

Frequency Responding LED Board
153B Final Project Proposal
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Overview

We propose using an 8x8 multicolor LED matrix to display the frequency of music being played in a fun and colorful way. Our way of input will be a microphone connected into an analog input on the LPC4088 board. The signal will then be decoded through our programming converting the signal through the use of Fourier transforms to useful data that will directly control the LED matrix. We will separate each frequency into a range, lighting the matrix further down (to the right) for a higher frequency and stacking the LEDs in that column for a louder signal in our designated frequency range. The column will also shift in colors going from green to yellow to red as the music dB rises.

Peripherals

- 8X8 Bicolor LED Matrix (<https://www.adafruit.com/product/902>)
- Microphone
(https://www.adafruit.com/product/1063?gclid=CjwKCAiA45njBRBwEiwASnZT59RQwhEwnXHS4oCkSJfF5oZ8Y3JWeZ0gui-FegBqn-VdYDhPM_vAURoCCdgQAvD_BwE)

Software Design

The program design will be split up into three main components. First, we will program the microphone to be in a listening mode for audio data frequency. As the sound comes into the microphone we will have the microphone communicate with the microcontroller to transmit the frequencies. As the frequency comes in, this is where our program will run to take the input and decided on what the board should display depending on the frequency. After this is decided, we communicate with the LED board we are using to tell it what it should display based on the output of our main program that analyzes the frequency. This program will all run continuously as new input comes in new data is analyzed and put out onto the board.

Goals/Intermediate Milestones

- Accurately decode the signal through use of Fourier transforms to read the correct frequency
- Have the LED board respond to each different frequency inputted
- Display the amplitude of the signal by use of stacking LEDs in a column
- Display the correct color when the amplitude passes certain thresholds
- Have the LED board respond to multiple frequencies being played at the same time showing the different amplitudes for each frequency

Individual Responsibilities

- Ryan Phan will be responsible for connecting the hardware and writing the code for the Fourier transform.
- Adjon Tahiraj will be responsible for working with the LED board and writing the code to output data at real time for the board to display the desired output that Ryan's part will work to gather.
- Michelle Nguyen will be responsible for working with the microphone input to get the data into the board and ready for Ryan's part to take the data and transform it.