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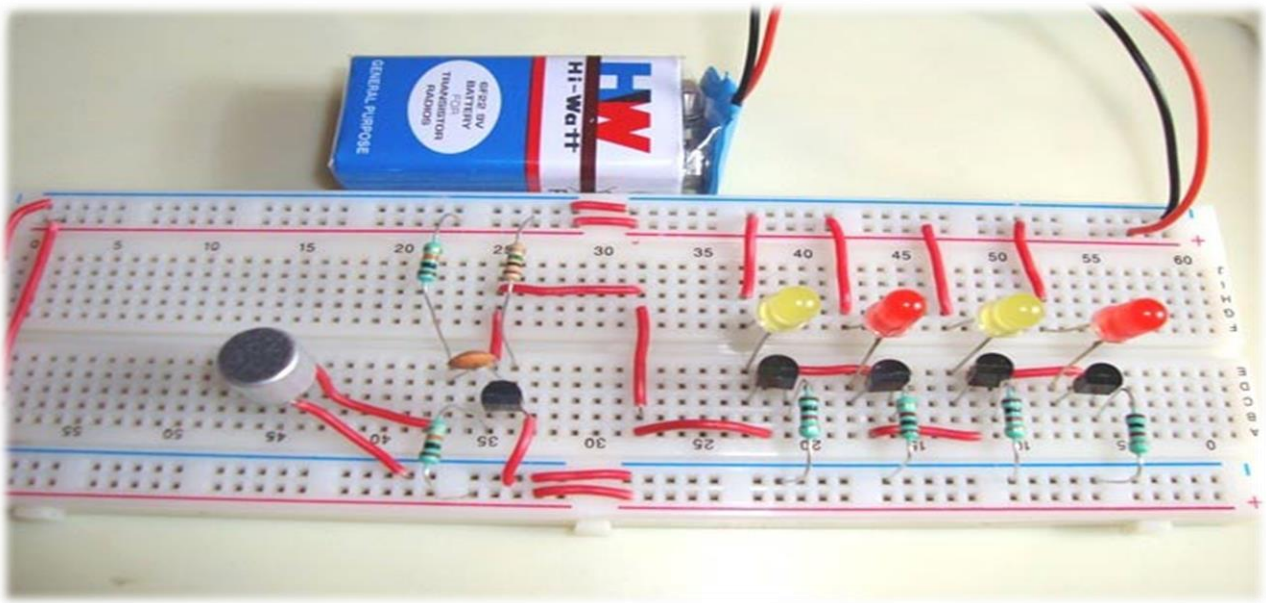
Music Rhythm Operated Dancing Light using LEDs & Transistors

Introduction:

In this project we are going to show you how to make Music Rhythm Operated Dancing Light using LEDs & Transistors. You might have seen the Disco Lights or DJ lights or light during a function that turn ON and OFF according to the beats or Rhythm of the music. This Music Rhythm Operated Dancing Light circuit is based on transistor BC547.

These lights turn ON & OFF according to the length and pitch of music beats or rhythm. Basically these are designed to pick the high intensity sound like Bass sound. So, these lights follow the high pitch beats in music like drum beats, and Turn ON and OFF according to music pattern.



Components Required:

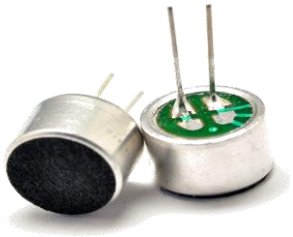
The circuit requires few of the basic components which are listed below:

1. Condenser Mic
2. Transistors BC547
3. LEDs
4. Capacitor 100nF or O.1uF
5. Resistors 10k Ω, 22 Ω, 1M Ω
6. ON/OFF Switch
7. 9 Volt DC Battery
8. Breadboard
9. connecting wires

Introduction About Components

Condenser Mic:

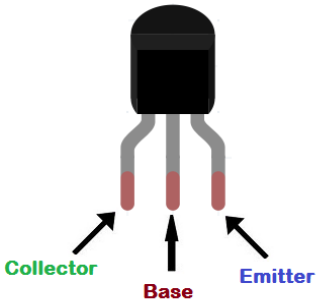
A **Condenser Mic** is a device that translates sound vibrations in the air and convert into electronic signals or connect them to a recording medium. To determine the polarity of MIC one should look at mic terminals, the terminal which have three soldering lines, is the negative terminal. Microphones enable many types of audio recording devices for purposes including communications of many kinds, as well as music and speech recording.

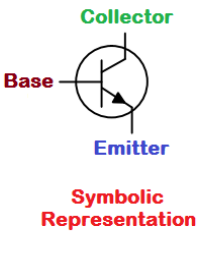


Transistors BC547:

Transistor BC547 is an NPN transistor, which is used as a Amplifier here. NPN transistor acts as a open switch when there is no voltage applied on its Base (B) and it acts as closed switch when these is some voltage at its base.

Generally, 0.7 volt is enough to get it fully conducted. Transistors consist of three pins which show in figure.

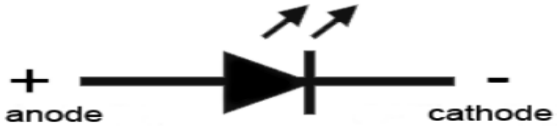


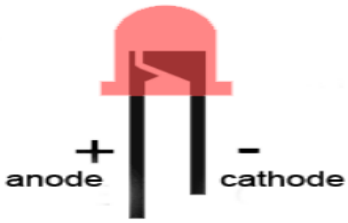


BC547

LEDs:

LED stands for light emitting diode. It is made up of semiconductor device which emit different light source as its output. It is a **basic** pn-junction diode, which emits light when electrically biased in the forward direction of the p-n junction. When LED is switch on electrons are able to recombine with electron holes within the device and the device release energy in the form of light. LEDs are available in Red, Orange, Yellow, Green, Blue and White colors.





Capacitor (100nF or O.1uF):

A capacitor is a device which stores electric charge. Capacitors consist of two conductors which are separated by a dielectric medium. It works when potential difference applied across the conductors.

In this project we use ceramic capacitor because Ceramic capacitors are typically small and have small energy storage capacities.

Capacitor Symbol

Resistors (10k Ω, 22 Ω, 1M Ω):

Resistor is a two terminal passive component used to control the flow of current into the circuit. A current through resistor is directly proportional to the voltage applied across resistor terminal.

Resistor comes in two varieties

i. **Fixed Resistor** means they have fixed value of resistance.

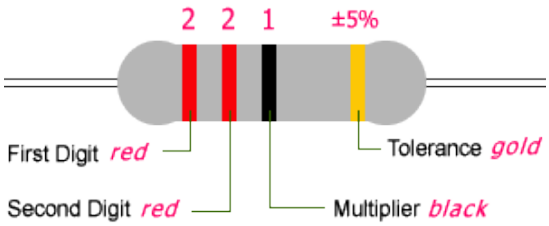
ii. **Variable Resistor** means their value of resistance can be changed.

Resistor

Resistor Symbol

In this project we use fixed resistor. We can calculate the value of resistor with the help of multimeter or we can do it with help of color code available on resistor.

Color	Color	1st Band	2nd Band	3rd Band Multiplier	4th Band Tolerance
Black		0	0	x1Ω	
Brown		1	1	x10Ω	±1%
Red		2	2	x100Ω	±2%
Orange		3	3	x1kΩ	
Yellow		4	4	x10kΩ	
Green		5	5	x100kΩ	±0.5%
Blue		6	6	x1MΩ	±0.25%
Violet		7	7	x10MΩ	±0.10%
Grey		8	8	x100MΩ	±0.05%
White		9	9	x1GΩ	
Gold				x0.1Ω	±5%
Silver				x0.01Ω	±10%



A 22Ω Resistor
22×1 Ohms with a tolerance rating of ±5%

Switch:

Switch is used to open or close the electrical **circuit**, turning the flow of electricity on or off in a circuit.

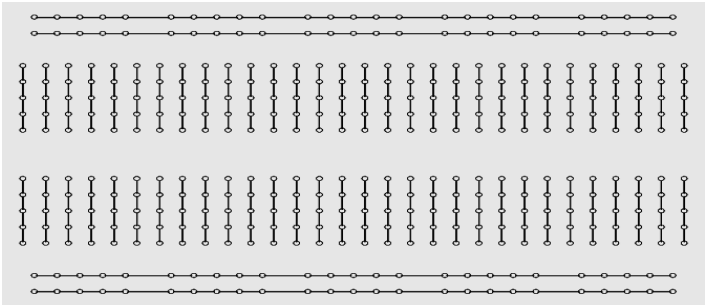
9 Volt DC Battery:

9-volt **DC Battery** is use to supply voltage across the electric circuit.

Breadboard:

A **breadboard** is a solderless device which is **used to** build and test circuits quickly before finalizing any circuit design. The **breadboard** has many holes into which circuit components like capacitor and resistors can be inserted.

Breadboard



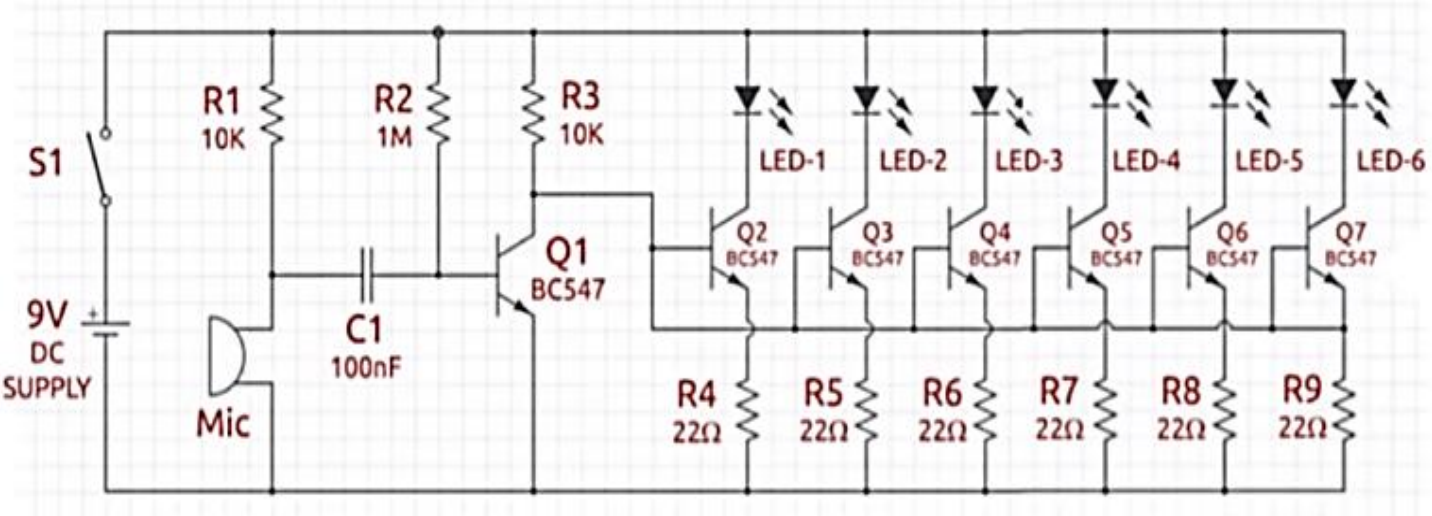
Inner connection

Connecting wires:

Connecting wires are used to connect different electrical component with each other.

Circuit Diagram:

Assemble the circuit on breadboard as per the circuit diagram.



Working Explanation:

In this **LED Music Light Circuit**, condenser mic picks up the sound signals and converts them into voltage levels. These voltage signals are further fed into **R-C 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 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 also add more LEDs with transistor and resister to make it cooler.

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.

Applications:

i. **Cell phone background lights for rhythmic flashing**

Cell phone background lights for rhythmic flashing according to the ringtone or incoming call alert. Latest **android** mobiles **have** option to enable LED **flash notification**. If your mobile **does** not support LED **flash** option, you **can** use free **android** apps. You **can** try Ringing **Flash** lights or **Flash** Alerts apps. When your phone **has** option, you need not to use any other apps.

ii. **In disco and party Lounges.**

Randomly changing **disco light** color, show **you** a romantic and relaxation atmosphere. Flash mode **lights** can flash, appeared or disappeared quickly as the music rhythm changes.

iii. **In musical fountains dancing Bluetooth speakers**

Sound SOUL Music Fountain Mini Amplifier USB Dancing Fountain Speakers for PC / MP3 Players / Mobile Phones / Tablets etc. Small and lightweight, convenient to carry. Easy to use, just one 3.5MM cable, connect with almost all cell phones, mac, pc, laptop. Its beautiful appearance makes you love it at first sight. No matter what you use it to listen music, or just put it on the desk, it is surely best collection or decoration for house.

iv. **Simple sound to light unit for music**

Sound Activated LEDs Kit Four high-intensity LEDs **light** up and react simultaneously to every **sound**. Use for different, fun, and practical applications like a **sound** indicator or simple **sound-to-light unit** for music.

v. **Sound Indicator**

Technology use in Future:

i. **LED Light Up shoes with music (special for dancing purpose)**

ii. **Door Bell**