Color of Music

Audio and Visible Light Frequency Matching

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Abstract

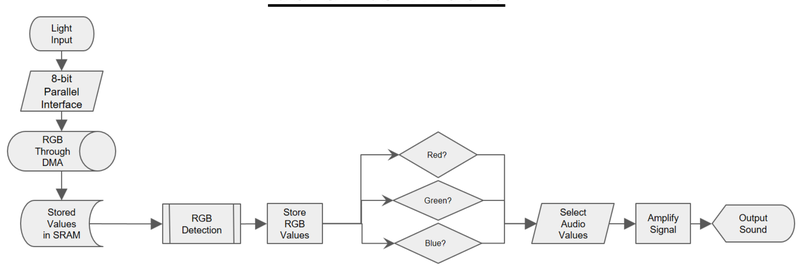
In this work, we developed a clear and interactive device that creates a medium to display corresponding frequencies between audio and visible light waves. The device's microphone allows the user to input an audio signal between 32 and 4200 Hz that will be translated and displayed through its corresponding color on the frequency range on an array of RGB LEDs. Conversely, the device's image processor recognizes the colors that match the seven natural notes, A_4 through G_5, and determines the corresponding frequency tone that is heard through the device's speaker. This portable device is designed to enhance the user's understanding of both audio wave frequencies and light wave frequencies in an entertaining and interchangeable technique.

Objectives

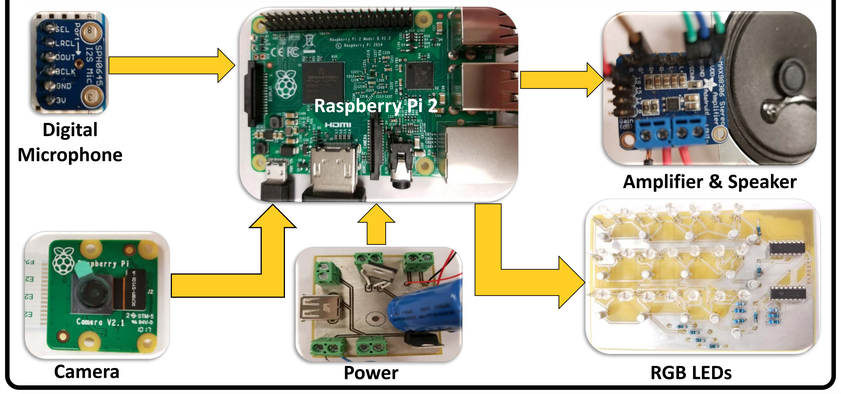
- To bridge the sound world and visual world, translating sound to color and color to sound.
- There is a common medium that we use to merge the two senses. Every musical note has a frequency that is specific to only that note
- Map the seven natural notes (ABCDEFG) to a specified color (ROYGBIV) based on frequency
- Map color (ROYGBIV) to the seven natural notes (ABCDEFG)
- Provide pleasant auditory and visual stimuli
- Our hope is for the device to serve as an alternative form to learning music

Music to Color

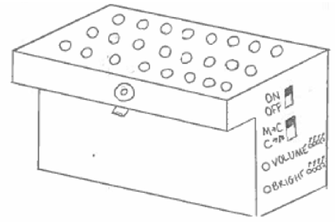
Color to Music



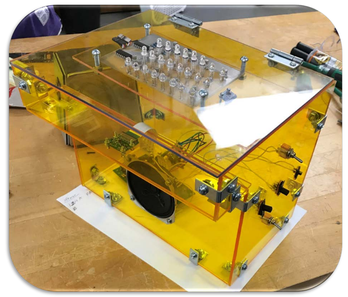
Components



Design



Conceptual Design



Prototype

Results

Color → Music

Music → Color

Conclusion and Future Works

- Color detection from sample images was successful
- Musical output using the speaker was successful
- The integration of color detection to musical output was successful
- Musical note detection based on frequency was successful
- LED color output was successful
- The integration of note detection to LED output was unsuccessful
- 50% of engineering requirements met
- Final device budget was $225.93
- Future work on the device could include
  - Parallelizing the image/color processing algorithm
  - Utilizing multiple CPU cores for faster and more streamlined communication between devices

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