

WYRKSHOP MOBILE MAKERSPACE

LilyPad Protosnap Plus Sewing

ESTIMATED TIME: 3 HOURS



LEARNING OBJECTIVES

- Learn how to create a concept map
- Discover the art of hand sewing
- Create a custom beanie

PREREQUISITES:

- LilyPad Protosnap Plus coding lesson plan
- Custom LilyPad code uploaded and tested on LilyPad

LEVEL: 3

MATERIALS NEEDED:



LilyPad Protosnap Plus Kit



Beanie



Paper



Hot Glue Gun



Embroidery Machine (optional)



Pencil and markers

ACTIVITY OUTLINE:

STEP 1:

If you plan on embroidering your beanie, do that now.

Once your beanie is customized with a design, its concept map time! These are easy to make with a little practice. What I like to do is imagine all the components I have to put onto the surface (don't worry, nothing has to be to scale. First write out what components your Arduino code uses.

LILYPAD MAIN COMPONENT

BUZZER

GREEN LEDS

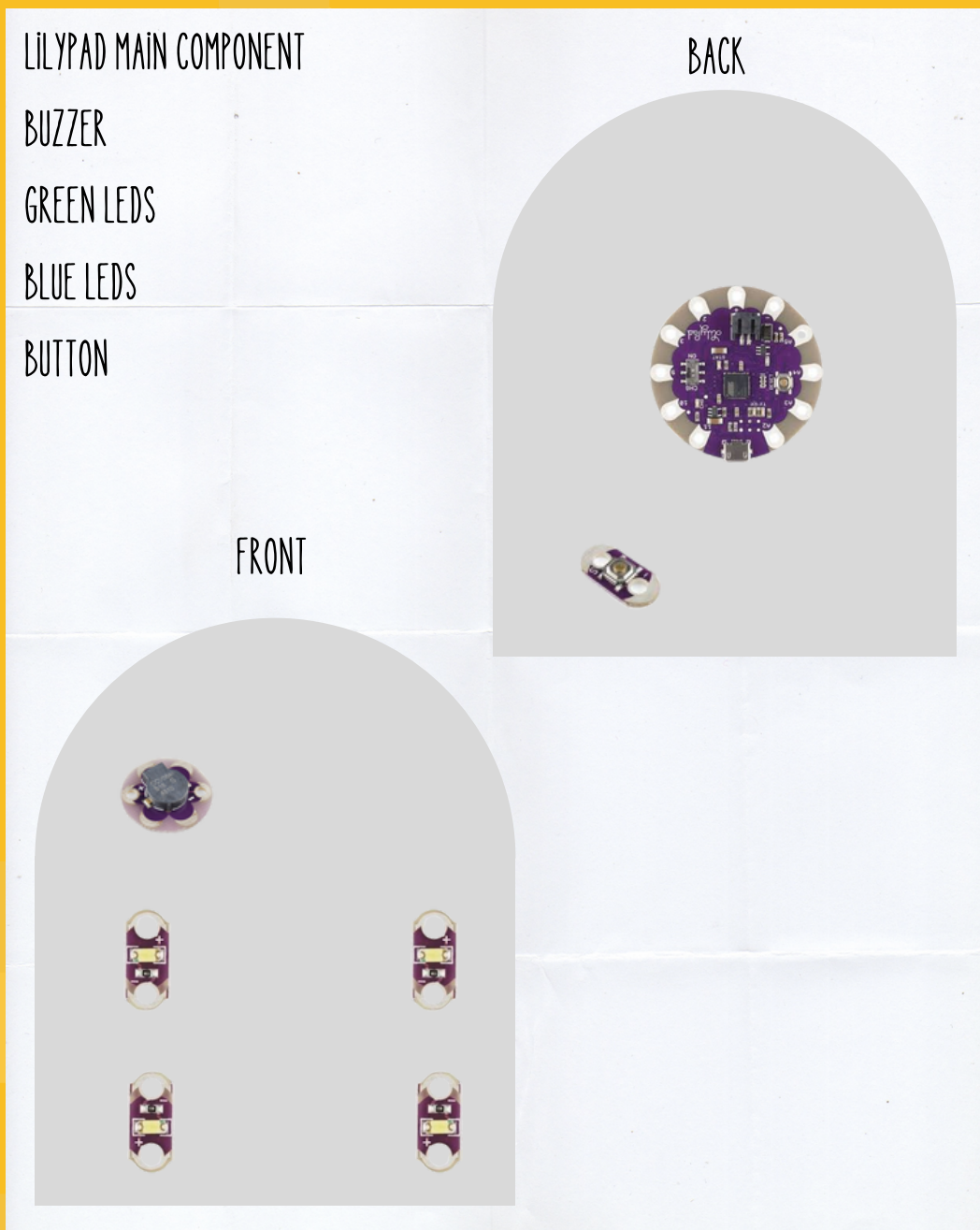
BLUE LEDS

BUTTON

ACTIVITY OUTLINE:

STEP 2:

Next draw out the front and back of the beanie and plan out generally where all the components will lay. Do not snap out any components yet!



ACTIVITY OUTLINE:

STEP 3:

Now, take a close look at the LilyPad. Do you see those silver lines connecting the components to the main board? Well, those are telling you what prong (the smooth oval thing on the main component with a hole in it) to sew that specific component to. For example, trace the line of the buzzer back to the main component. This is line A3 and if you look close enough, on the Lilypad main component you will see a small A3. This means that once the components are snapped out, they need to be sewn back to the main board and connected to that prong.

STEP 4:

Take a look at the negative connections on the components. You will notice these all lead back to the same negative prong. The main component actually has two negative prongs. You can connect all the negatives together and sew them back to the negative prong or to one of the two negative prongs. **Do not sew a negative to the wrong port!** This can break the Lilypad.

STEP 5:

Don't get your wires crossed. When you are planning out your sew lines, don't get your thread from one component crossed with another. This can break the Lilypad component. You may be asking yourself, can I just go under while one goes over? This is not advised. The cords can still get crossed, and we don't want that!

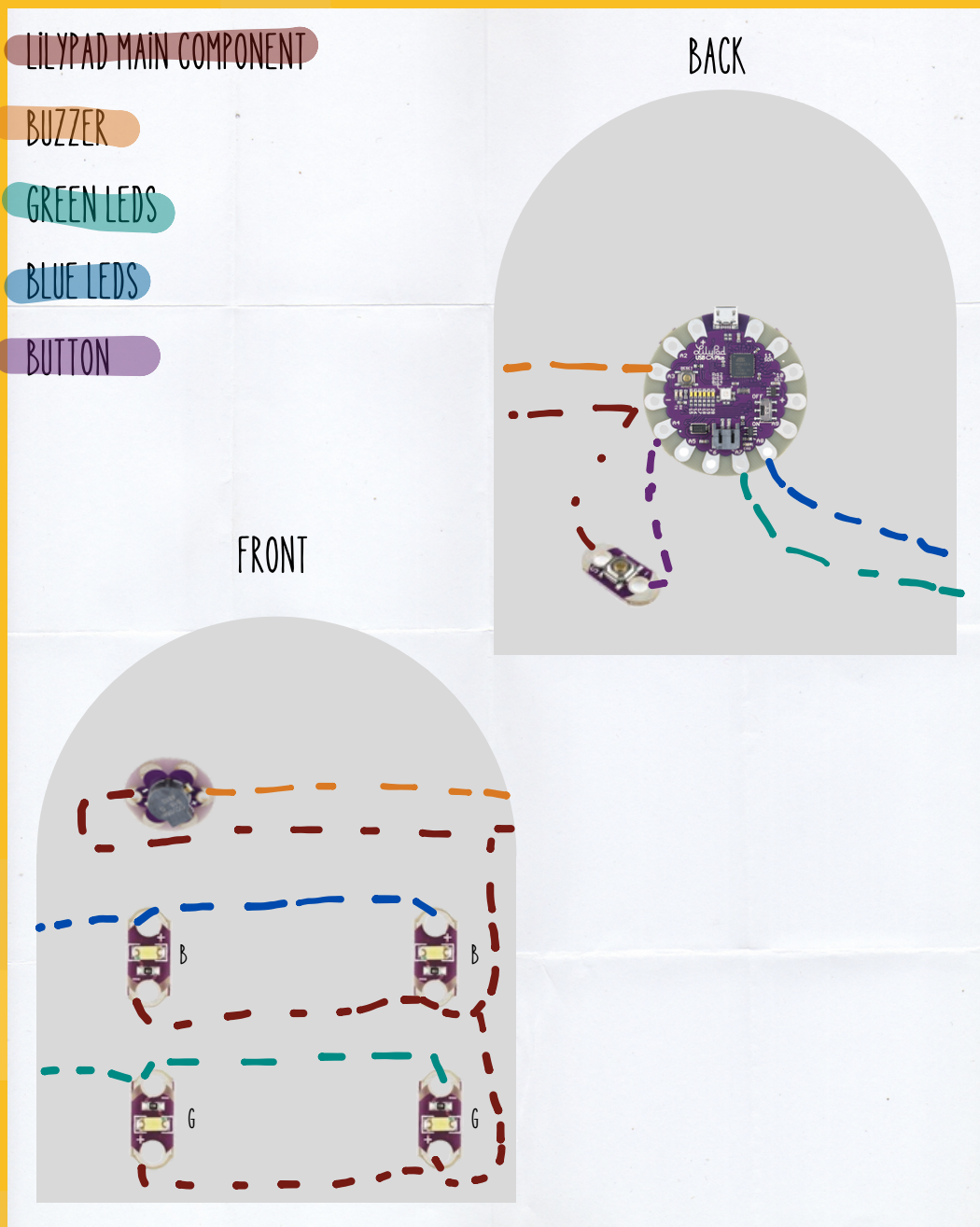
STEP 6:

Last lesson before we get to planning, some components don't indicate polarity (have one side that is negative and one that is positive). This is because it doesn't matter which side is negative and which is positive, as long as one goes to each you will be fine! These components are the button and switch.

ACTIVITY OUTLINE:

STEP 7:

Draw lines from your components leading back to the board. Make sure no lines intersect! Once you have this done, highlight your lines and make a key of your components. In this case, my main component is highlighted in red to denote my negative, buzzer in orange, green LEDs in green, blue LEDs in blue, and button in purple.



ACTIVITY OUTLINE:

STEP 8:

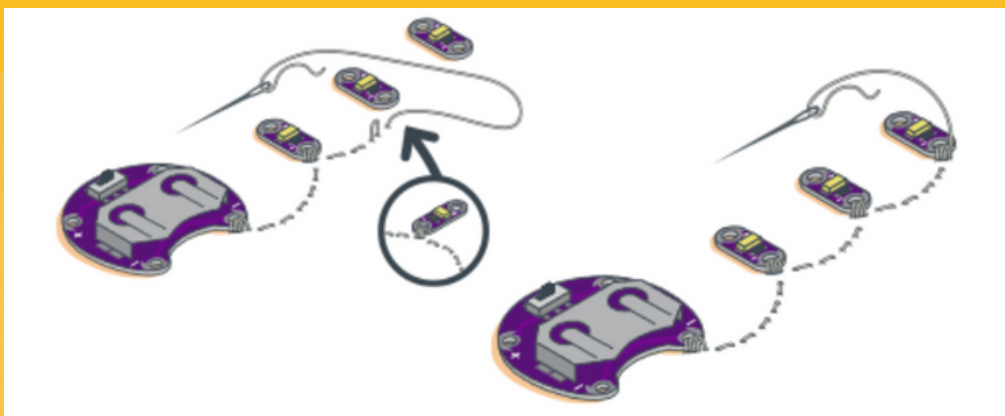
If everything looks good, its time to break your components out from your board. Now, lay out your components onto your hat in their correct orientation. Put a dot of hot glue on the back of all of your components and glue them into place. Do not put any hot glue on the prongs, this will interfere with conductivity.

STEP 9:

Now let's get into the basics of sewing electronics. Before swing, make sure your battery is not connected to the LilyPad. Use the "thread" provided (this isn't actually thread its stranded steel, but for these purposes we will call it thread) and the needles. Sew from the main component to the accessories (buzzer, LEDs etc.) using the steps below. Keep clean close stitches for best results. Below are a few helpful tips and images:

STARTER KNOT:

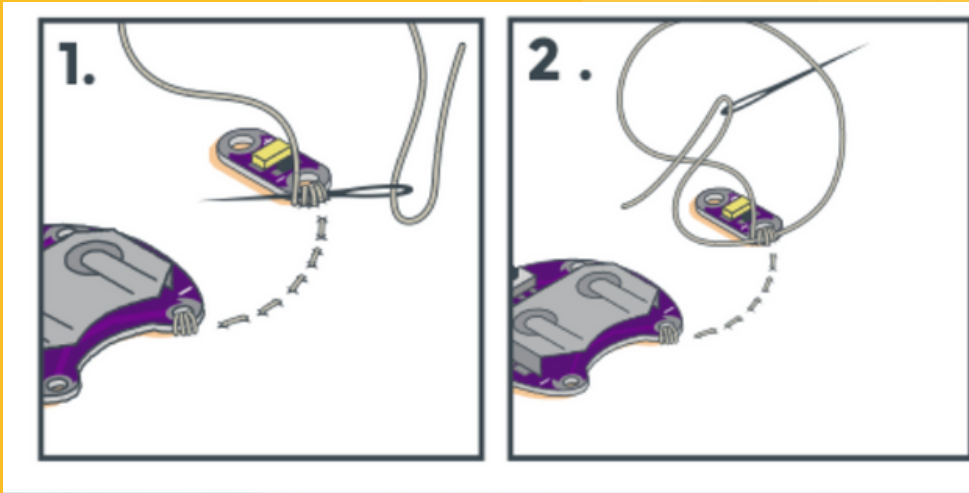
Do not tie the thread onto the needle. Keep ahold of the tail as you sew. Loop the thread around the prongs 4-5 times for proper connection.



SEWING TO MULTIPLE COMPONENTS:

Don't tie off thread until you reach your final component. Loop 4 times around each prong, then sew to the next.

ACTIVITY OUTLINE:



STOPPING AT A COMPONENT:

Keep clean stitches. When you reach a component go around 3-4 times to tie off, do a figure 4 knot.

FINISHING KNOT (FIGURE 4 KNOT):

This image shows how to do a figure 4 finishing knot. Do this finishing knot 2 times to make sure it sticks.

