ECE5725

Project Week 2 Proposal and Progress Report

Monday Section

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Project Proposal

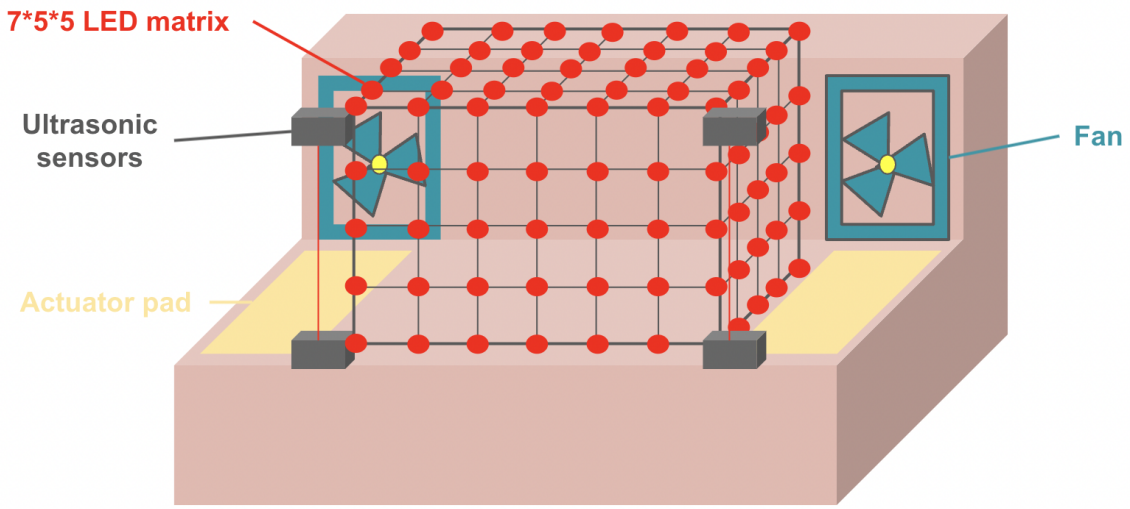
Definition:

The definition of music can be described as an art of arranging sounds in time through the elements of melody, harmony, and rhythm. The most common way to appreciate music is through the sense of hearing. However, we believe that in this multisensory world, people are able to feel the music through other senses, such as eyesight and touch. Music visualization has already been popular at parties or concerts, and it enhances the experience of just listening to music. As for the sense of touch towards music, a person can feel the beats simply by placing one's hand in front of a speaker. In this project, we are curious about the outcome of an intact experience of hearing, seeing, and touching the music all at once. This project has the potential to enable people with hearing disabilities to enjoy the music as much as the general public. Moreover, it defines a new recreation as 'feeling' the music.

Goal:

The goal of this project is to design a multisensory music box that enables users to feel the music from hearing, seeing, and touching. In the hearing part, our raspberry pi would be connected to a speaker for the sound output. The input of the music would come from users' mobile devices via bluetooth. As for the visualization, we design a 7*5*5 LED matrix for a 3D display. It shows the waveform of the music from the input. Last, a set of heating pads and fans are embedded in the box. The fans will be controlled to spin according to the rhythm based on the music.

As for the control, two sensors will be placed on the left/right side of the music box to capture different hand motions. The user can control the device to play/pause/stop the music, navigate to the next/previous song, and adjust the volume.



Schedule:

Legend: Tzu-Yun | Both | Hongyi

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Compared ideas and estimate workloads	Both					
Write Propsal	Both	Both				
Contact to purchase parts		Tzu-Yun				
Implement Waveform		Hongyi	Hongyi	Hongyi		
Soldering		Both	Both			
Sensors and speakers equipped			Tzu-Yun			
Sensor softeware			Hongyi	Hongyi		
Wind or touch part			Tzu-Yun	Tzu-Yun		
Adjusting Temperature				Both		
Webpage design and implemenation				Both	Both	Both
Demonstration					Both	Both

Elements:

This project is a complete embedded system including LEDs and sensors as input/output peripheral devices and software to control these hardwares. For the hardware part, we plan to use one raspberry pi, a speaker, 175 LEDs,

Final Project Demo:

In the final project demo, a music player would be presented and the demonstrator would show gestures to control the player. While playing the music, the cube would change colors and present identical waveforms as the changes of melody and rhythms.

Progress Report

Progress: We have discussed the selections of two ideas including the smart blind stick and the music player cube and found the final proposal for this project. We were determined to design a multi-function cube which helps show the change of the melodies and rhythms of the music.

Problems: Both of the two ideas have problems. For the smart stick:

1. The stick would be too basic if we only applied the ultrasonic sensors as the hardware. The optimal solution should be using a Lidar. However, the part is expensive and out of the budget.
2. The smart stick to some extent is not so useful for the visually impared persons. There are multiple solutions for the case. For example, guide dogs and some wearable devices could be used as help. However, the two solutions would not be suitable for this project after consideration.

For the music cube:

1. We found it required too many LEDs to make sure the display was aesthetically pleasing.
2. The waveform in 3D would be difficult to implement.

Solutions:

After consideration, we decided to make the cube as the project. Since we thought it would be feasible to apply plenty of soldering LEDs and the price for the LEDs is not expensive as well. We planned to contact the store for the LEDs we need. In addition, we planned to make the cube touchable and the users would feel the change of the music not only by the waveform but also from the temperatures and winds.

Plan for next week:

We planned to focus on soldering, waveform software and purchasing the LEDs next week.