

LED Umbrella Instructions

PART I: LED ASSEMBLIES

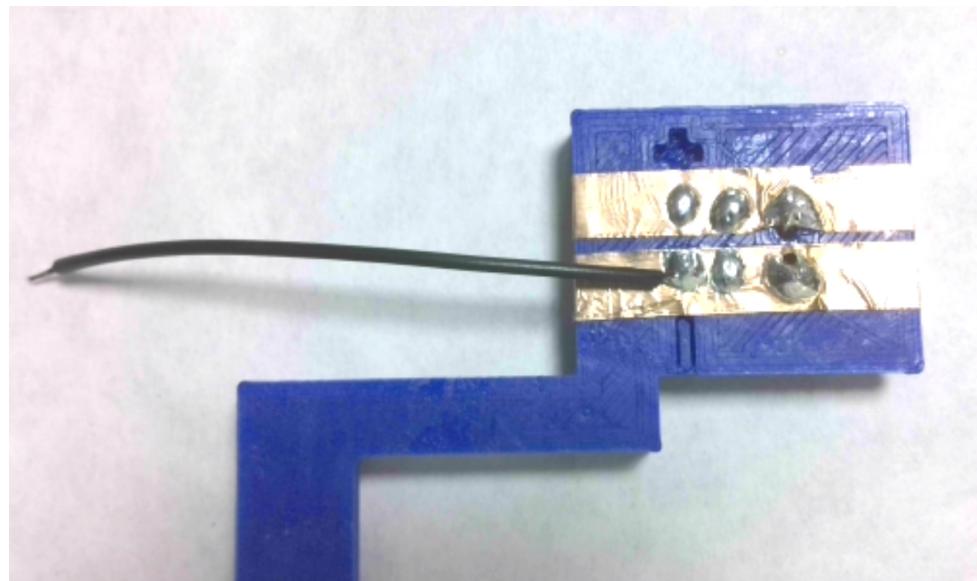
Quick Overview:

- Three stage process
 - Stage I: LED Assemblies
 - Stage II: LED Rib Strands
 - Stage III: Umbrella Assembly
- Each stage depends on parts from the last stage.

1. How to Make the LED Assembly (Row 1-7):

1.a. Final Product:

1.a.1.



1.b. Parts:

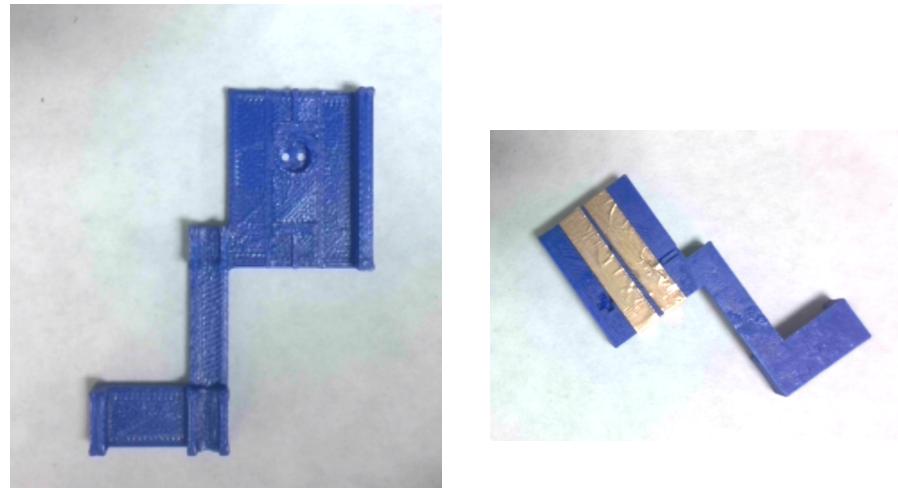
1.b.1.

Part	Count
Copper Tape	2
LED	1
Black Wire (2.8 in / 72 mm)	1
Solder Tin	6
3D Printed LED Assembly Part	1

1.c. Steps:

1.c.1. 3D Printed LED Assembly Part:

- 1.c.1.○ Apply the 2 pieces of copper tape to the 3D printed part, making sure they do not touch. There is a ridge on the front that serves to guide the placement of the copper tape. Copper tape should cover the holes in the bottom of the 3D printed part.

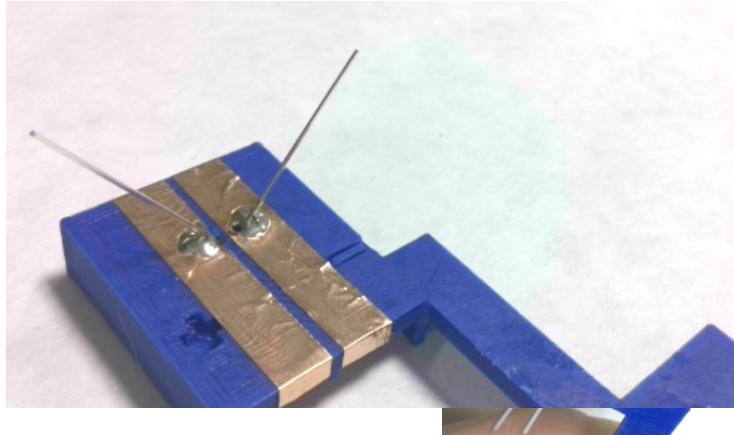


- 1.c.1.○ Take a small tool to puncture a hole on the other side of the copper tape from the top side of the assembly, making sure to avoid loosening the copper tape's hold from the top.

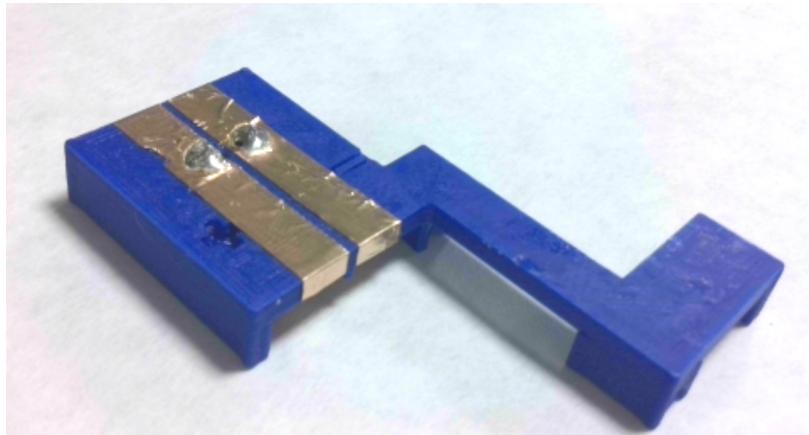


1.c.1.○ Place LED legs in holes. Align the long leg with the hole that has a “+” symbol on the opposite side. Likewise, do the same for the shorter leg for the “-” symbol.

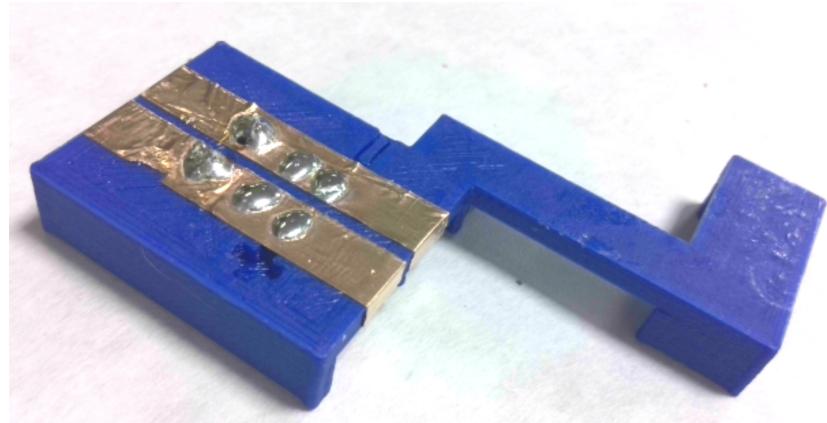
1.c.1.○ Turn legs to the side slightly at a 30 degree angle. Apply solder to the legs and to the copper tape around the LED legs. The solder joint should be clean and resemble a small hill in shape.



1.c.1.○ Remove LED legs with a wire cutter.



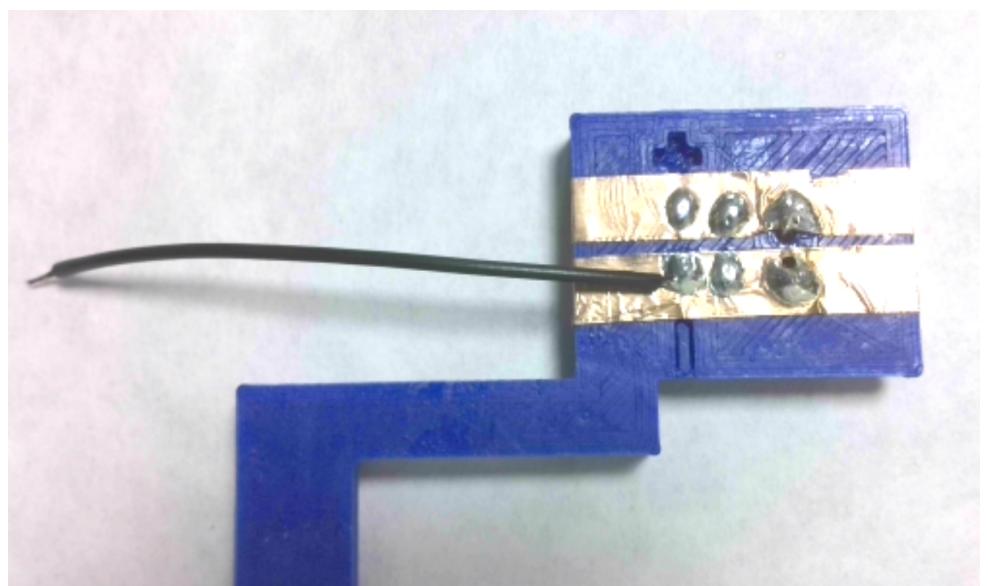
1.c.1.○ Tin the copper tape with 4 solder joints with 2 for each copper tape. Make them close enough as seen in the below image:



1.c.1.○. Tin the pre-stripper black wire:

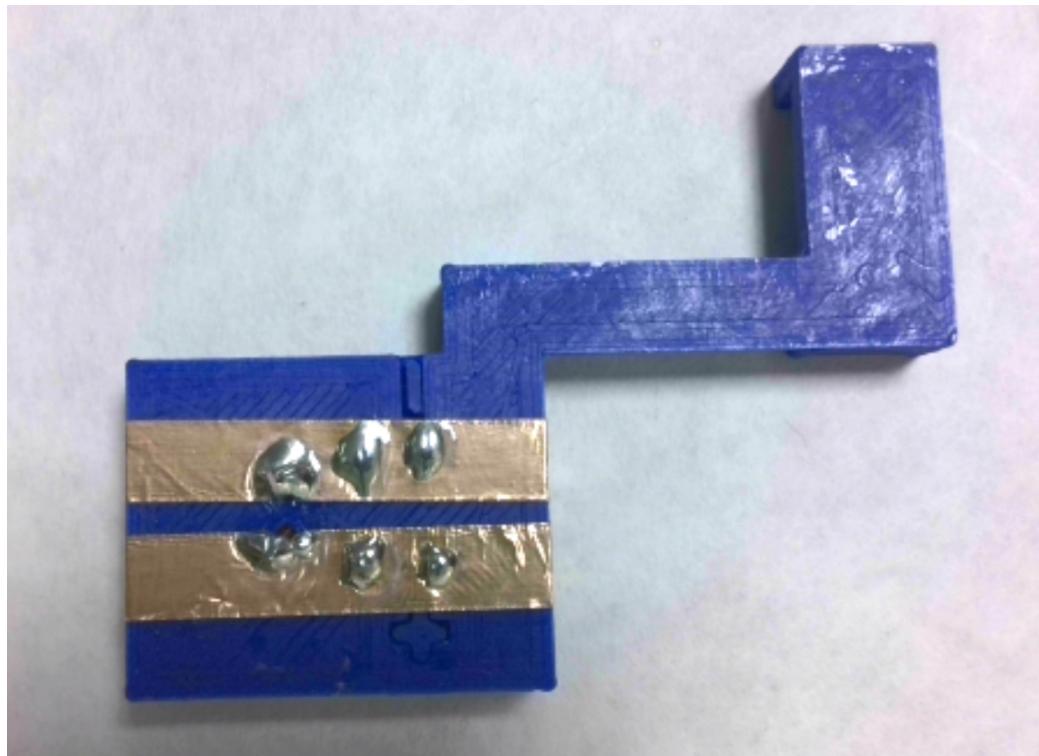


1.c.1.○. Solder the tinned blacked wire onto the assembly
exactly as seen in the image below:



2. How to Make the LED Assembly (Row 8):

2.a. Final Product:



2.a.1.

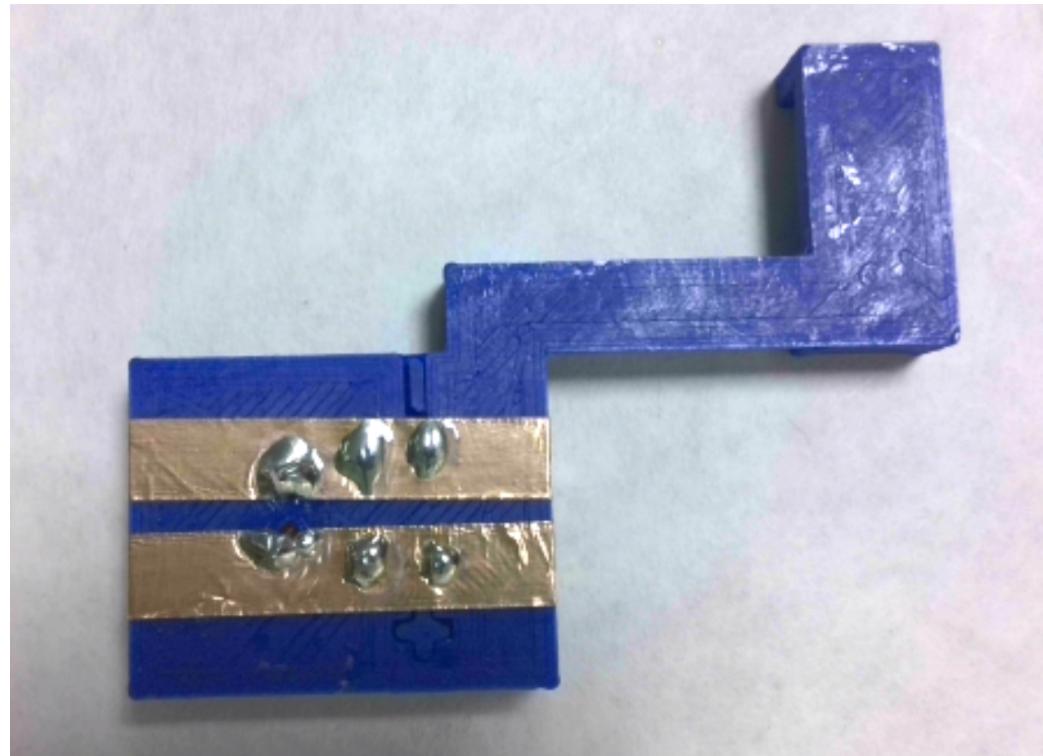
2.b. Parts:

2.b.1.

Part	Count
Copper Tape	2
LED	1
Solder Tin	6
3D Printed LED Assembly Part	1

2.c. Steps:

2.c.1. Follow the steps as listed in "***How to Make the LED Assembly (Row 1-7):***". The only change in the instructions is that there is no black wire to solder onto the LED assembly.



PART II: LED Rib Strands

3. How to Make the LED Rib Strand (Column 1-7):

3.a. Parts:

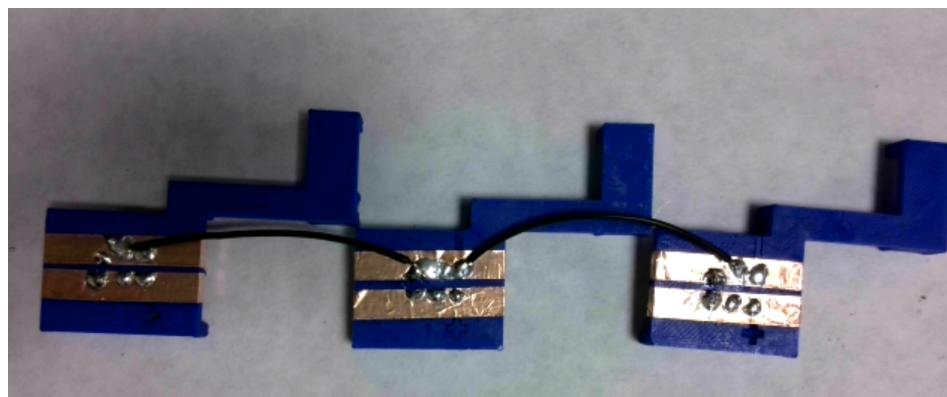
3.a.1.

Part	Count
LED Assembly (Row 1-7)	1
LED Assembly (Row 8)	1
Long Black Wire	1
Row 1 Red Wire (4 ½ inches/ 110 mm)	1
Row 2 Red Wire (6 ½ inches/ 16.3 mm)	1

Row 3 Red Wire (8 1/4 inches/ 21 mm)	1
Row 4 Red Wire (10 1/4 inches/ 26.2 mm)	1
Row 5 Red Wire (11 1/2 inches/ 30 mm)	1
Row 6 Red Wire (13 1/2 inches/ 35 mm)	1
Row 7 Red Wire (15 1/2 inches)	1
Row 8 Red Wire (16 inches/ 41 mm)	1

3.b. Steps:

3.b.1. Content



- 3.b.2. Take LED assemblies (Row 1-7) and solder black wire onto the second solder joint of the copper tape next to (-) symbol. Continue this until the 8th LED assembly is soldered.
- 3.b.3. Starting from row 1 until row 8, solder the appropriate red wire type from the solder joint closest to the LED's legs.
- 3.b.4. Solder the long black wire from the row 1 LED assembly of the created strand.

4. How to Make the LED Rib Strand (Column 8):

4.a. Parts:

4.a.1.

Part	Count

LED Assembly (Row 1-7)	1
LED Assembly (Row 8)	1
Long Black Wire	1

4.b. Steps:

- 4.b.1. Follow the steps as listed in "**How to Make the LED Rib Strand (Column 1-7)**". The only change in the instructions is that there is no red wire to solder onto the LED assembly.

PART III: Umbrella Assembly

5. LED Umbrella Assembly:

5.a. Parts:

- 5.a.1.

Part	Count
LED Rib Strand (Column 1-8)	8
Column 1 Row 1 Long Red Wire	1
Column 2 Row 2 Long Red Wire	1
Column 3 Row 3 Long Red Wire	1
Column 4 Row 4 Long Red Wire	1
Column 5 Row 5 Long Red Wire	1
Column 6 Row 6 Long Red Wire	1
Column 7 Row 7 Long Red Wire	1
Column 8 Row 8 Long Red Wire	1
Arduino Mega	1
Arduino Mega Case Bottom	1
Arduino Mega Case Top	1
Battery	1

Screw	2
Hex Nut	2

5.b. Steps:

- 5.b.1. Snap on the LED strands for each umbrella rib, leaving the column 8 LED strand for last.
- 5.b.2. Solder the red wire on each LED row of a given column to the following row of the next LED strand.
- 5.b.3. Solder the long red wire for each LED column at its appropriate location for the given column.
- 5.b.4. Connect long black and red wire to appropriate pin connections of the arduino.
- 5.b.5. Place arduino in case handle.
- 5.b.6. Attach case handle to umbrella handle.
- 5.b.7. Secure case to umbrella using screw and hex nut for both sides.