

SYNCHRONISED AUDIO FREQUENCY AND LIGHT-EMITTING DEVICE

Technical Field

1. This utility model belongs to the sound-light control technology, It involves sound frequency and light emitting.

Technical Background

2. For sound-light control, there are basically two main types, namely signal-control or LED (light-emitting diode) with integrated circuits (IC).
3. Signal-control makes use of the change in frequency from high-to-low or low-to-high to create a signal, which will turn on or turn off the LED (light-emitting diode), in accordance of the change from high-to-low or low-to-high.
4. The disadvantage of using signal-control is that it cannot reflect the fluctuations of frequency.
5. LED (light-emitting diode) with integrated circuits (IC) are pre-programmed based on a pre-set value.
6. The disadvantage of the LED (light-emitting diode) with integrated circuits (IC) is that the LED's colour changes has no relation to the change in the audio signal's frequency. Hence the audio and colour change cannot be synchronised. Also, LED (light-emitting diode) with integrated circuit (IC) has a fixed pattern of colour changes, it will just cycle through repetitively. Making it unable to create a myriad of colour changing effect.
7. The aim of this utility model is to provide a method of synchronising the change in frequency to the change of colours, based on pre-set values.
8. This utility model consists of audio frequency equaliser, amplifier circuits, speaker and light-emitting device.

Audio signal is sent to the audio frequency equaliser, after proecssing and amplification, it will output the signals to the speaker and the light-emitting device.

The light-emitting device consists of an array of RGB LED (light-emitting diode). The amplifying circuits consists of an audio amplifier and 3 frequency-band amplifiers.

Each of the frequency-band amplifier will output a different colour signal based on a pre-set value.

The RGB LED (light-emitting diode) will then emit colours based on the colour signals from the frequency-band amplifiers.

9. Each of the frequency-band amplifiers will have a pre-set value of the frequency range.
10. The frequency range of the frequency-band amplifier is from 20Hz – 20KHz.
11. The pre-set frequency range of the 1st frequency-band amplifier is 20Hz – 20KHz, the pre-set frequency range of the 2nd frequency-band amplifier is 300Hz – 20KHz and the pre-set frequency range of the 3rd frequency-band amplifier is 700Hz – 20KHz.
12. The light-emitting device is LED (light-emitting diode).
13. There is an audio amplifier between the audio frequency equaliser and the speaker.
14. The device, will consist of at least 2 sets of the audio-light control circuits, consisting of the audio frequency equaliser, frequency-band amplifiers, audio amplifier and speakers.
15. Through the device, the audio will be synchronised with the light, the fluctuation of the audio frequencies will create a change of colours, in accordance to the respective frequency, thus creating a myriad change of colour effects.

Photo Illustrations

16. Figure 1 is the flow diagram for the audio and light control components.
17. Figure 2 is the flow diagram for the entire device.

Specific Implementation Details

18. In combination of the above photo illustrations, below are the specific implementation details.
19. Implementation Details 1

Audio signal is sent to the audio frequency equaliser, which will be processed and output to the speaker and light-emitting device. The light-emitting device is an array of RGB LED (light-emitting diodes).

There are 3 frequency-band amplifiers, each amplifier will create a colour signal based on the primary colour of RGB.

Audio signals from various audio sources (audio-capable equipment for example, personal computers, mobile phone, CD, VCD, DVD, MP3, MP4, various audio/HIFI equipment, etc) is sent to the audio frequency equaliser, it will be processed and sent to the 1st frequency-band amplifier, 2nd frequency-band amplifier and 3rd frequency-band amplifier based on the pre-set frequency range. The signal will be amplified, and each frequency-band amplifier will generate a colour signal based on the primary colour of RGB.

20. The RGB LED will synthesise and emit the colour, based on the colour signals from the 3 frequency-band amplifier.
21. The LED's colour changes is defined by the 3 different frequency ranges. The synthesis of the colour is based on the 3 primary colours, Red, Green and Blue, mixed in different ratios.
22. When there is an audio signal input, the LED (light-emitting diode) will emit different colours based on the 3 primary colour or a combination of the 3 primary colour. The colours as follows,
 - (1) primary colour: Red, Green, Blue
 - (2) secondary colour: Yellow (Red + Green), Cyan (Green + Blue), Magenta (Red + Blue), White (Red + Green + Blue)
 - (3) other colour: Orange, Gray and other colours from the visible light spectrum (combination of the primary colours and the intensity of the light)
23. When there is an audio signal input, the frequency-band amplifiers will output colour signals of 6 different combinations of colours based on the 3 primary colours (i.e. RGB, RBG, BRG, BGR, GBR, GRB).
24. The audio signal from the audio frequency equalizer will be sent to the audio amplifier, after amplification it will be output to the speaker.
25. The change in the audio frequency and loudness intensity of the audio signals, will synchronize with the light-emitting device based on a preset frequency range, thus creating the visual colour change effects.
27. The three preset frequency-band range as follows,
 - (1) 1st frequency-band range from 20Hz - 20KHz
 - (2) 2nd frequency-band range from 300Hz - 20KHz
 - (3) 3rd frequency-band range from 700Hz - 20KHz
28. When the frequency ranges from 20Hz - 20KHz, the pre-set colour signal of the 1st Frequency-band amplifier will be stronger

When the frequency ranges from 300Hz - 20KHz, the pre-set colour signal of the 2nd Frequency-band amplifier will be stronger

When the frequency ranges from 700Hz - 20KHz, the pre-set colour signal of the 3rd Frequency-band amplifier will be stronger

29. Implementation Details 2

The device uses multiple of the audio-light control circuits as described in Implementation Details 1

30. The LED (light-emitting diode) is a common technology, the working theory is omitted in the diagrams.

The implementation details is used to illustrate the technical aspects of the utility model, and not to limit the area of patent protection.

Any technical personnel with common knowledge can amend or replace the implementation details, while not changing the fundamental aspects of the working theory.