

Exploring techniques in blending hard and soft materials

Brim

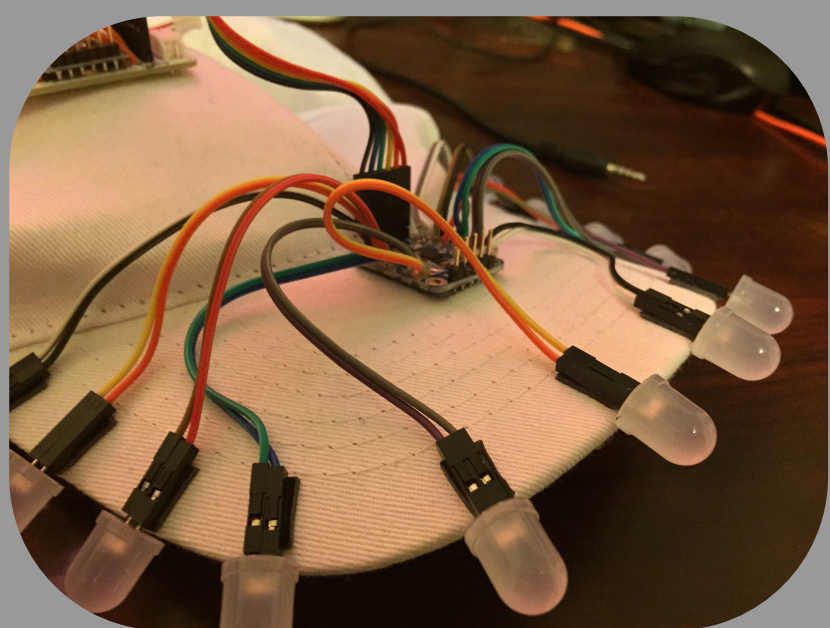
by Calvin Smith



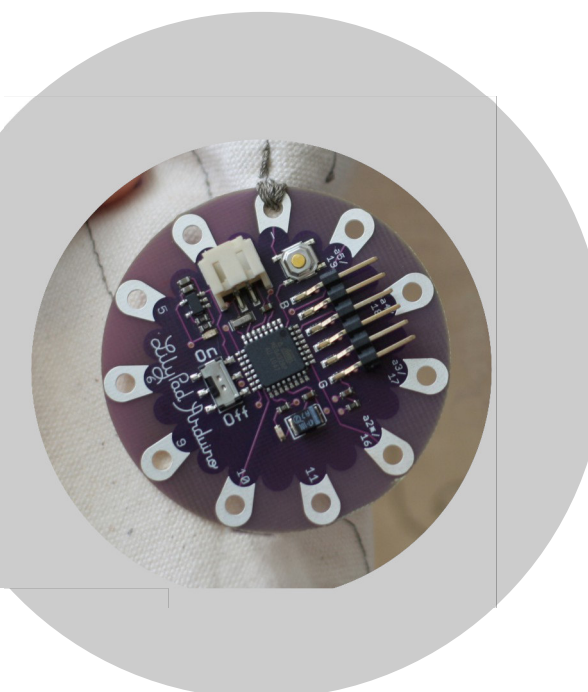
Goal:

This was an exploratory project to develop techniques for incorporating LEDs into a hat that respond to music. Coming from a technical background, my questions were primarily on manufacturing considerations

Earlier prototypes had wires everywhere. Wearing the hat was not easy, although the lights responded well.

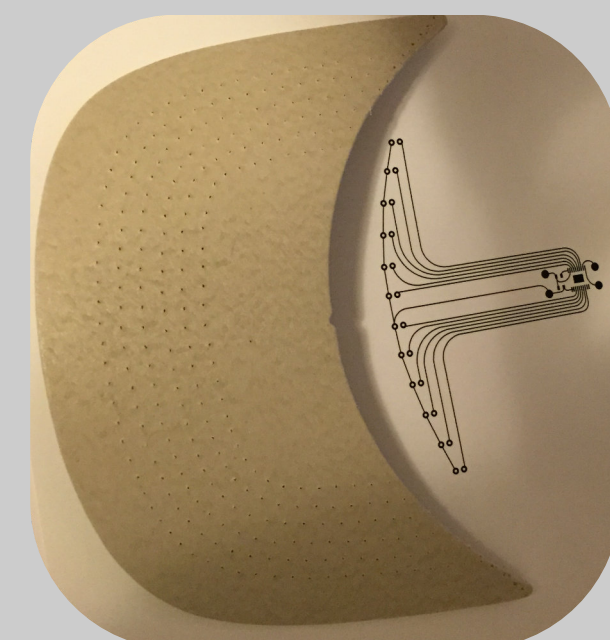


Modern technology available to hobbyists allows us to sew circuits into existing garments - this still results in an excess of stitching or bulky electronics plainly visible



Process

To remove bulk, we off-loaded some components and added an RF link between the pieces. The intent was to prevent wires (as in the prototype) from going everywhere by embedding them on the brim with a flexible PCB and putting the battery in the front panel. Unfortunately, the RF modules are sensitive and were damaged in construction, and the PCB resisted all attempts to be made flexible.



Online tutorials have already demonstrated how to make a hat react to the intensity of sound. Instead, this project utilizes a more sophisticated *spectrum analysis* to break the sound into channels.

1. Design

2. Etch

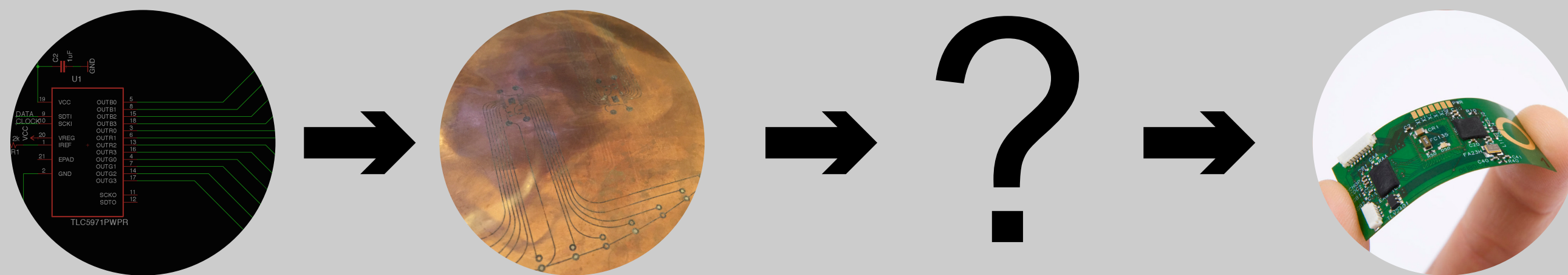
3. ???

Result

Towards the future:

1. Enable remote communication
2. Take advantage of economy of scale to produce flexible PCBs
3. Apply these techniques to other garments

Flexible PCB Creation:



Why is this so difficult?

1. Number of variables to control (paper, toner, method)
2. Different materials with drastically varying thermal properties

Resources:

<http://lilypadarduino.org/hat>
<https://learn.adafruit.com/vu-meter-baseball-hat/overview>
<http://pages.cs.wisc.edu/~cjsmith/music.html>
<http://www.businesskorea.co.kr/english/news>

For more info, visit:

pages.cs.wisc.edu/~cjsmith/music