❖ Tick Tock sound generator using 555Timer IC

➢ Source: Circuit link

➢ Components Required:

- 555 Timer IC
- 8 Ohm Speaker
- LED (Optional)
- Capacitors: 2 x 10uF
- Resistors: 47K, 220R
- Breadboard
- Few Breadboard Connectors
- (5-9)V Power Supply

➢ Working of the Circuit:

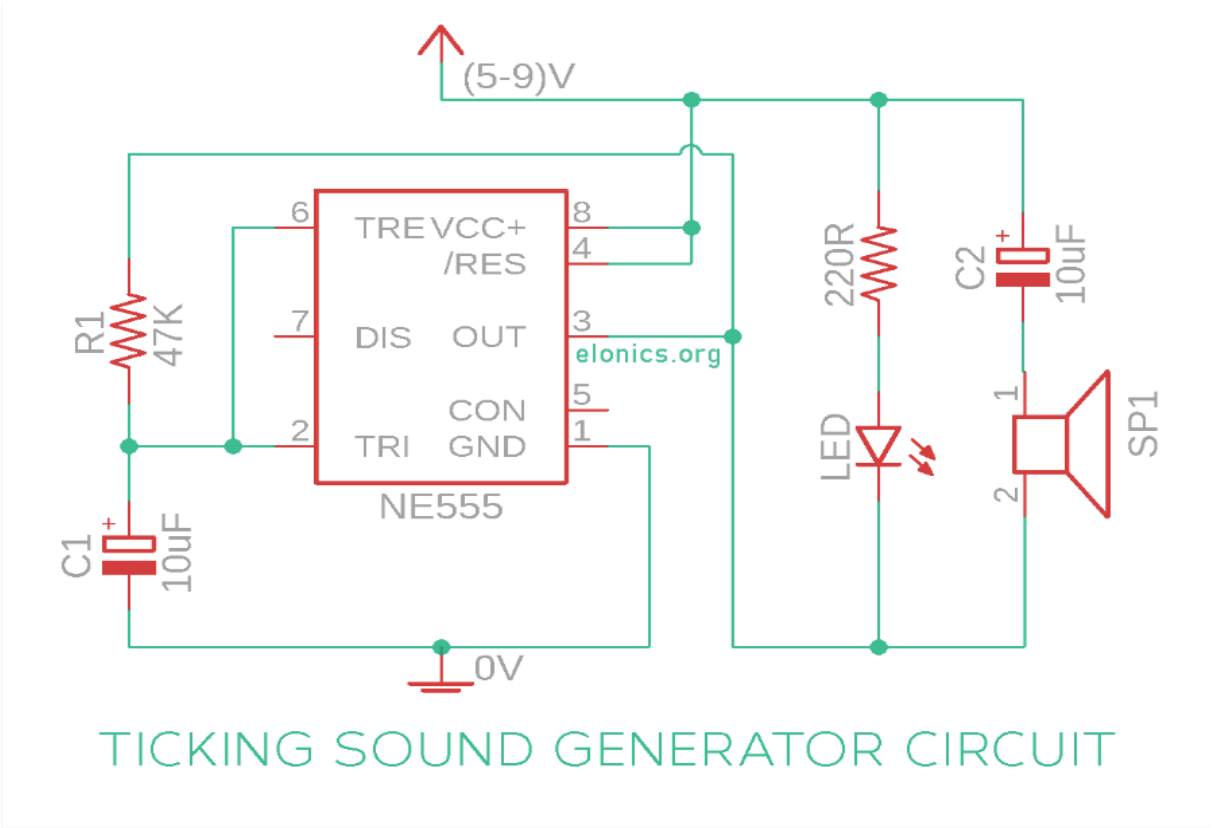
In this circuit, 555 timer IC is configured to work in astable / bistable mode. It means that voltage at the output of 555 IC continuously toggles between 0V and Vs (The supply voltage).

Each time there is a transition in the output voltage from 0V to Vs or from Vs to 0V, the diaphragm of the speaker moves rapidly. This movement generates a tick or tock sound depending on whether the diaphragm is moving up or down.Creating a tick-tock sound generator involves additional design considerations for the sound generation circuit, such as pulse generation and amplification. The specific components and values in your circuit will depend on the desired frequency and sound characteristics.

Flow Process:

- Launch Eagle
- Schematic Design
- Component and Symbol Libraries
- Schematic Capture
- PCB Layout

- Ground Plane
- Design Rules
- Design Checks
- PCB Footprints
- Review and Verification
- Fabrication



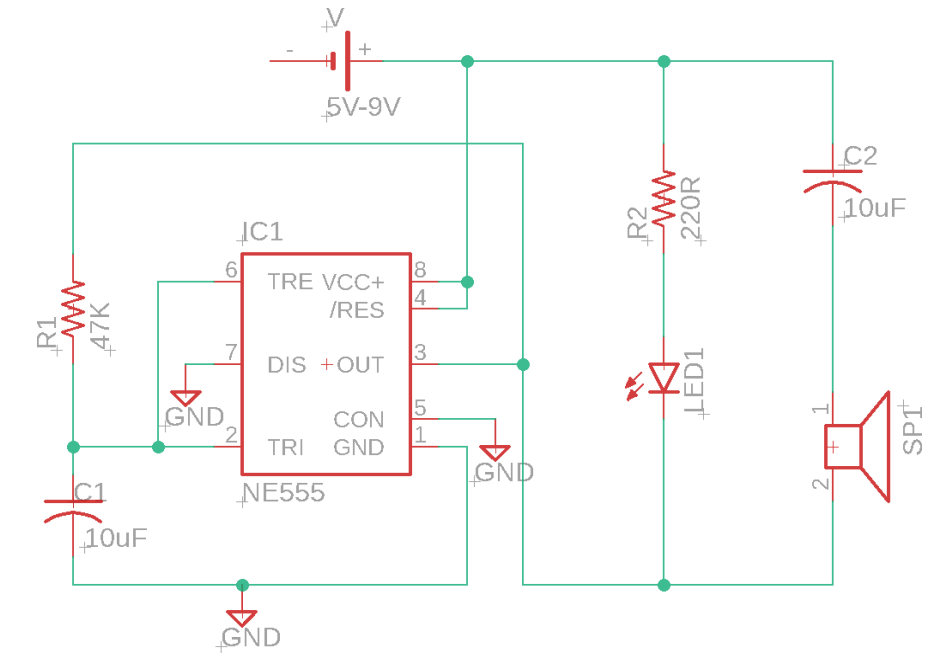
The frequency of the tick-tock sound depends on the values of R1, R2, and C1. You can choose these values according to your desired frequency. Here's a rough formula to calculate the frequency:

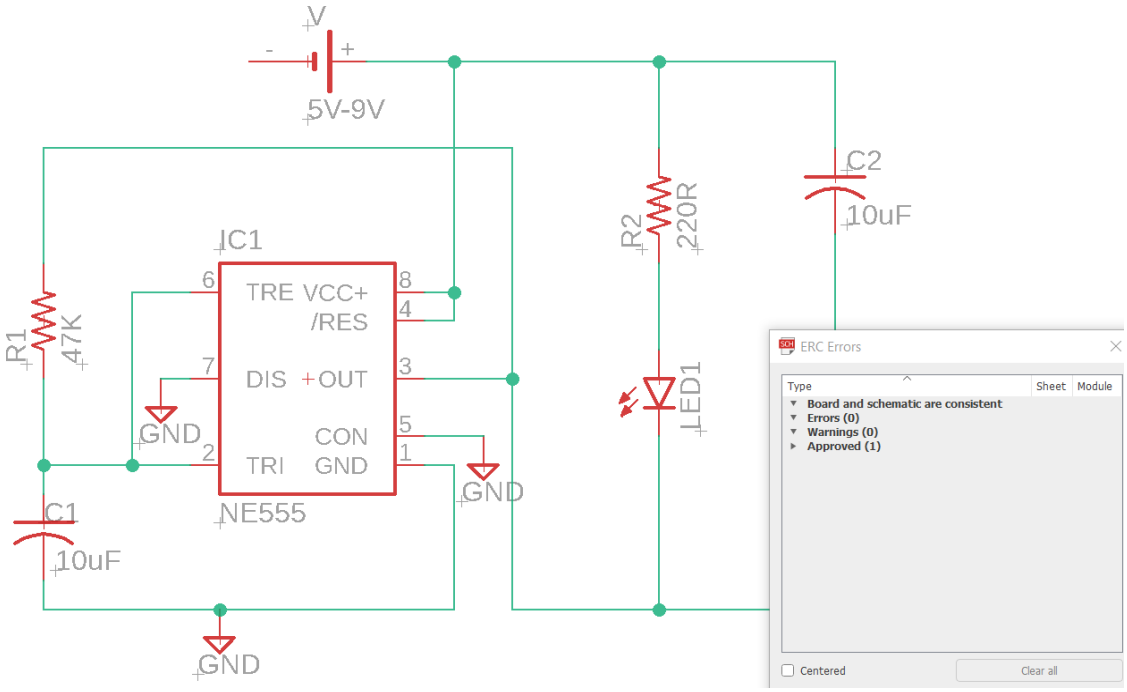
Frequency (Hz) = 1.44 / ((R1 + 2 * R2) * C1)

Summary:

- The timer IC operates as an astable multivibrator, which continuously generates a square wave.
- When power is applied, Pin 3 (OUT) of the 555 timer oscillates between low and high levels,creating a square wave output.
- The square wave drives the speaker or buzzer, creating a tick-tock sound.

➢ Schematic:

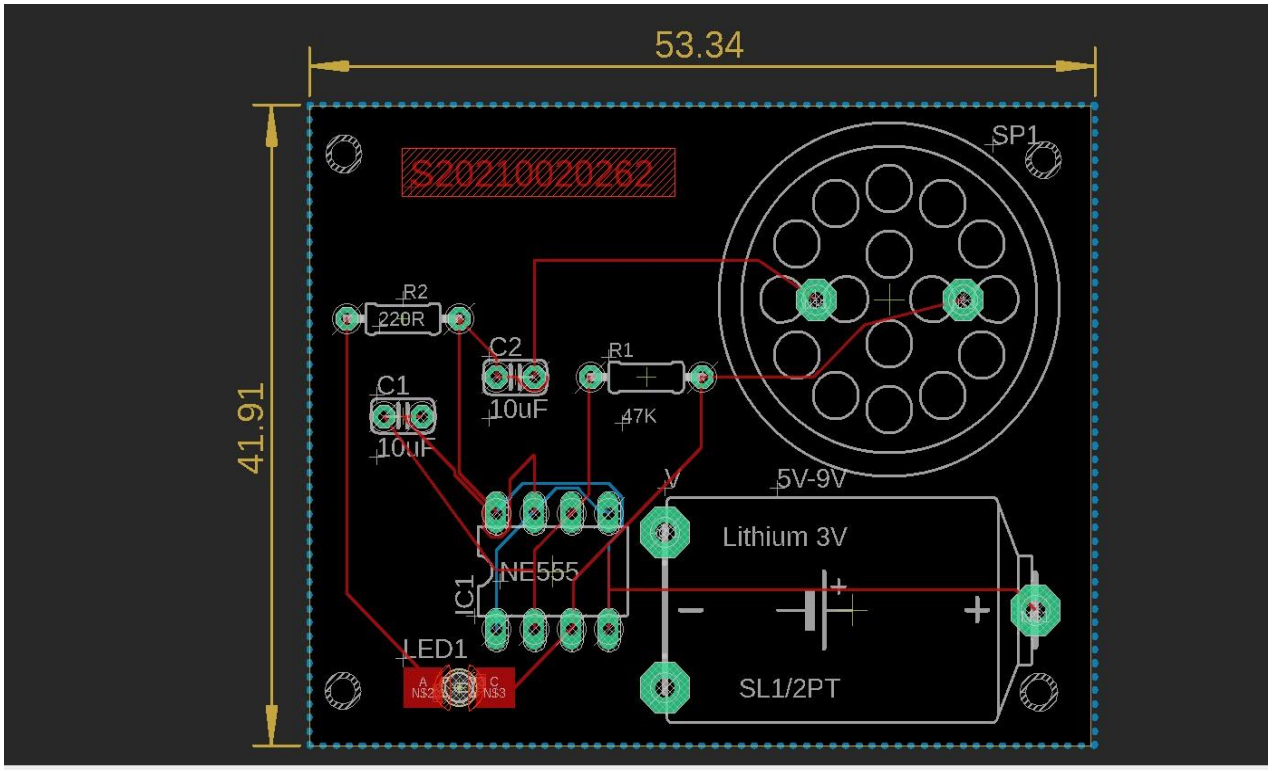




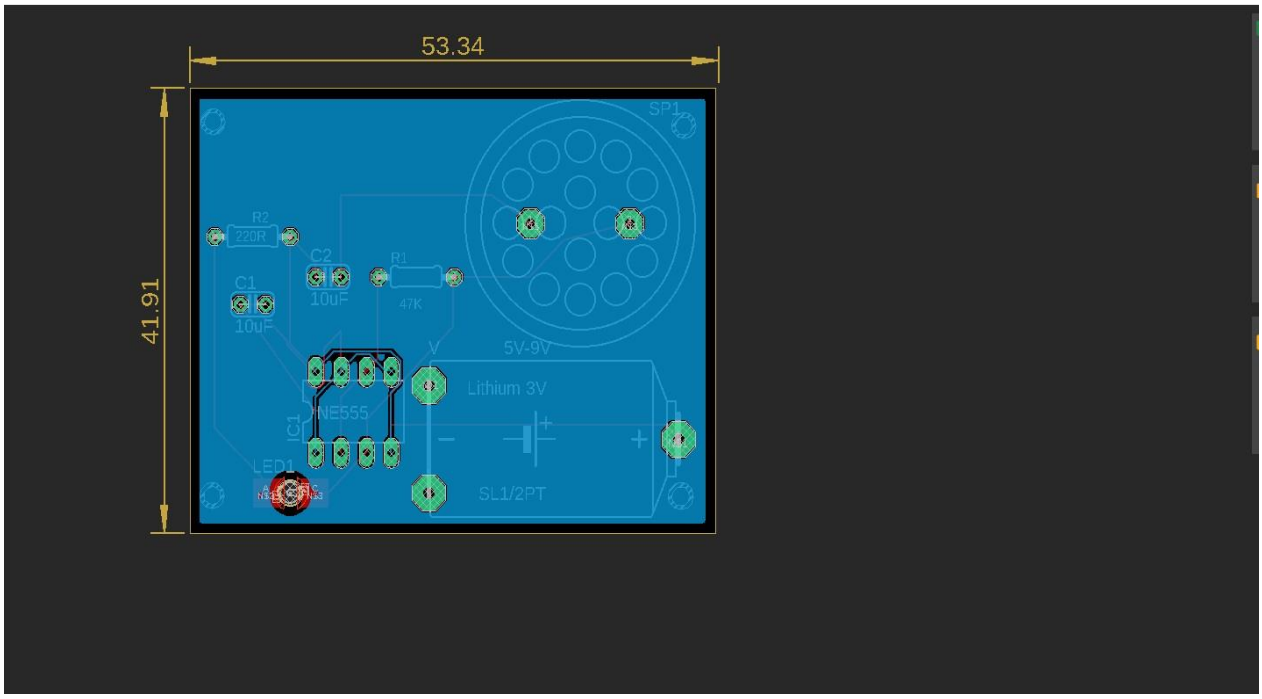
Implementation of schematic of the circuit with 0 errors following ERC.

➢ PCB board:

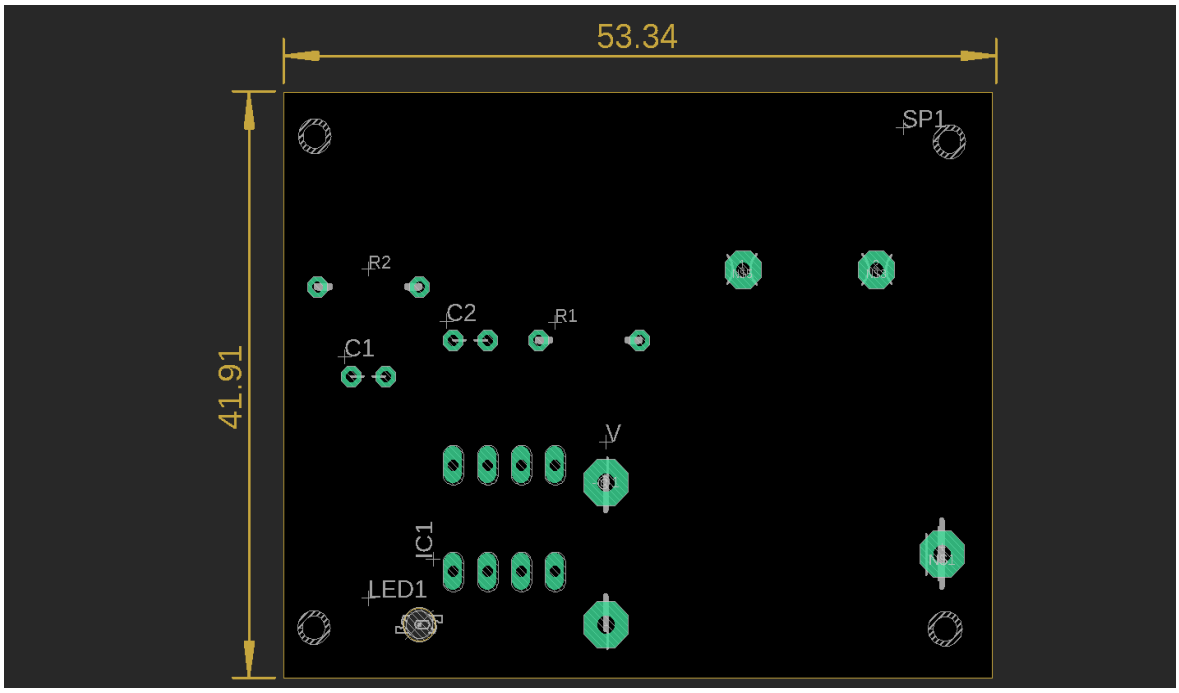
1.Overall PCB from top view:



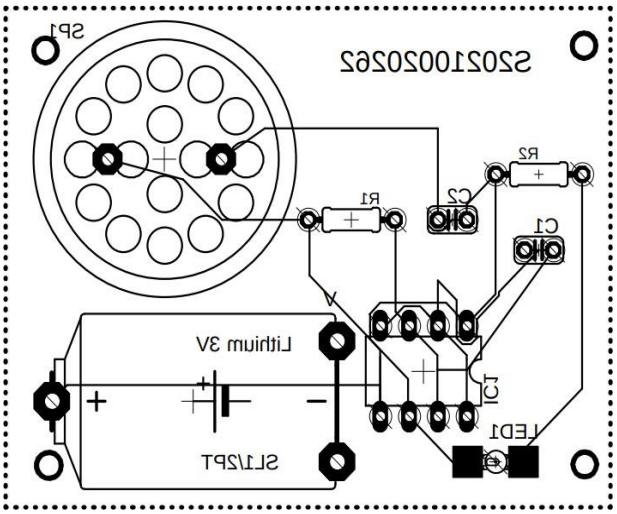
2.Bottom view of the PCB:



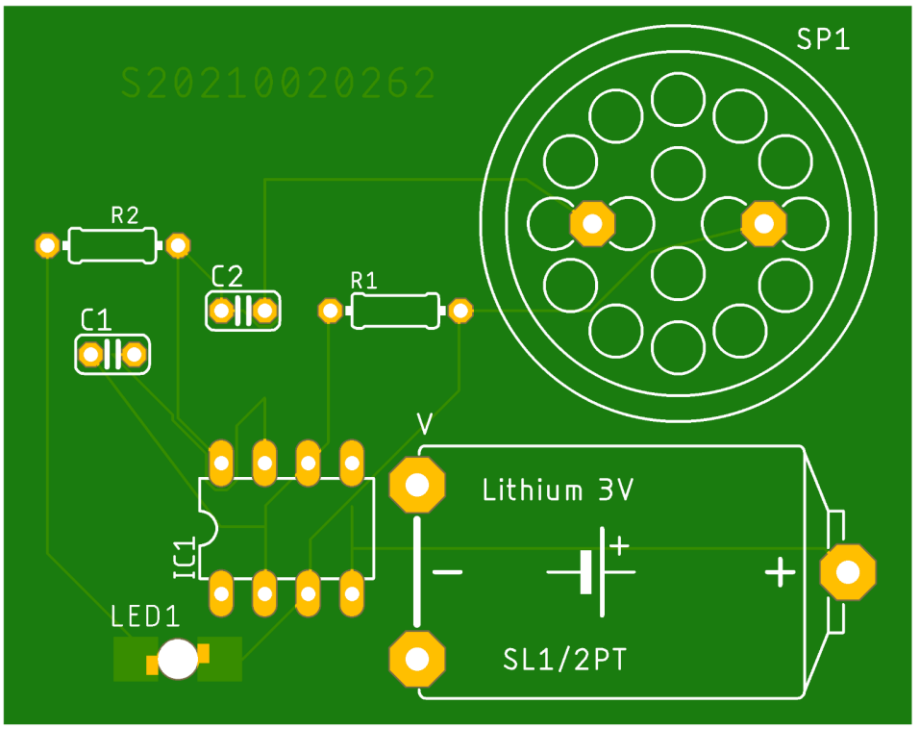
3. Copper Filling of the PCB holes:



4. PCB LAYOUT WITH COMPONENTS:



5. Manufacturing board:



Contribution:I Implemented the Whole Schematic design, PCB designing, and obtained PCBLayout, As this is my Individual Circuit.

No.of Layers: 2
Dimensions of PCB: 53.34mm X 41.91mm

Further Improvements:

We can adjust the gap between successive beats, in real time, by replacing the Resistor R1 with a potentiometer. Multiple circuits with different beat/ticking frequencies can be combined to make audio synthesizer circuits.

Applications

- To add a mechanical feel to digital clocks.
- In metronome circuits (The musicians maintain rhythm).
- In hypnotic devices that require flashing of lights and ticking sounds.

➢ Implementations By understanding EP course:

- -Reduced the area of the circuit
- -Reduced the board dimensions.
- -Power Optimization.
- -Integrated the whole circuit.
- -Increased the performance of the Circuit.
- -Made the Design Cost Effective.
- -Used effective models of each component according to the source circuit.
- -Interconnect level-1 and Interconnect level-2
- -Electronic packaging level-2

➢ Team Contributions:

Team No: 04

- **1.** A. Kiranmai - **S20210020251 (Group lead)**

  Contribution**: Sound Operated Timer using 555 Timer.**

- **2.** B .Havilah - **S20210020262**

  Contribution**: Tick-Tock Sound Generator using 555 Timer.**

- **3.**P. Jasmitha - **S20210020314**

  Contribution: **Motion Detector using 555 Timer.**

➢ Conclusion: We all Implemented the Schematic Designs, and PCB Layout Designing of IndividualCircuits Using 555 Timer in Eagle Autodesk Software.