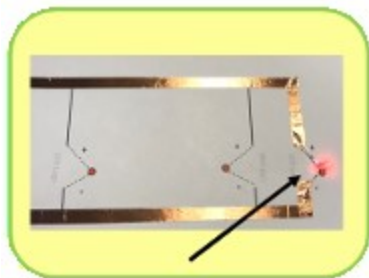


Image 14



3.10 Place the battery, positive side up, on the two foam spacers. Make sure the battery is centered over the gray circle (**Image 11**).

3.11 Continue running the copper tape along the dotted black line, and across the battery to its far edge. Be sure to stop at the edge so it doesn't touch the copper tape from the beginning of the circuit (**Image 12**).

Note: If this end of the copper tape touches the section of copper tape under the battery it will short circuit.

3.12 You just completed the pressure sensor and power source. It's time to connect the first LED to the gap along the outer pathway. It's easier to trouble shoot a problem in the circuit now before additional pathways are added.

3.13 Bend the LED legs wide enough to connect to the copper tape on both sides of the gap, line the legs up with the dotted lines and the LED to the red circle (**Image 13**).

3.14 Tear off two small pieces of copper tape and use them to cover the LED legs and stick them to the existing copper tape (**Image 14**).

Note: Remember that polarity matters. The positive leg needs to connect to the side marked positive and the negative leg needs to connect to the side marked negative.

3.15 Press the giant Easter egg on the front of the template. Once you see the LED light up you will be ready to build the other three pathways in the circuit (**Image 14**).

Note: If your LED doesn't light up, you should check out our trouble shooting tips at the beginning of this post, next to the investigation tab.

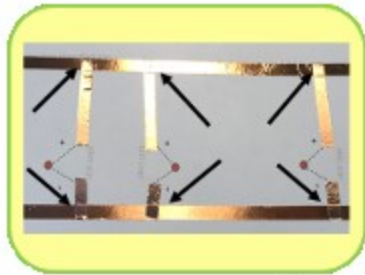


Image 15

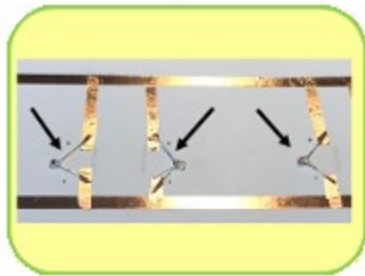


Image 16



Image 17



Image 18

3.15 Press the giant Easter egg on the front of the template. Once you see the LED light up you will be ready to build the other three pathways in the circuit (**Image 14**).

Note: If your LED doesn't light up, you should check out our trouble shooting tips at the beginning of this post, next to the investigation tab.

3.16 Attach the copper tape to the remaining three pathways that cut vertically through the circuit. Start at the top of each line and be sure to overlap the piece of copper tape already in place so a connection is formed (**Image 15**).

3.17 Run the copper tape down along each black line. When you reach the gap in each pathway use your fingers to cut the tape and then continue placing the tape along the black line on the other side of the gap. Each pathway is complete when the copper tape overlaps the horizontal copper tape along the bottom of the circuit (**Image 15**).

3.18 It's time to connect the other three LEDs. Bend the LED legs wide enough to connect to the copper tape on both sides of the gaps, line the legs up with the dotted lines and the LEDs to the red circles, one LED per pathway (**Image 16**).

Note: Remember that polarity matters. The positive leg needs to connect to the side marked positive and the negative leg needs to connect to the side marked negative.

3.19 Tear off two small pieces of copper tape and use them to cover the LED legs and stick them to the existing copper tape (**Image 16**).

3.20 Congrats! You have just finished creating your pressure sensor template (**Image 17**).

3.21 Set the template in the stand created in step **3.1**, with the picture facing forward. Press the giant Easter egg from the front and watch the LEDs light up (**Image 18**).

Now that you have a working circuit you may want to use some scotch tape to secure the LED bulbs to the back of the template. You can also poke a small hole through the template near each LED if your kids would like the LEDs to shine a little brighter from the front.