

Music Visualizer with LED Strip

Our goal for the final project is to develop an interactive music visualizer using Raspberry Pi and an addressable LED strip. The system will process real-time audio, perform frequency analysis, and dynamically control LED lighting patterns based on the music.

Components:

-Raspberry Pi 3B+

-USB microphone or audio line-in device

<https://www.adafruit.com/product/3367>

-Addressable LED strip (WS2812 or APA102)

<https://www.amazon.com/TOPXCDZ-WS2812B-Flexible-Individually-Addressable/dp/B0C71DV224?th=1>

-5V power supply with sufficient current

-Level shifter (for WS2812)

<https://www.ti.com/product/SN74HCT245>

-Wires, connectors, breadboard, and optional enclosure(s)

Methodology

1. Connect the LED strip to the Raspberry Pi, ensuring proper power and signaling.
2. Capture audio input via USB microphone or line-in.
3. Use Python to process the audio using FFT (Fast Fourier Transform) for frequency analysis.
4. Map frequency bands to LED patterns and brightness.
5. Implement a web interface for user control, including adjusting sensitivity, color schemes, and patterns.