



ELECTRONIC CIRCUITS-1 MINI PROJECT

GROUP P5, ECE A BATCH

REMOTE AUDIO

LEVEL

INDICATOR

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AIM

To design an 8 LED audio level indicator circuit that can display the variation of an audio signal in a group of 8 LEDs

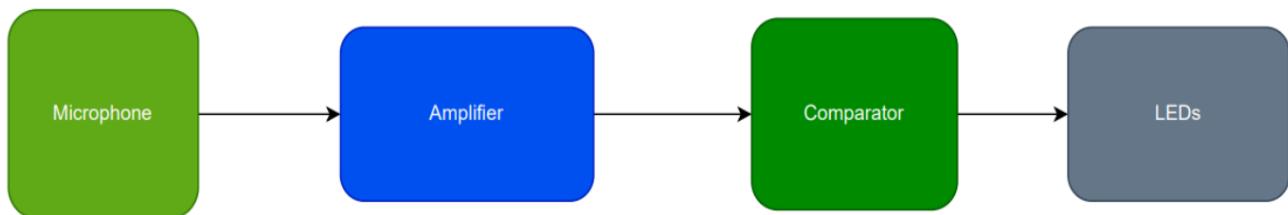
INTRODUCTION

The normal level-indicator circuits available in the market require connections to the player's output, which may not be easily accessible. The audio level indicator circuit described here removes this restriction as it may be placed close to the player's speakers, yet the desired effect can be realised.

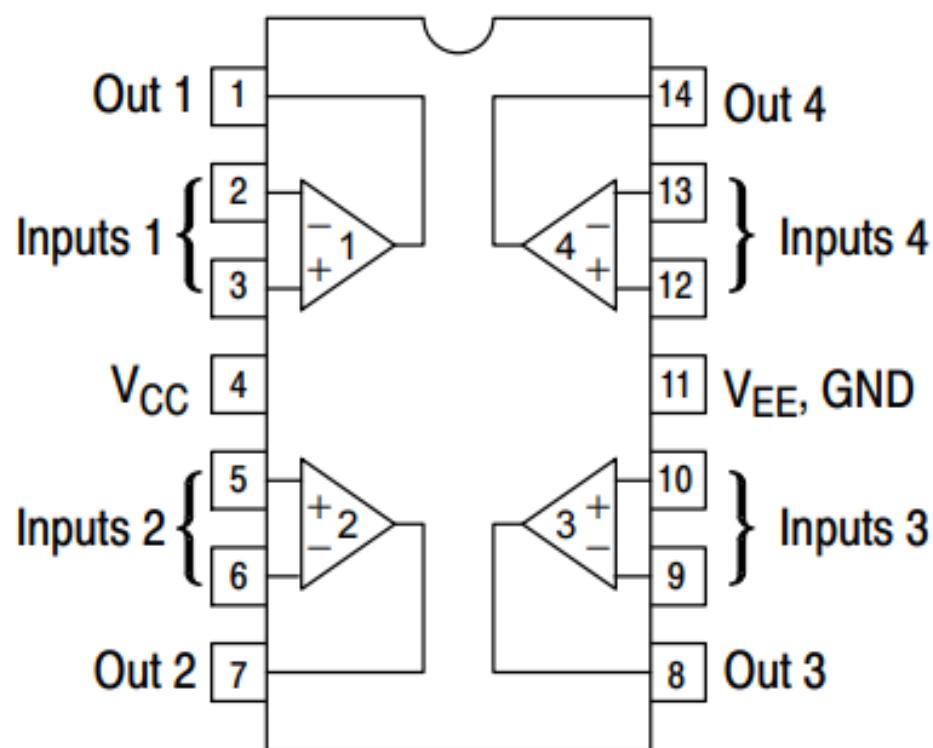
COMPONENTS

- LM324 IC - 2
- RESISTORS - 4.7K,10K,1K,220
- CAPACITORS - 0.1uF
- MICROPHONE - 1
- LEDs
- POTENTIOMETER - 220K
- WIRE
- BREADBOARD

BLOCK DIAGRAM

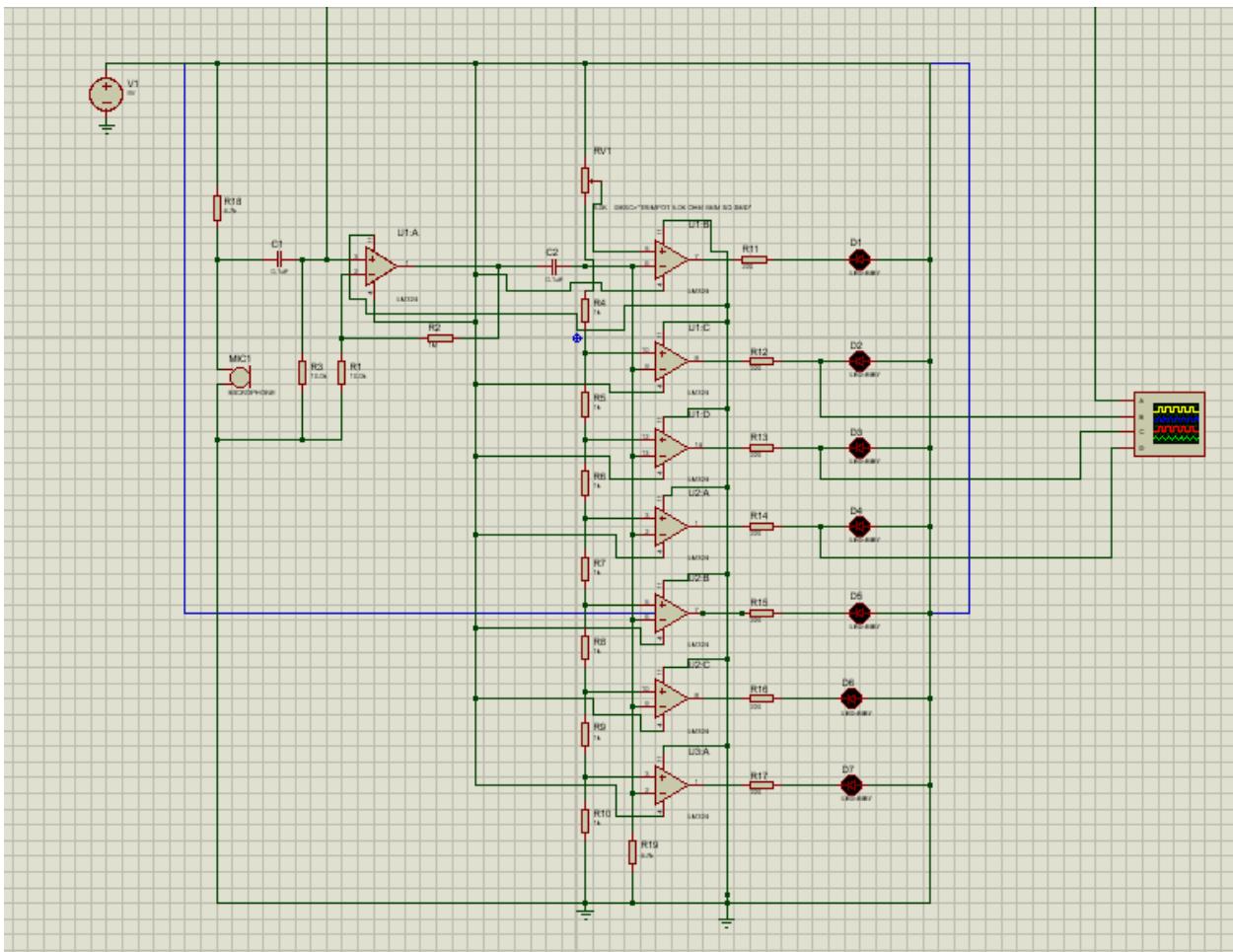


LM324 PINOUTS



The operational amplifier LM324 IC can work like a normal comparator, and it comprises four independent op-amps internally. This IC has been designed with low-power, bandwidth and high stability for operating with single power supply over extensive voltage ranges. The range of operating voltages of this IC includes 3.0 V for low and 32 V for high. The range of common mode input mainly comprises the negative voltage supply, thus removing the requirement of outside biasing components in several applications. The range of output voltage also comprises the negative voltage supply.

CIRCUIT DIAGRAM



THEORY

In the remote audio level controller the signals are picked up by the condenser microphone, which get further amplified by the noninverting amplifier built around one of the four op-amps of LM324 as shown in the circuit diagram.

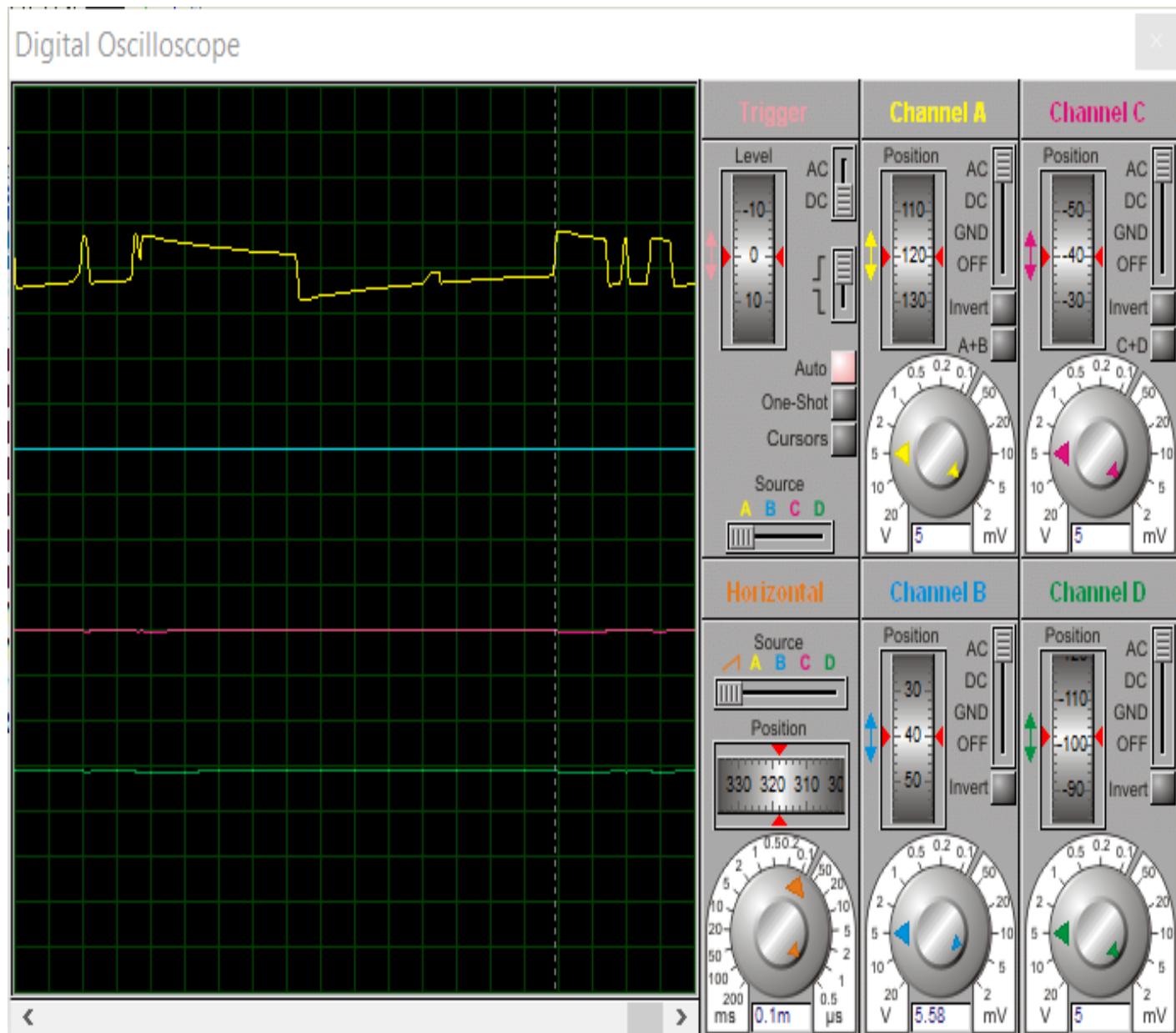
The remaining three, along with four op-amps of the second LM324, are used as seven comparators to work as the level detector, giving seven output levels through seven coloured LEDs.

The sensitivity of the audio level indicator circuit may be improved by varying the 220k potentiometer. A 4.7-kilohm potentiometer may be connected in series resistors with the 220k potentiometer if a fine adjustment is desired.

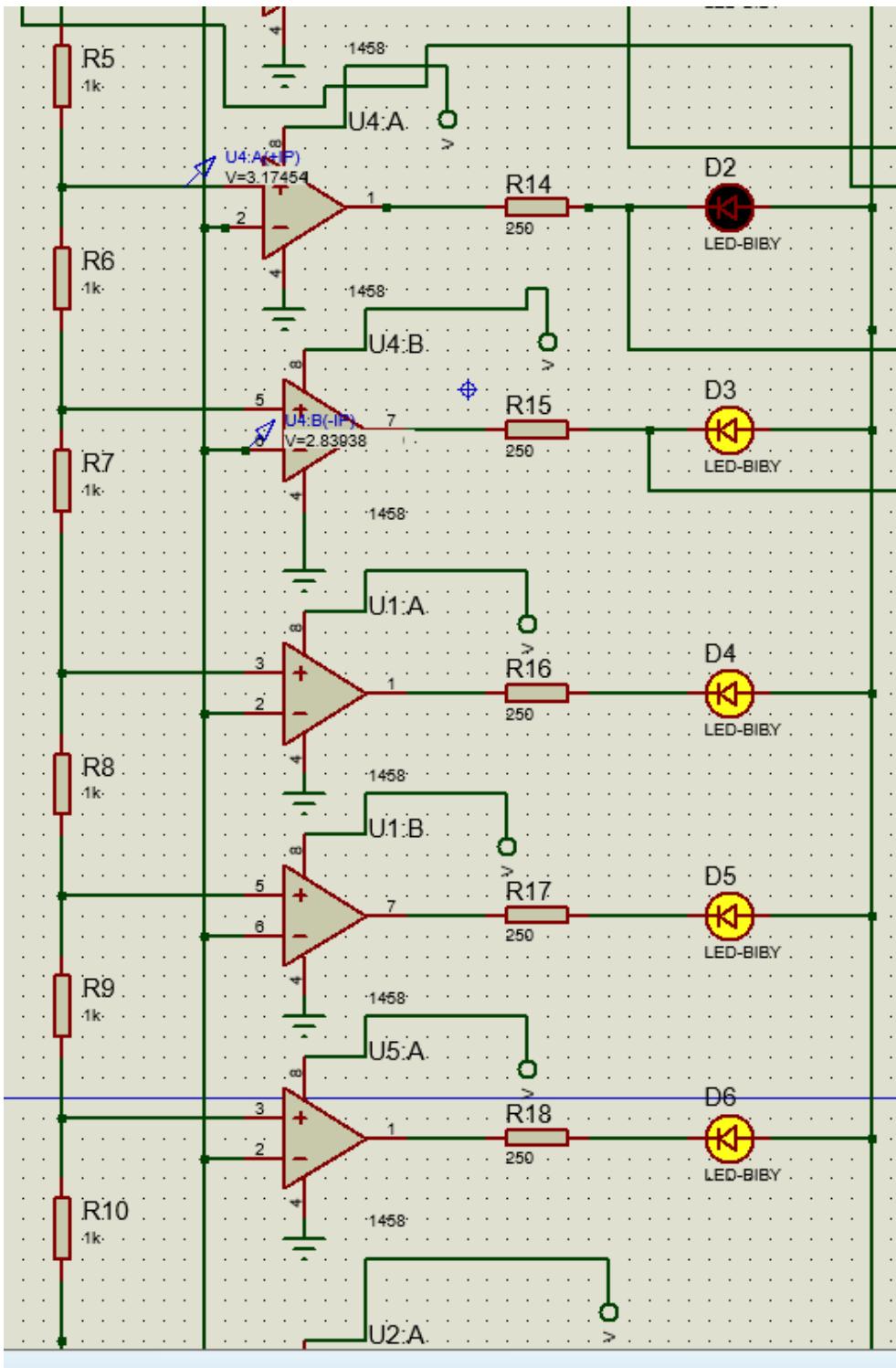
A total of 7 LEDs are used to indicate the audio level. Each LED is connected in such a way that the positive terminal of the voltage supply is connected to the anode of the LED and the cathode is connected to the output of the comparator. The LED will be ON if the output of the comparator is low i.e., ($V_{out} > R_{ref}$) In this way, each LED can be lit based on the input audio signal. The LEDs glow successively depending on the voltage that the Amplifier Corresponding to them gives as output. The louder the sound, the more LEDs glow. Resistances are attached to avoid the LED breakdown when the comparator output voltage is high. (If the voltage is beyond the breakdown voltage). Here LED-BIBY's (which gives a yellow glow) were used to indicate the audio level. LEDs (D5, D6, D7) have a small reference voltage. They glow even for low audio input. LEDs (D2, D3, D4) have typical reference voltage which glows for moderate audio input. LED(D1) has a high reference voltage so it glows for high audio input.

RESULT BASED ON PROTEUS

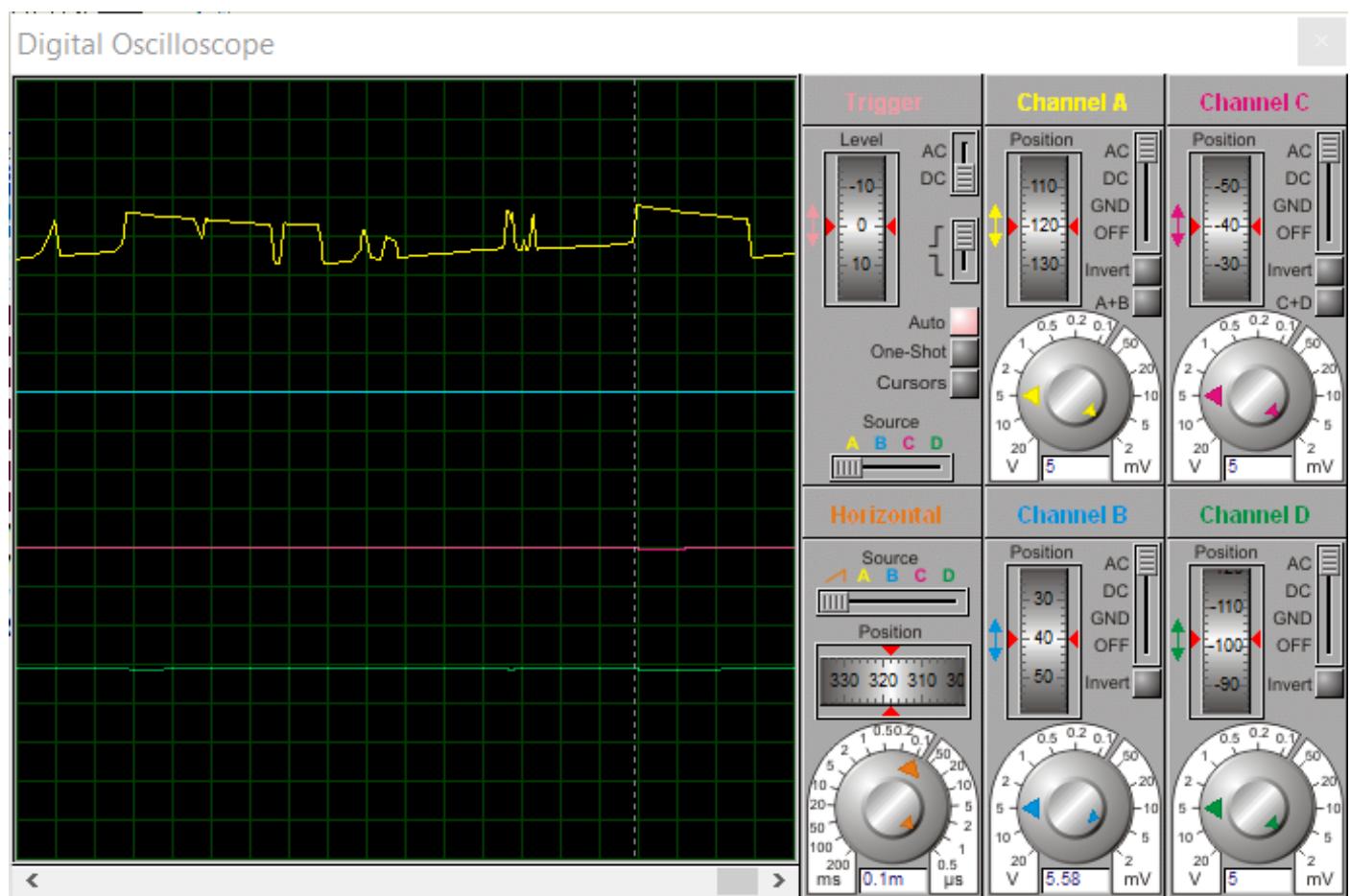
For high level audio frequency:-

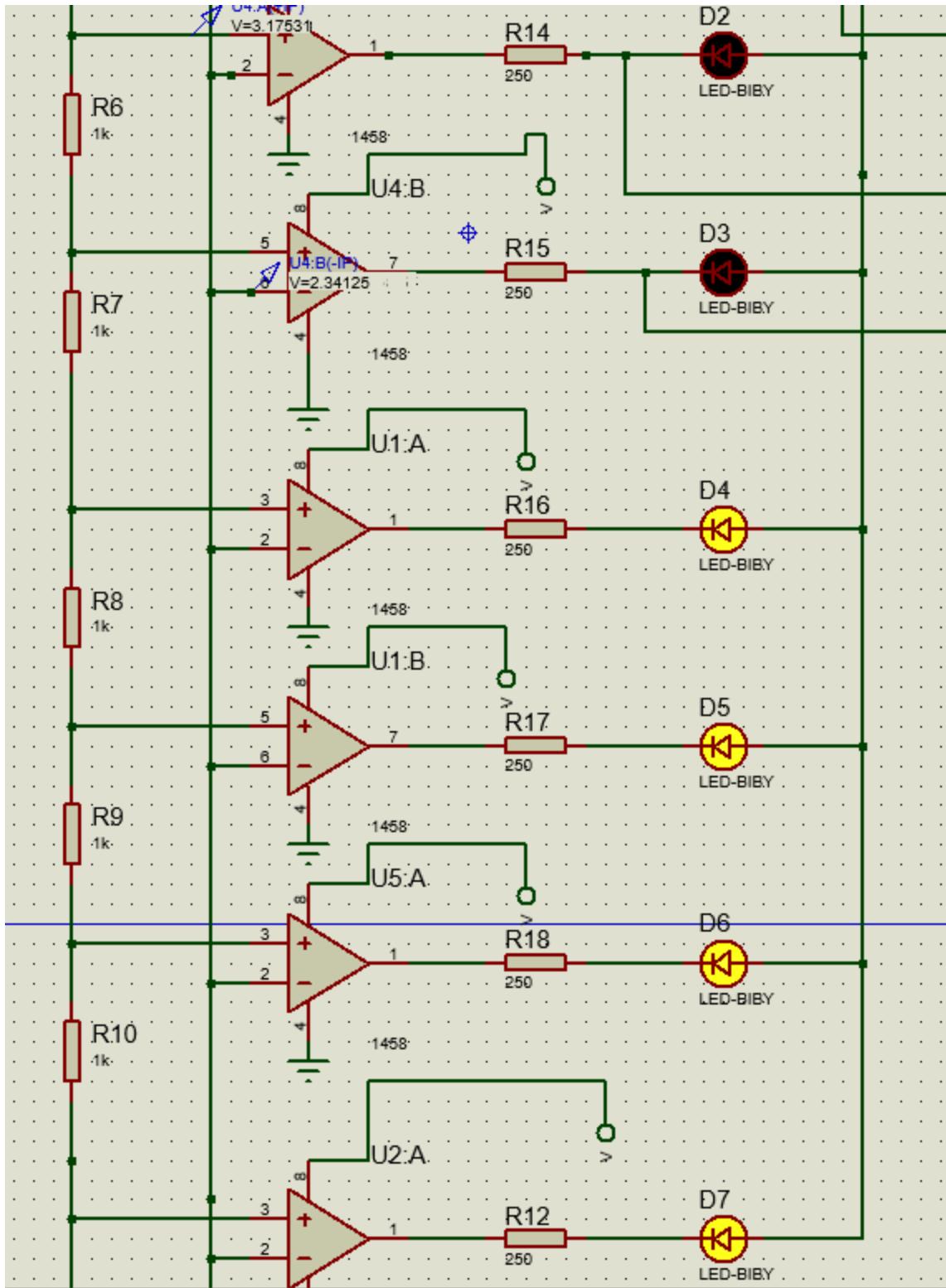


LEDs blinking



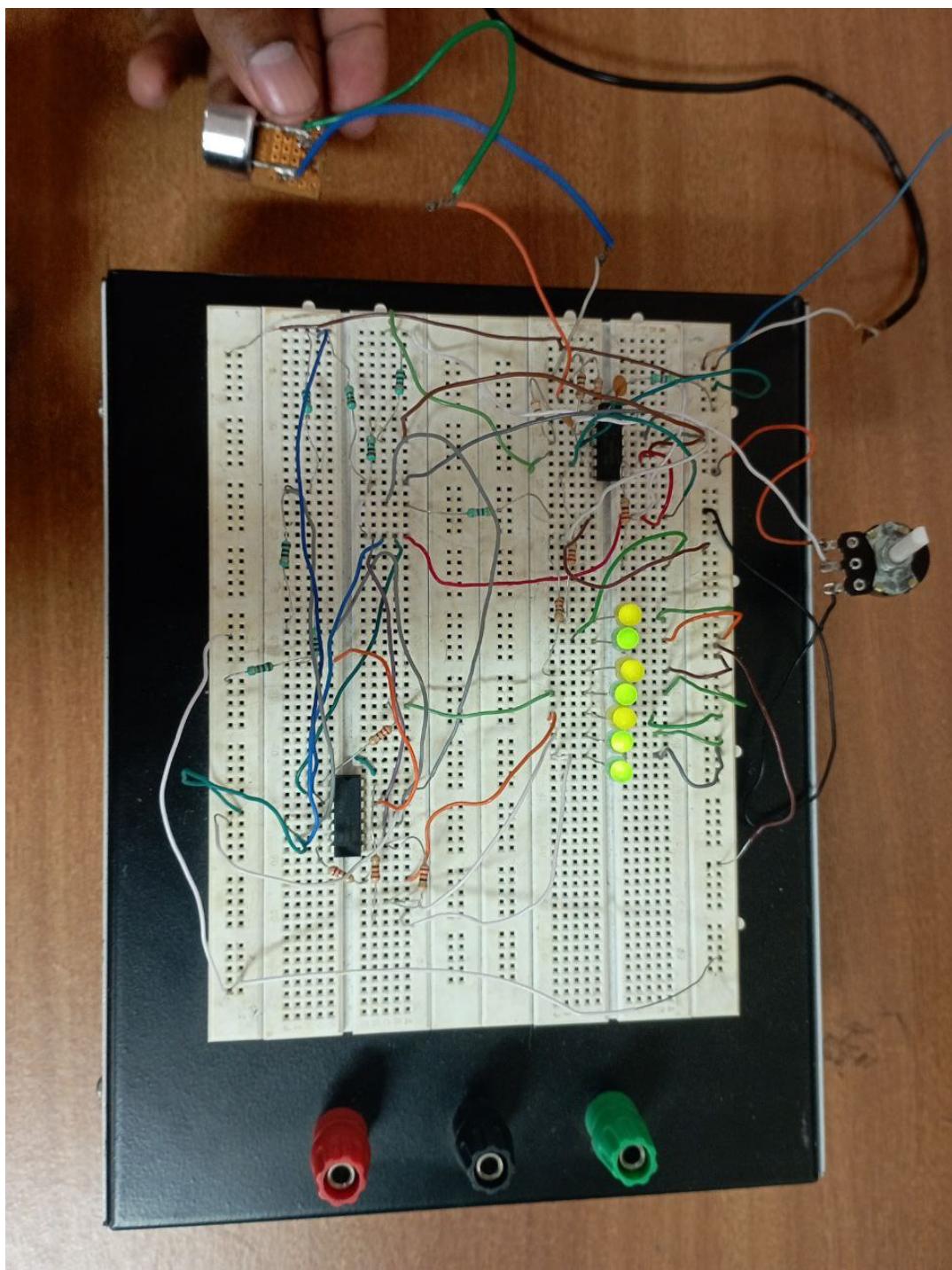
For Normal Audio Level:

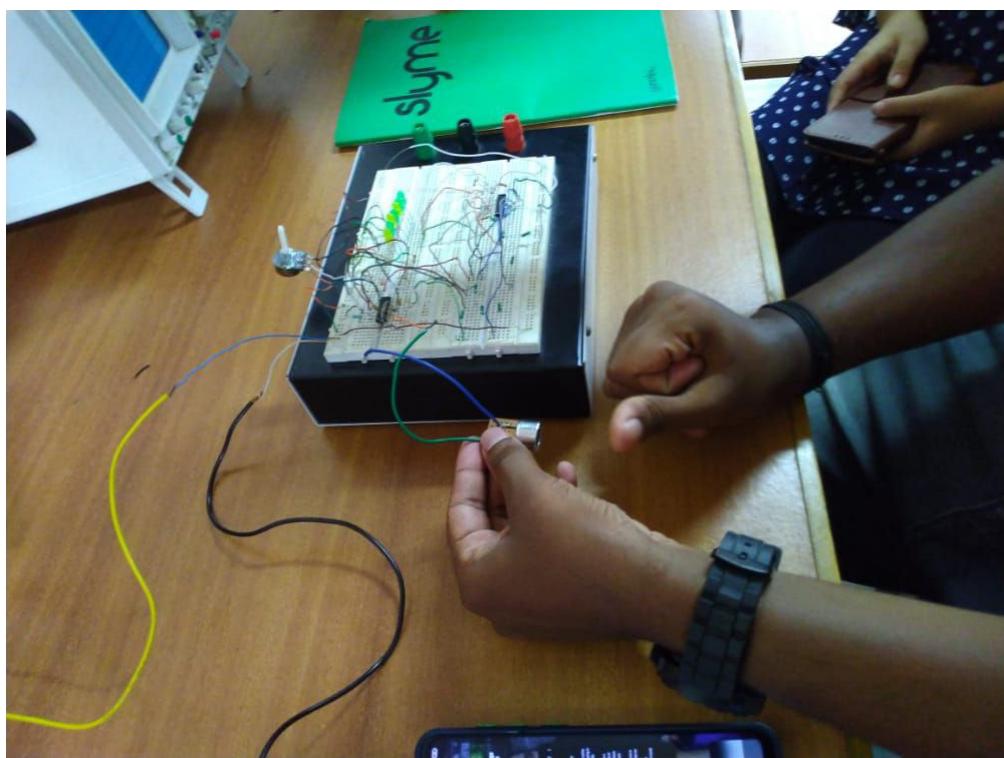
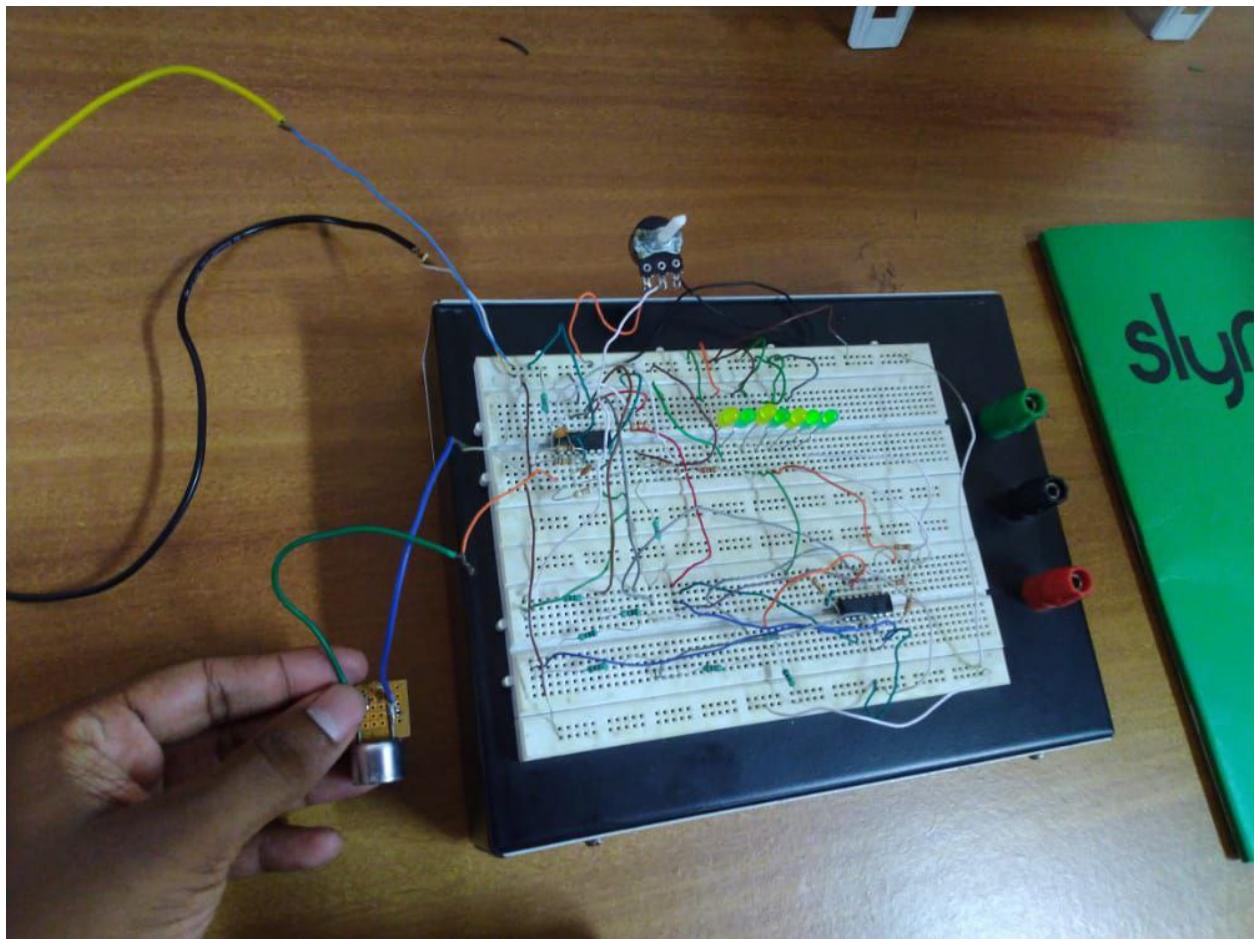




RESULT

HARDWARE IMPLEMENTATION





Step 1: Detection of sound signal and conversion to electric signal

Initially the condenser microphone picks up the audio signals and convert them into electrical signals

Step 2: Amplification and quality Incrementation

The signal is now amplified by the non-inverting amplifier, and capacitors are present to avoid DC noise interruptions

Step 3: Modification of signal and inputting to comparator

The signal is further passed through a capacitor for better quality signal and then it is passed to a negative input of a set of comparators

Step 4: Comparator operation

The comparators have different voltage values divided using resistors which ultimately add up to 9V. These values are segmented to different voltage values by voltage divider rule and is fed into the positive terminals of the comparators. The comparators compares the positive input which is used for detection level and the negative input which is the input signal cascaded by a transfer function. If the negative input is higher the output from the comparator goes to negative saturation voltage, or else the positive saturation voltage is given as output from the comparator

Step 5: LED working

The LED is connected with the P side to the high voltage and whenever there is a low voltage in the output of the comparator the corresponding LED glows as there is a negative voltage on the N side and different levels of the sound can be detected as clearly indicated by the above steps

REFERENCE

https://www.youtube.com/results?search_query=remote+audio+level+indicator+in+proteus

<https://www.elprocus.com/lm324-ic-pin-configuration-and-its-applications/>

<https://www.electroschematics.com/remote-audio-level-indicator/>
