

# Audio Visualizer

SE 101 Lab Proposal • Hansson Lin, Thomas Kou

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## Description

An audio visualizer with an array of 24 LED light strips acting as the “display”. Software will simultaneously play back an audio file while analyzing the signal’s frequency spectrum. The magnitude of the signal at different frequencies will be sent to the audio visualizer, which is then responsible for displaying the data by lighting up the appropriate LEDs in the array in “bar graph” form.

## Major Software Components

- Implement a simple user interface that selects an audio file to be played and visualized.
- Implement an audio playback system.
- Perform realtime audio frequency analysis based on the current audio being played.
- Create a system that relays the audio data to the visualizer.
- Program the visualizer to light up the appropriate LEDs in the display.

## Prototype Plan

Our prototyping strategy will make use of *horizontal* and *experimental* prototypes.

- The project will involve ideas that neither of us are too familiar with, such as programming algorithms that analyze audio frequencies, meaning that it is likely that code will be experimented with and thrown away.
- There are numerous components at play in our project, meaning that integration will be a key challenge. A horizontal prototype strategy will ensure that our components will work together as intended as they are being developed.
- When prototyping, integration will likely be tackled first, followed by experimentation with audio algorithms.

## Hardware Acquired / To Acquire

- Array of LED light strips (approx. 24 strips of 12 lights each)
  - Alternative: a 24×12 array of individual LEDs (288 total)
- Speaker(s) for audio playback
- Computer to send audio information to the Arduino

## Challenges Anticipated

- Learning how to analyze and generate an audio frequency spectrum based on a single audio signal. This will likely involve delving into more complex fields of math such as Fourier analysis.
- Reading and analyzing currently-playing audio in real time.
- Interfacing the Arduino with the LED light display and controlling the lights appropriately.
- Transmitting audio information from the computer to the Arduino using an appropriate medium (e.g. wired, Bluetooth, etc) and format.