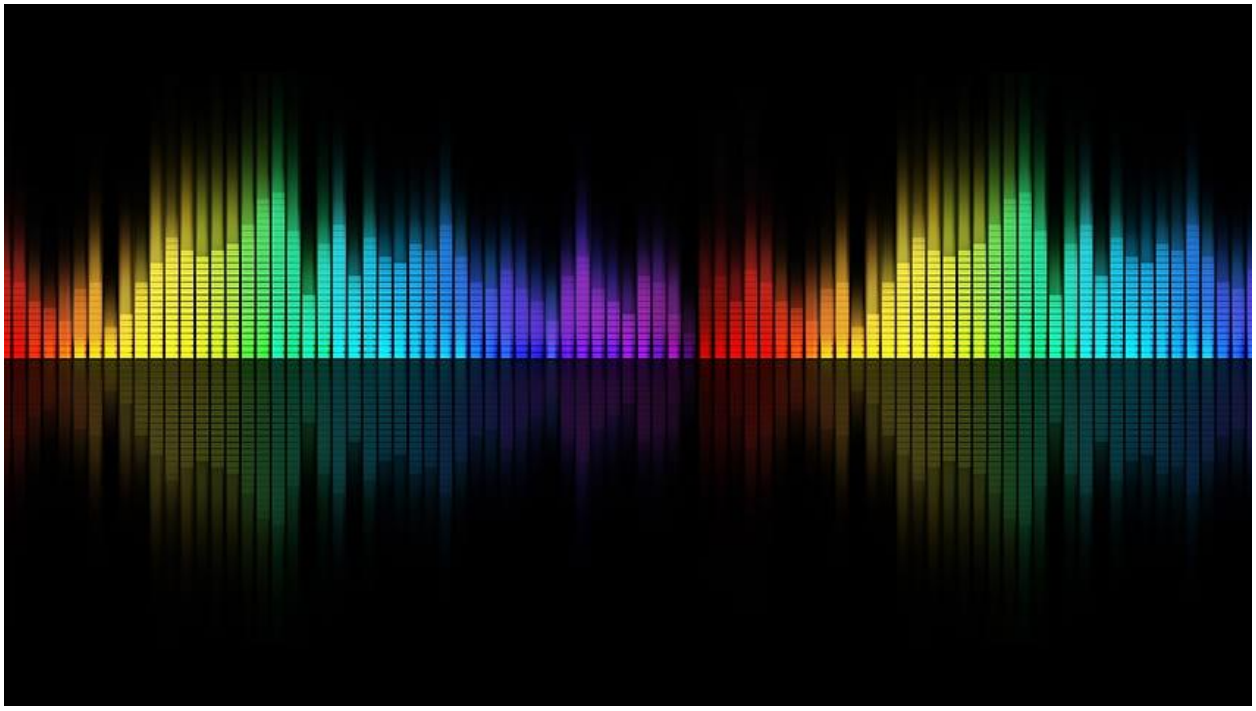


Real time Audio Spectrum Analyser

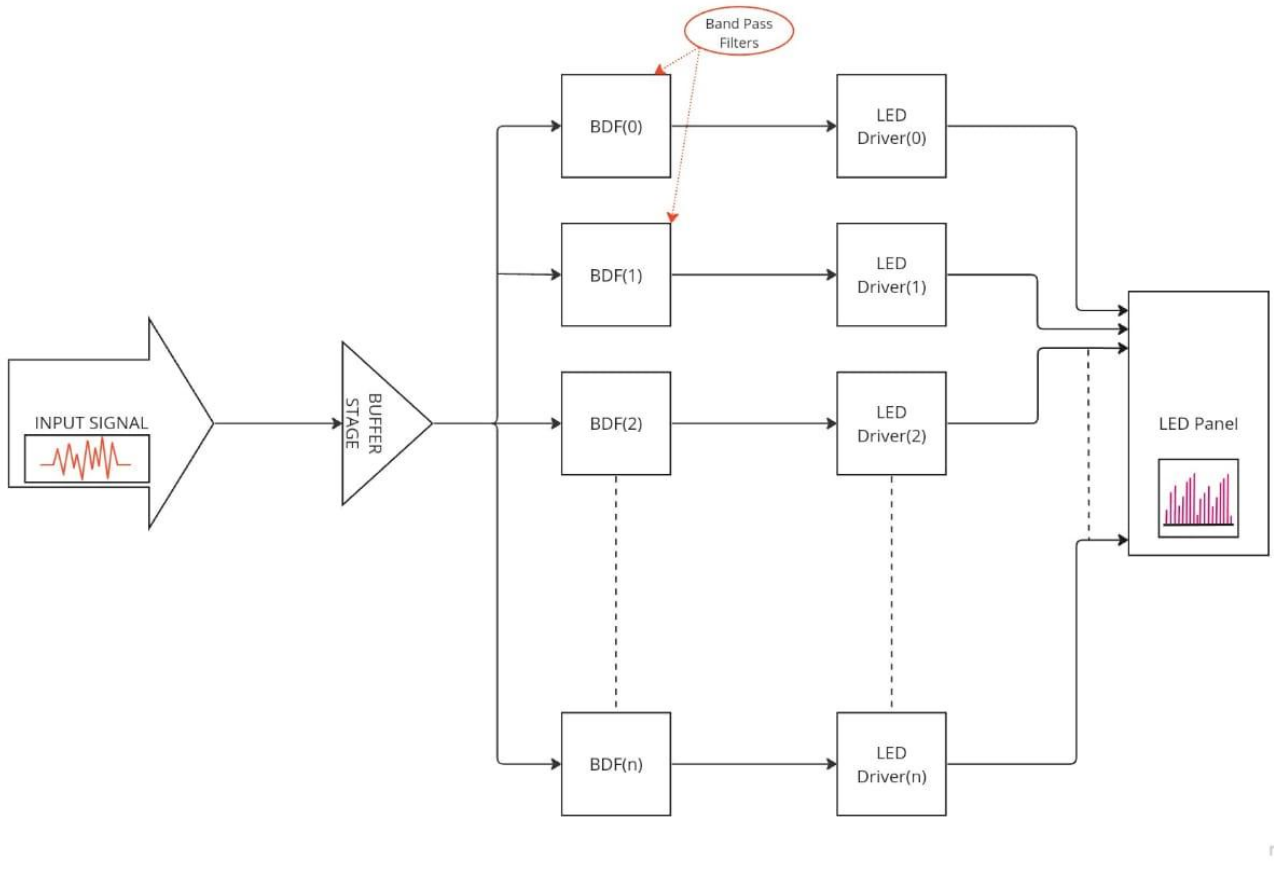
Waveharmony
Mihiran Wickramarathne - 210703V
Sanuja Rupasinghe - 210549D
Dinuka Madushan - 210349N
Chamikara Siriwardane - 210612P

Functionality

This is an analogue audio spectrum analyzer for audio. The user will input an audio signal through a microphone or an AUX port into the device and it will show its frequency spectrum in real time. Professional RTAs use ⅓ octaves which have 31 bands. We have not yet decided the number of bands. Proposed device will cover frequency bands from 20Hz to 20kHz, which is the human hearing range.

The spectrum will be visualized with LED columns(LED VU meters) dedicated to each frequency band.

Diagram



Methodology

Even Though the software based and DSP RTAs are available in the market we are proposing an analog hardware based RTA.

There will be a buffer(amplifier) to the input signal because there are a significant number of filters to drive.

We are proposing to use active second order filters to filter out certain frequencies. And then each filter output will be fed into LED drivers.Number of LEDs turning on will be proportional to the amplitude of frequency band of interest(filtered out signal).

Micro Products and Allocation

- ### Buffer stage(Dinuka)

  This will be used to drive filters. It will be implemented using Op-Amps as amplifiers.

- ### Filters(Mihiran and Sanuja)

  This is the most crucial part of the system. This will be implemented using second order active filters.(Order may vary in implementation). We will be using butterworth filters or multiple feedback filters. Same filter design will be repeated for various bands.

- ### LED Panel(Chamikara)

- ### Power supply

(Implementations may vary from the proposed methods above)

References

- R. Quan and R. Elliott, "Hardware Based Real-Time Audio Analyser." Sound-au.com. *https://sound-au.com/project136.htm* (24.08.2023).
- PLATINUM . "28 Band Spectrum Analyzer , " YouTube","*https://youtu.be/vpWOu1kNCAI?si=V9QEPBe_TOHIVByw*" (24.08.2023)
- emdee401, "Classic Analog Spectrum Analyzer for Your Desktop.".instructables.com. *www.instructables.com/Classic-Analog-Spectrum-Analyzer-for-Your-Desktop/* (24.08.2023).