# Exploratory 9 – Sound Sensing LED Display

Printed Circuit Board (PCB) Assembly

Important – The ability to make GOOD solder connections (think Mt. Fuji) is critical to the successful outcome of your project. You MUST complete the soldering practice board BEFORE attempting the actual project PCB and have reasonable confidence that you can make solder connections that will work!

Use the following diagrams of the PCB for reference when soldering in components:
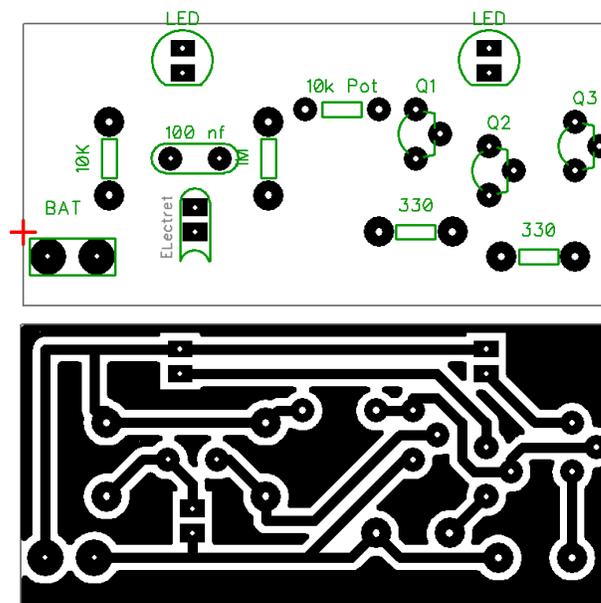

Step 1 – solder in all resistors (Pro Tip – shine copper with steel wool and keep banding direction consistent so the board can be easily read)
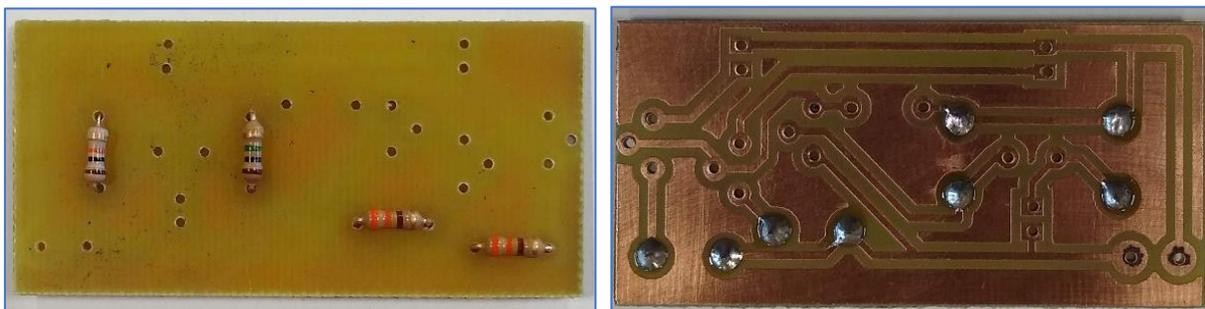
Step 2 – Solder in the ceramic disc capacitor. Make sure it has the number 104 printed on it. This type of capacitor <u>HAS NO POLARITY</u>, so direction doesn't matter.

Step 3 – Obtain two 'Super Bright' LED from your teacher. Solder them in remembering that these <u>DO HAVE POLARITY</u> and need to be installed in the correct direction. Consult the diagram at the beginning of this document to determine which way they go. These need to sit flat on the board!
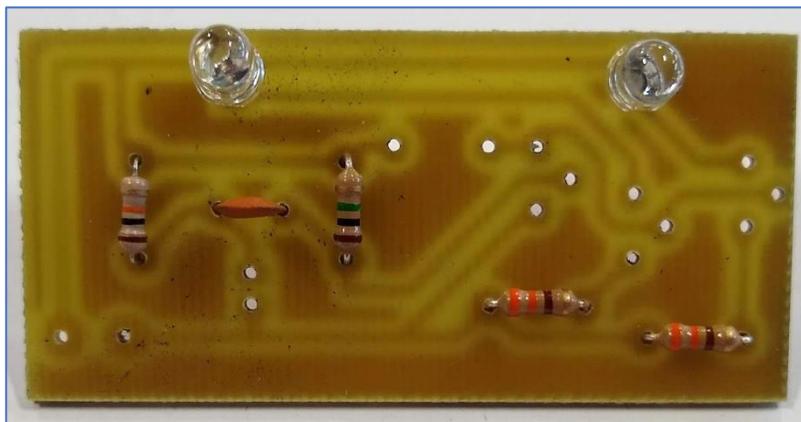
Step 4 – Solder in the Electret Microphone. Trouble keeping it in place? Use a piece of masking tape. Electret microphones <u>HAVE POLARITY</u>! Have your teacher identify the lead on the microphone that is negative and consult the drawing at the beginning of this document to determine where it goes!
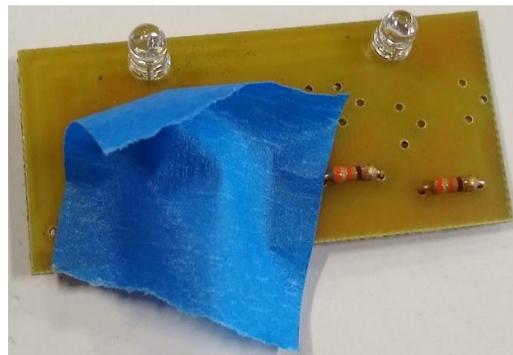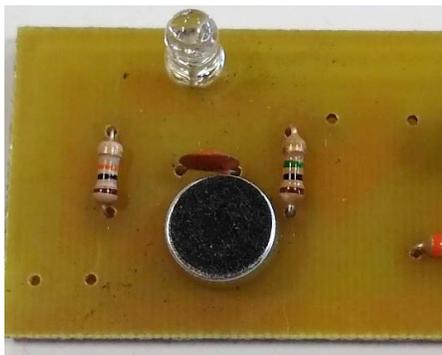
Step 5 – Solder in the three transistors. Note the flat face and its direction. Consult the diagram at the beginning of this document for further reference. Use tape to keep them in place while soldering.

Step 6 – Obtain approximately 10 cm of wire for the power connection. Strip the wires at each end removing only approximately 0.5 cm when doing so.

Step 7 – Neatly twist the strands of the wire, then 'Tin' the wire by applying a small amount of solder. Be sure to not increase the size of the wire as this might make it difficult to insert into the PCB.

Step 8 – Solder the power wires to the PCB. <u>TAKE CARE</u> to connect the red wire to the hole nearest to the short edge of the board.

Step 9 - Obtain approximately 10 cm of wire for the potentiometer. Strip the wires at each end removing only approximately 0.5 cm when doing so. Twist the strands neatly and tin all wires (see step 7).

Tin the potentiometer leads that are to be used. This time try to leave an extra bit of solder behind when doing so.

Using needle nose pliers to hold the wire and a 'third hand' to hold the potentiometer, bring the wire and the terminal in contact with each other. Use the soldering iron to 'Re-flow' the tinned connections. They should melt together without extra solder being needed.

Step 10 – Solder the other ends of the potentiometer's wire into the board.   It does not matter which wire goes in which hole as potentiometers <u>HAVE NO POLARITY</u>.

Step 11 – Test operation. Set the bench top power supply to 5 volts and connect your project (insert wire ends into power terminals). BE CAREFUL TO RESPECT POLARITY, red to red and black to black. Talk to your project. Yes, talk to it! Adjust the potentiometer to achieve the sensitivity required and observe the pretty lights 😊

Step 12 - Apply hot glue to your PCB as shown. Make sure the wires are going the way shown in the picture. Hold the tip of the glue gun in contact with the board/wires as applying and carefully squeeze out the appropriate amount of glue. By doing this we create a 'strain relief' that works to prevent the wires from breaking at the board.
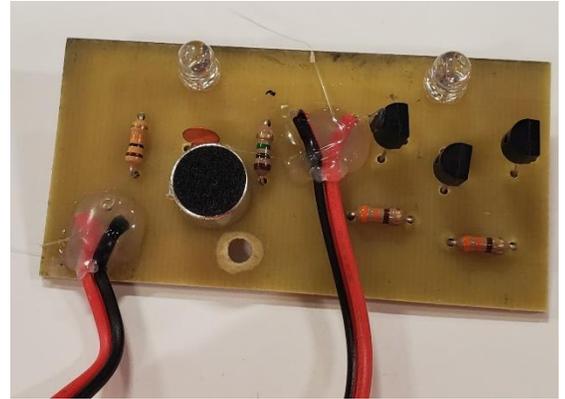
Step 13 – Obtain a micro-USB port. Insert a micro USB cable into the port, then carefully apply hot glue around the outside edges of the USB port to help keep the port secured to the PCB Board. Add a little extra to each corner nearest the wire connections to be. This will be used as insulation later.

Step 14 – Insert the power wires into the correct location on the USB circuit board so that they enter on the flat side and exit on the side that has the USB port. (VBUS = positive & GND = negative)

Step 15 - Solder the power wires to the USB circuit board on the side of the board that has the port. DO NOT let the solder connect to another wire location!
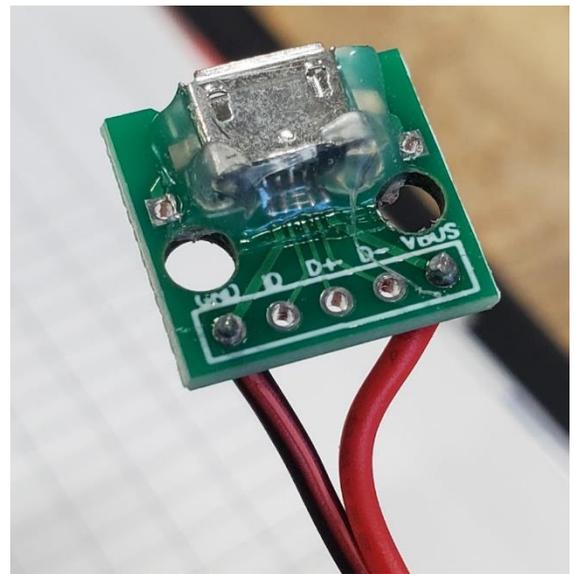
Congratulations! Your project's circuit board is now complete. If you haven't already done so you should move on to making the stand and the tile.