

ECE 5725

Project Week 3 Progress Report

Monday Section

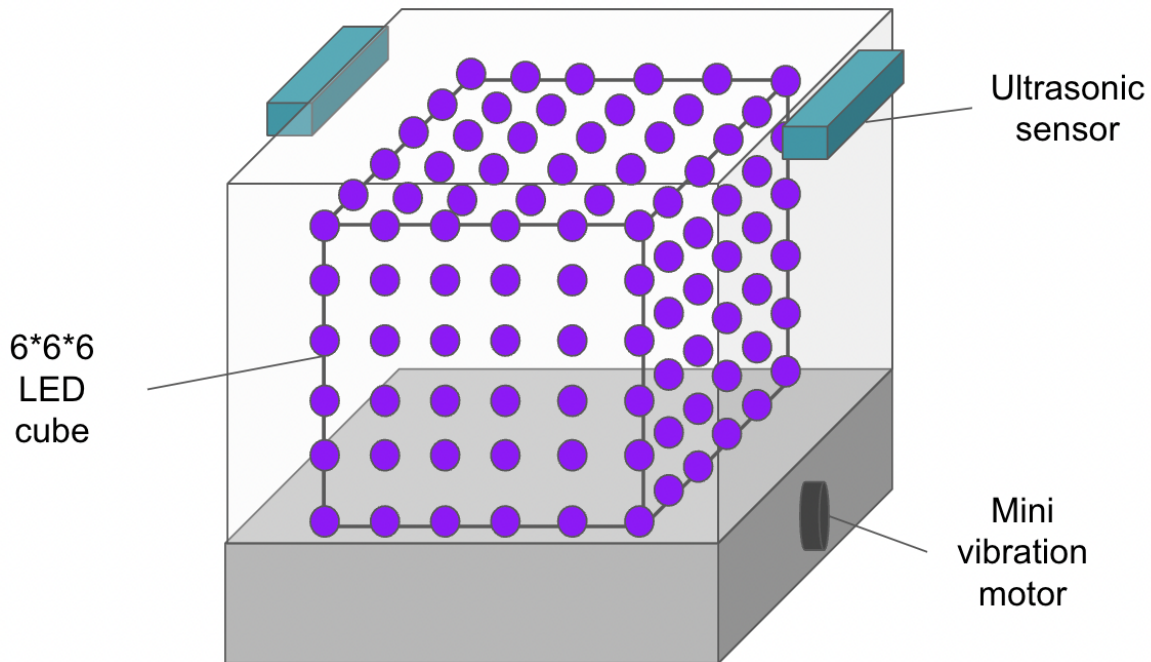
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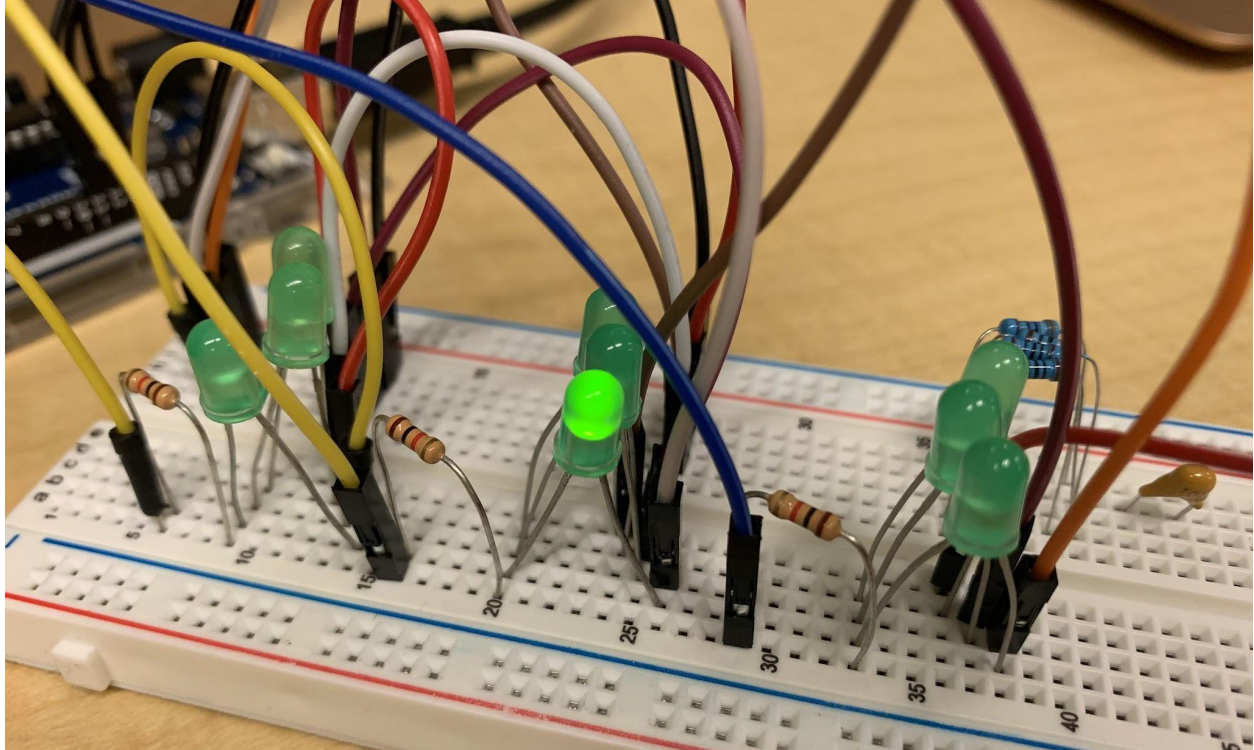
Progress:

We decided to build a 6*6*6 LED cube to display music visualization. This week, we updated the design of the device, tested simple LED multiplexing, ordered some of the parts, and explored resources for music waveform visualization.



The updated design removes the need for heat pads and fans due to the limited effect from feeling the music by temperature. Instead, we chose to make the beat of the music become the output to the mini vibration motor. We simplified the structure to a 6*6*6 LED cube encased inside an acrylic mold. The ultrasonic sensors remain functional for gesture control.

We also tested simple LED matrix multiplexing as shown in the picture below.



We implemented it on Arduino Uno to blink the LED one by one in a 3*3 matrix. These 9 LEDs are controlled by 3 digital inputs (row) and 3 digital outputs (col). In the other testing, we tried to blink the LEDs at a high frequency to test the persistence of vision. In this case, all LEDs are bright at the same time in our eyes, but the brightness of each is really dimmed.

As for the parts, we ordered 300 pcs of 5 mm RGB common cathode LEDs and 300 pcs of 5 mm single-colored LEDs.

For the software, this week we proposed several kinds of forms displaying the waveform.

1. There is an open-source software which can be modified to use for the project. Here is the link: <https://github.com/scottlawsonbc/audio-reactive-led-strip>.
2. The problem would be how to change the strip to the 3 dimensional form. The basic idea is to initially change the strip to a circle by connecting the beginning and the end of the strip. For example, The figure would look like this:



Figure 1: the strip



Figure 2: connecting the beginning and the end of the strip

3. Then we designed to transform the circle to a sphere. The basic idea would copy the characteristic of the circle to several circles and then overlap them to draw a ball. We will discuss and design the detailed algorithms this week.
4. Some package would be used: Numpy

Problems:

The LEDs are dimmed when using simple multiplexing. We still have to figure out how to deal with this issue. We are still considering the feasibility of multiplexing 216 RGB LEDs, so the single-colored LEDs will be the backup if the soldering process doesn't go well as expected.

Plan:

Hardware:

1. Build up the base plane for the LED cube from acrylic plates, including finalizing the size.
2. Start LED soldering after the LED parts arrive.
3. Design the schematic of the electronics.
4. Finish ordering the rest of the parts.

Software:

1. Think about the detailed algorithm to transform the circle to a sphere.
2. Find the algorithm to identify the beats in the music to apply the Vibration Module.
3. Generate a mapping function of the multiplexing with the waveform generation function.

Tracking of Initial Plan:

We changed a lot from our original design and are in the first stage to gather feedback and do simple tryouts on the hardware. We need to catch up on the settling down the base plane and start building the real parts by next week.