

Air Effect And Music Rhythm LED Synchronized Flash Light

A

REPORT ON

MINI SKILLED BASED PROJECT (Power Electronics)

Submitted in partial fulfillment of the requirement for the award of the degree of

BACHELOR OF TECHNOLOGY

In

ELECTRICAL ENGINEERING

By

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24 NOVEMBER 2023

CERTIFICATE

This is to certify that **ENROLLMENT (0901EE211098 – 0901EE211104)** studying in **MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE**, BATCH-(2021-2025) have completed their Mini Skilled Based Project entitled “**Air Effect And Music Rhythm LED Synchronized Flash Light**” at **MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE** under my supervision.

It is further certified that they had attended required number of practical classes at **MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE**, GWALIOR for the completion of their Mini Skilled Based Project during 5th semester.

Prof. Manoj Kumar
Project Supervisor

PLAGIARISM CHECK CERTIFICATE

This is to certify that I/we, students of B.Tech. in Electrical Engineering Department have checked my complete project entitled “**Air Effect And Music Rhythm LED Synchronized Flash Light**” for similarity/plagiarism using the “Turnitin” software available in the institute.

This is to certify that the similarity in my project is found to be less than 30% which is within the specified limit. Full plagiarism report along with summary is enclosed.

GROUP NO. & Enrollment No.

Date: 24/11 /2023

GROUP 14 (0901EE211098 – 0901EE211104)

Name & Signature of Guide

Prof. Manoj Kumar

DECLARATION OF STUDENT

We hereby declare that the work presented in this SKILLED BASED PROJECT entitled “**Air Effect And Music Rhythm LED Synchronized Flash Light**” which is being submitted in the partial fulfillment of the requirement for the award of degree of Bachelor of Engineering in Electrical Engineering is an authentic record of our own work carried out under the guidance of

Prof. Manoj Kumar, Electrical Engineering Department.

The matter presented in this project has not been submitted elsewhere by us for the award of any other degree/diploma.

Group 14

From Enrollment (0901EE211098-0901EE211104)

Date: 24/11/2023

Place: Gwalior

This is to certify that the above statement made by the candidates is correct to the best of my knowledge and belief.

Guided by

Prof. Manoj Kumar Sir

Department of Electrical Engineering
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ACKNOWLEDGEMENT

Engineers in all disciplines must acquire knowledge of project making. Student, in particular, will find 'project making' as an integral part of their studies that will infuse the spirit of doing practical work in them.

The satisfaction that accompanies the successful completion of any task would be incomplete without the mention of the people who made it possible whose constant guidance crowned our efforts with success.

We sincerely express our deep gratitude to the management of our college for giving us liberty to choose and to work on the most relevant project i.e. **"Air Effect And Music Rhythm LED Synchronized Flash Light"**.

We are thankful to **Prof. Manoj Kumar** for ensuring that we have a smooth environment at the college and lab. At the very outset we would like to offer our never ending thanks to our project supervisor **Prof. Manoj Kumar** who helped us with our project from the beginning till the end. His continuous surveillance over our work allowed us to work more efficiently.

Group 14

From Enrollment (0901EE211098-0901EE211104)

ABSTRACT

In this project, the group will be operating a Air Effect and Music Rhythm LED Flash Light by using Transistors. The LED lights during a function will turn on and off according to the beats or rhythm of the music.

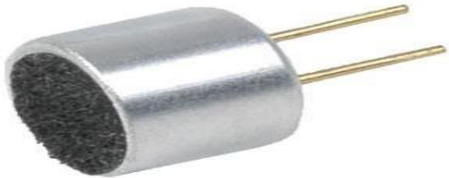
I. BACKGROUND

lights turn on and off base on the Air Affects and music beats and its rhythm. These lights blink according to the pitch and length of the beats of the music. These choose mainly the bass sound which is a high-intensity sound. These lights follow high-pitched sounds and beats as their blinking pattern.

The Air and Music Rhythm LED Flash Light project is a simple and fun project that makes dancing LED lights by using the sounds of music, just like what’s stated earlier. It only requires few basic electrical and electronic components.

The project Music Rhythm LED Flash Light is based on transistor BC547. A BC547 transistor is a NPN transistor, hence the collector and emitter will be open or reverse biased, when the base pin is held at ground and will be closed or forward biased when a signal is provided to base pin. BC547 has a gain value of 110 to 800. This value determines the amplification capacity of the transistor.

The project uses a microphone through which the sound is picked up and amplified. The signal activates a series of LED lights through an intermediate circuit. The blinking of these lights occurs when the music beats changes constantly. A musical sequence of blinking LED lights shows depending on beat of the music.



II. OBJECTIVES

The objective of this project is to design a component by using different types of diodes and transistors to produce music synchronized lighting.

Specifically, this study seeks to achieve the following objectives:

- To build a Music Rhythm LED Flashlight circuit.
- To light up different LED’s (Light Emitting Diodes) according to the audio signals which are feed through condenser microphone.
- To present the beat of the song to a blinking pattern.
- To have more knowledge about transistors and its applications
- To apply the knowledge learned from the subject in constructing the prototype

At the end of this project, all of the objectives must be achieved. It is to make sure that the project operates

smoothly and follow the main concept of the project by using the suitable equipments.

III. MATERIALS

The circuit to be constructed consists the components with their specified values needed by the researchers to obtain the desired output.

TABLE 1: MATERIALS USED WITH ITS CORRESPONDING QUANTITIES AND VALUES

Materials	Quantity	Value
NPN Transistor	9	BC547
DC Switch	2	
Breadboard	1	-
Resistors	1+2+8	1MΩ 10kΩ 22kΩ
Ceramic Capacitor	1	100nF
LED	8	-
Electret/ Condenser Mic	1	100nF
Connecting Wires	-	-
Battery/Power Supply with. Clipper	1	9V
Power Transistor	1	CE 50V, CB 50V, EB 4V

❖ Condenser Mic

- should be connected properly in the circuit, according to its polarity. To determine the polarity of MIC one should look at mic terminals, the terminal which have three soldering lines, is the negative terminal.

❖ BC 547 Transistor

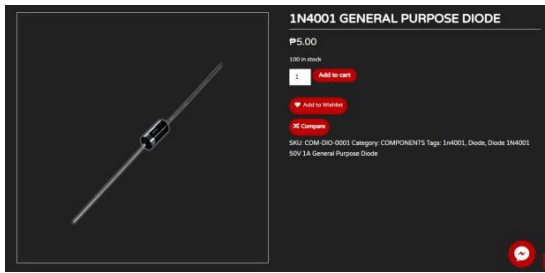
- a negative-positive-negative (NPN) transistor that is used for many purposes. Together with other electronic components, such as resistors, coils, and capacitors, it can be used as the active component for switches and amplifiers.



❖ 1N4001 Diode

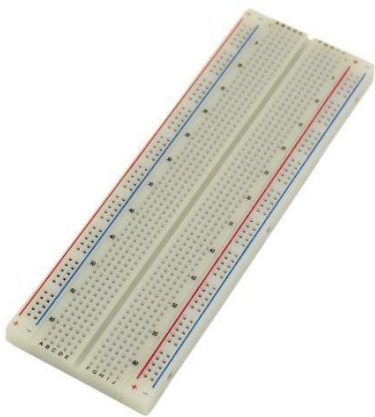
- A diode is a device which allows current flow through only one direction. That is the current should always flow from the anode to cathode. For 1N4001 diode, the maximum current carrying

capacity is 1A it withstand peaks up to 30A. Hence it can be used in circuits that are designed for less than 1A. The reverse current is 5uA which is negligible. It can withstand reverse voltage peak up to 50V.



❖ **Breadboard**

- is a solderless device for temporary prototype with electronics and test circuit designs.



❖ **Resistor**

- is a passive two-terminal electrical component that implements electrical resistance as a circuit element.



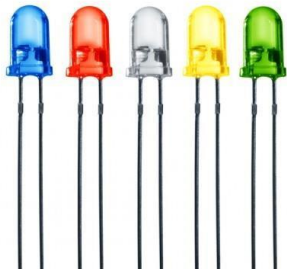
❖ **Ceramic Capacitor**

- is a passive two-terminal electrical component that stores potential energy in an electric field.



❖ **LED**

- light-emitting diode is a two-lead semiconductor light source. It is a p–n junction diode that emits light when activated. When a suitable current is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons.



❖ **DC Switch**

- A voltage regulator that uses a switching element to transform the supply into an alternating current, which is then converted to a different voltage using capacitors, inductors, and other elements, then converted back to DC



❖ **Connecting Wires**

- allows an electrical current to travel from one point on a circuit to another because electricity needs a medium through which it can move.



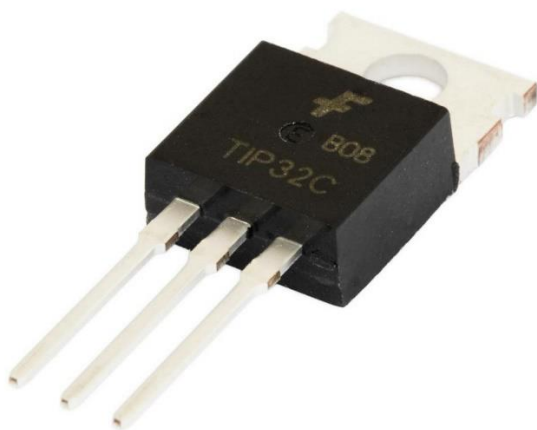
❖ Battery or Power Supply

- electrical device that supplies electric power to an electrical load. Either a 9V battery or a 12 V supply can be used to perform the project.



The materials listed were thoroughly chosen based on the constructed circuit for complying with the output required. The group looked out for the components availability and efficiency in the webpage of an electronic shop in Batangas.

❖ Power Transistor



The three-terminal device which is designed specifically to control high current – voltage rating and handle a large number of power levels in a device or a circuit is a power transistor. The **classification of power transistor** include the following.

- Bipolar junction transistor (BJTs)

- Metal oxide semiconductor field-effect transistor (MOSFETs)
- Static induction transistor (SITs)
- Insulated-gate bipolar transistor (IGBTs).

A transistor is a semiconductor device, which was invented in the year 1947 at Bell Lab by William Shockley, John Bardeen, and Walter Houser Brattain. It is a basic building block of any digital components. The very first transistor invented was a **point contact transistor**. The main function of a transistor is to amplify the weak signals and regulate them accordingly. A transistor comprises of semiconductor materials like silicon or germanium or gallium – arsenide. There are classified into two types based on their structure, BJT- bipolar junction transistor (transistors like Junction transistor, NPN transistor, PNP transistor) and FET- field-effect transistor (transistors like junction function transistor and metal oxide transistor, N- channel MOSFET, P- channel MOSFET), and there functionality (like Small-signal transistor, Small switching transistor, Power transistor, High-frequency transistor, Phototransistor, Unijunction transistors). It consists of three main parts Emitter (E), Base (B), and Collector (C), or a Source(S), drain (D), and gate(G).

IV. SCOPE AND DELIMITATIONS

This project is instigated in such a way that the lights (LED's) glow according to the music. The rhythm following lights can be achieved by this system. This system uses a microphone through which, the audio input is picked up and amplified. Then this amplified signal triggers the sequence of LED's through an intermediate circuit. Hence the flashing of the LED's is done when an audio input is constantly changing its beat. So a beautiful scenario of the changing LED's can be viewed with the changing beat of the music. Additionally, the project can enhance by using triacs and optoisolators to use high power lamps in place of LEDs.

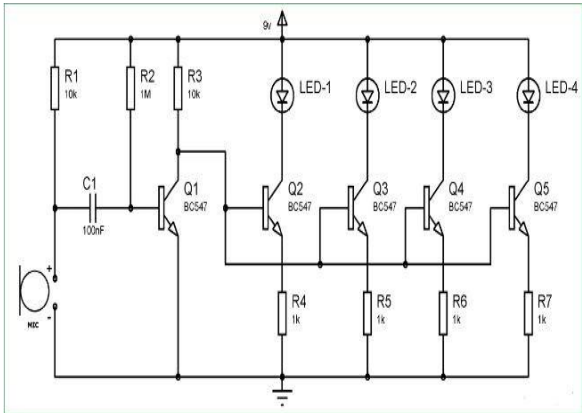


Figure 1. Music Rhythm LED Flash Light Circuit

In this Music Rhythm LED Flash Light Circuit, condenser microphone picks up the sound signals and converts them into voltage levels. These voltage signals are further fed into R-C filter or HIGH PASS filter (R2 and C1), to eliminate the noise from the sound. Further a NPN transistor (Q1- BC547) is used to amplify the signals, from the High Pass filter. Then finally these music signals are given to the array of transistors. Transistor in this array works as amplifier, and glows the four LEDs according to the sound pattern. This generates a very interesting sequence of dancing LEDs which follows the beats as per their intensity or pitch.

We can adjust the sensitivity of MIC by changing the value of R2 and C1, by using the formula for R-C filter:

$$F = 1 / (2\pi RC)$$

F is the cut off frequency, means filter only allow frequency above than F. It can be easily deduced that more the value of RC, less the cut off frequency and higher the sensitivity of MIC. And higher the sensitive of circuit means MIC can pick low volume sounds, hence LEDs can glow on low pitch music also. So by adjusting its sensitivity we can make it less sensitive to reacts only on high note beats or we can also make it more sensitive to react on every little beat in the music. Here we have set its sensitivity at moderate level. Some related application that will help the study:

LED Blinking Circuits Applications:

Dancing LED circuit can be used for any visual sign indication in any highways

or it can be used in advertisement hoarding also. LED blinking circuit can be used in signaling purpose. It can be used as signal for help, if you are in danger. It can also be used as flashing beacon, and as vehicle indicator when it is breaking down in the middle of the road. It can be used in operation theaters or offices as an indication that you are engaged in work.

IV. SIGNIFICANCE OF THE STUDY

We know that most of the devices are made for our daily life like as electronic devices like tube light, fan etc. These are on operated by electrons by the way of electric devices. The dancing lights are also operated by these electrons. It is used for celebrations like wedding anniversary, birthday festival, Christmas decorations, festivals etc.

We must have seen the dancing LEDs in discotheque or DJ lights, which turn ON and OFF based on the music beats. These lights blink according to the volume and length of music beats. Basically, these are intended to choose the high-intensity sound such as bass sound. So these lights go after the high pitch beats in tune like drum beats, and turn ON & OFF based on the music pattern. In the past, we have built dancing LEDs, which just goes to a set pattern and we can only manage the speed. Now we are taking this to next level, i.e. Music Rhythm LED Flash Light, in which light emitting diodes will blink according to music beats like a Disco light. This Musical LED system is very simple and easy to design, it just requires few basic electrical and electronic components and it appears very cool .

V. PERFORMANCE AND TESTING

For the performance, our group test the prototype on how distance and volume of the music affect the LEDs during lighting and blinking. The sensitivity of the mic is set to moderate.

The distance is measured by a ruler reference from the condenser microphone.

Test 1

Measured Distance(cm)	Glowing of Led Lights
1	YES

2	YES
3	NO

Test 2

The frequency and the decibel measured by an application.

Measured Volume(Db)	Glowing of Led Lights
	YES
	YES
	NO

VI. CONCLUSION

Our group concludes that the higher the sensitive of circuit means the microphone can pick low volume sounds, hence LEDs can glow on low pitch music also. So by adjusting its sensitivity, we can make it less sensitive to react only on high note beats or we can also make it more sensitive to react on every little beat in the music. The farther the distance of sounds the lower the possible for it to detect by the mic, also means the led will not glow if reaches its maximum distance. The higher the volume at fixed position, the more the LEDs glow, and the lower the Volume , the less possible for the LEDs to glow.

VII. RECOMMENDATIONS

Our group suggest for pursuing, must conduct further research about the topic and improve the casing of the projects. Digital remote that may be used allows to play the music controls and the number of led lights may be increase depend on your design and budget.

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PROJECT PICS:

