

PCBWORKSHOP

N CHANNEL MOS AUDIO AMPLIFIER IN ANALOG CIRCUIT

Designing and implementing an N-channel MOSFET audio amplifier involves several steps, including circuit design, simulation, and hardware implementation. Below is a detailed guide on the process, including the use of software tools like Tinker CAD and Easy EDA.

Step 1: Understand the Circuit Design

An N-channel MOSFET audio amplifier typically involves:

- A power supply
- Input signal (audio source)
- MOSFET as the main amplification component
- Biasing resistors
- Capacitors for coupling and decoupling
- Load (speaker)

Step 2: Circuit Schematic Design

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Components Needed:

1. *N-channel MOSFET* (e.g., IRF540N)
2. *Resistors* (various values for biasing)
3. *Capacitors* (for coupling and bypassing)
4. *Audio input source*
5. *Power supply* (12V-24V DC, depending on the MOSFET and desired output power)
6. *Speaker*

Basic Circuit Layout:

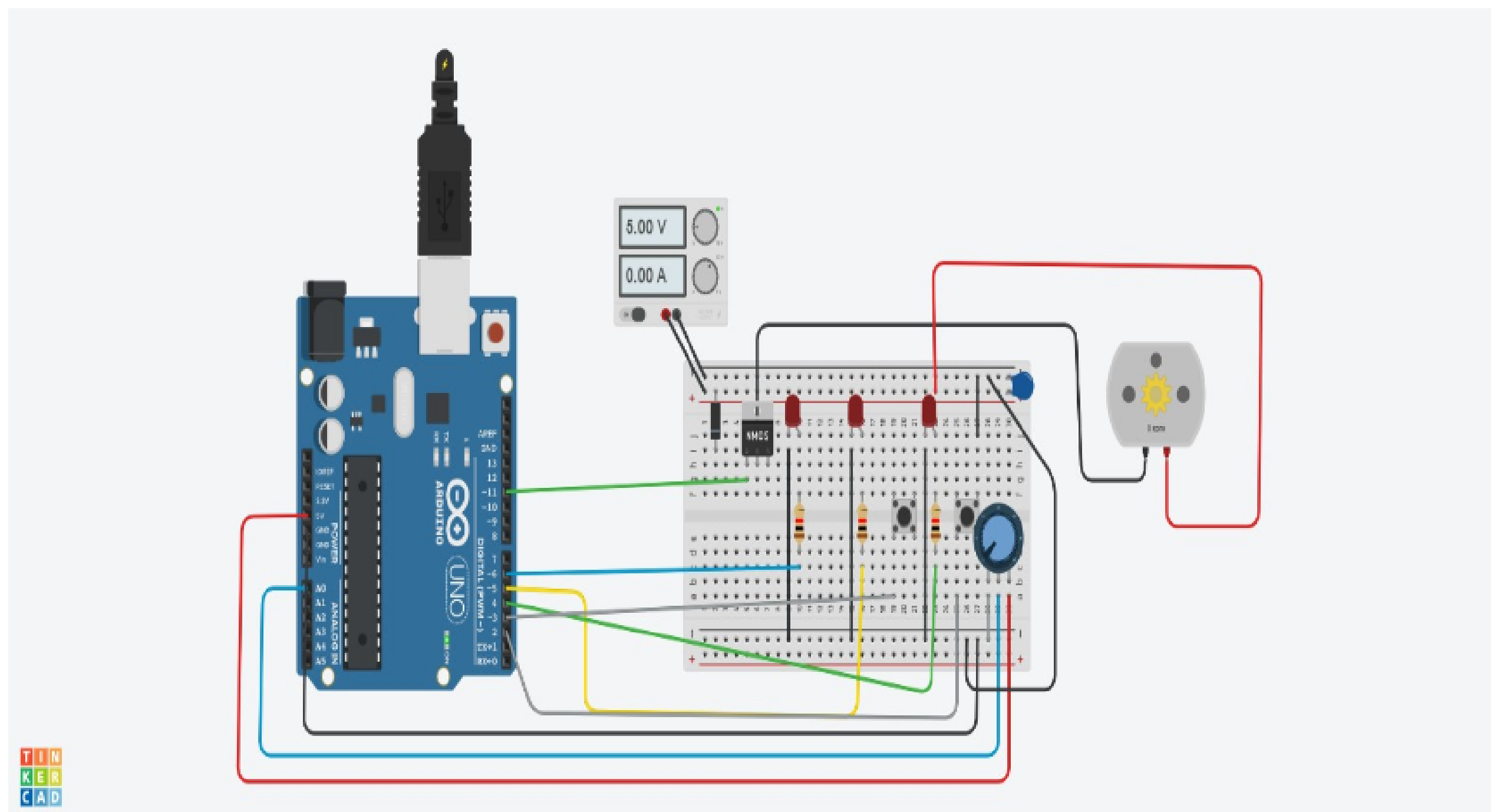
- *Drain* of the MOSFET connects to the positive power supply through the load (speaker).
- *Source* of the MOSFET is connected to ground.
- *Gate* is biased using a voltage divider network.
- *Coupling capacitor* connects the audio signal to the gate of the MOSFET.
- *Bypass capacitor* is placed across the source resistor to stabilize the operating point.

Step 3: Simulation in Tinker CAD

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1. ***Create a New Project***: Log in to Tinker CAD and create a new project.
2. ***Add Components***: Add a breadboard, MOSFET, resistors, capacitors, and other components from the components library.
3. ***Connect Components***: Wire the components according to the schematic design.
4. ***Simulate***: Run the simulation to check if the amplifier works correctly. Observe the output waveform using the oscilloscope tool within Tinker CAD.

RESULT OF TINKER CAD



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Step 4: PCB Design in EasyEDA

1. ***Create a New Project***: Log in to EasyEDA and create a new project.

2. ***Draw Schematic***:

- Use the schematic capture tool to draw the circuit diagram.

- Place the components and connect them according to the schematic.

3. ***Design PCB Layout***:

- Convert the schematic to PCB.

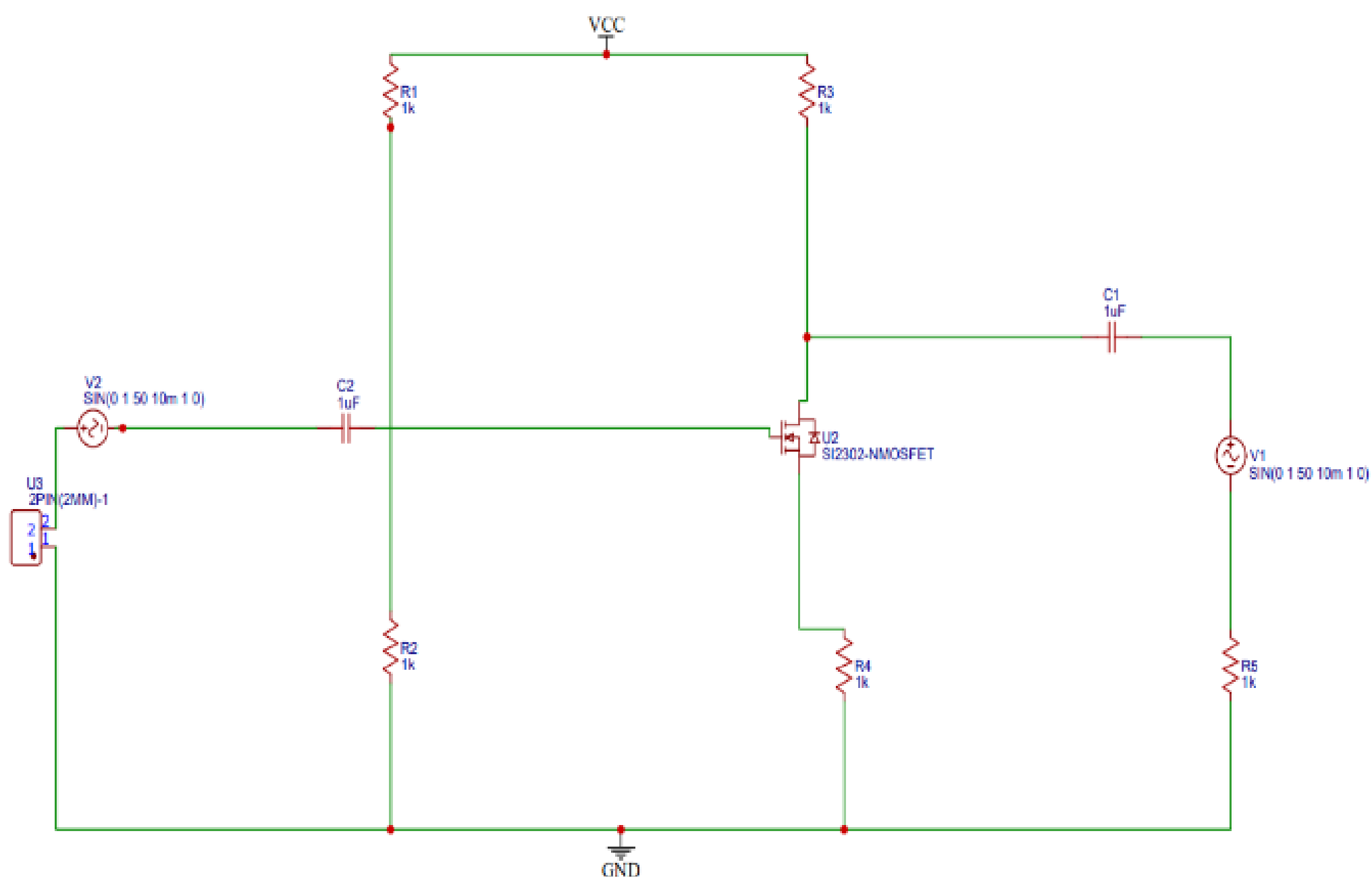
- Place the components on the PCB layout.

- Route the traces manually or use the auto-router.

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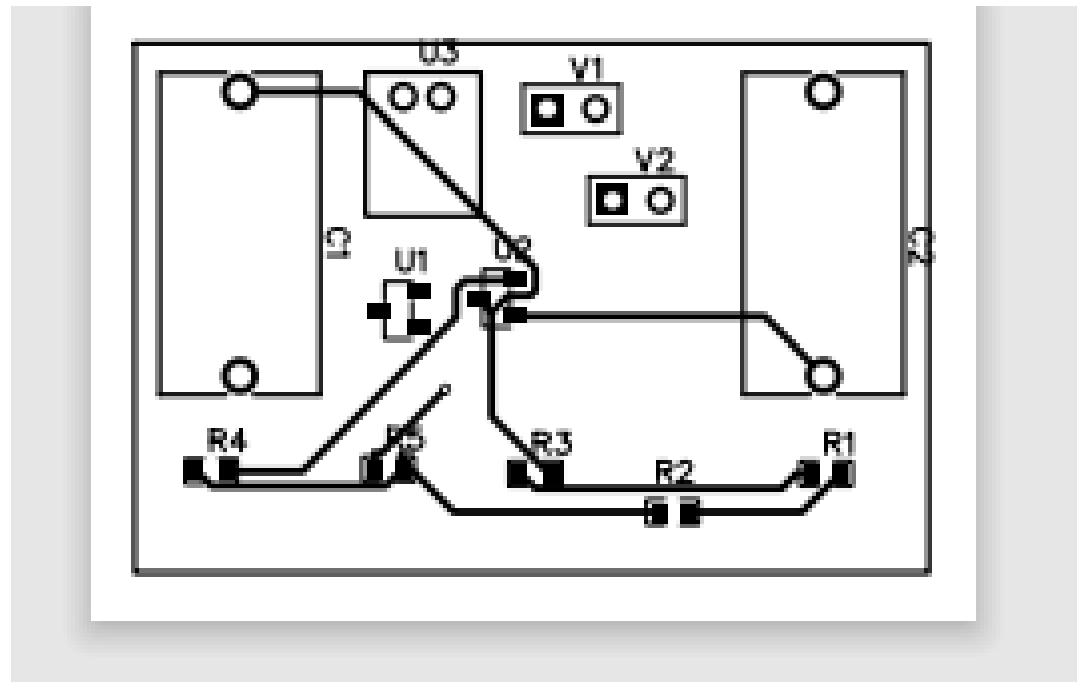
- Ensure proper grounding and trace width for power handling.

4. ***Generate Gerber Files***: Once the design is complete, generate the Gerber files necessary for PCB manufacturing.

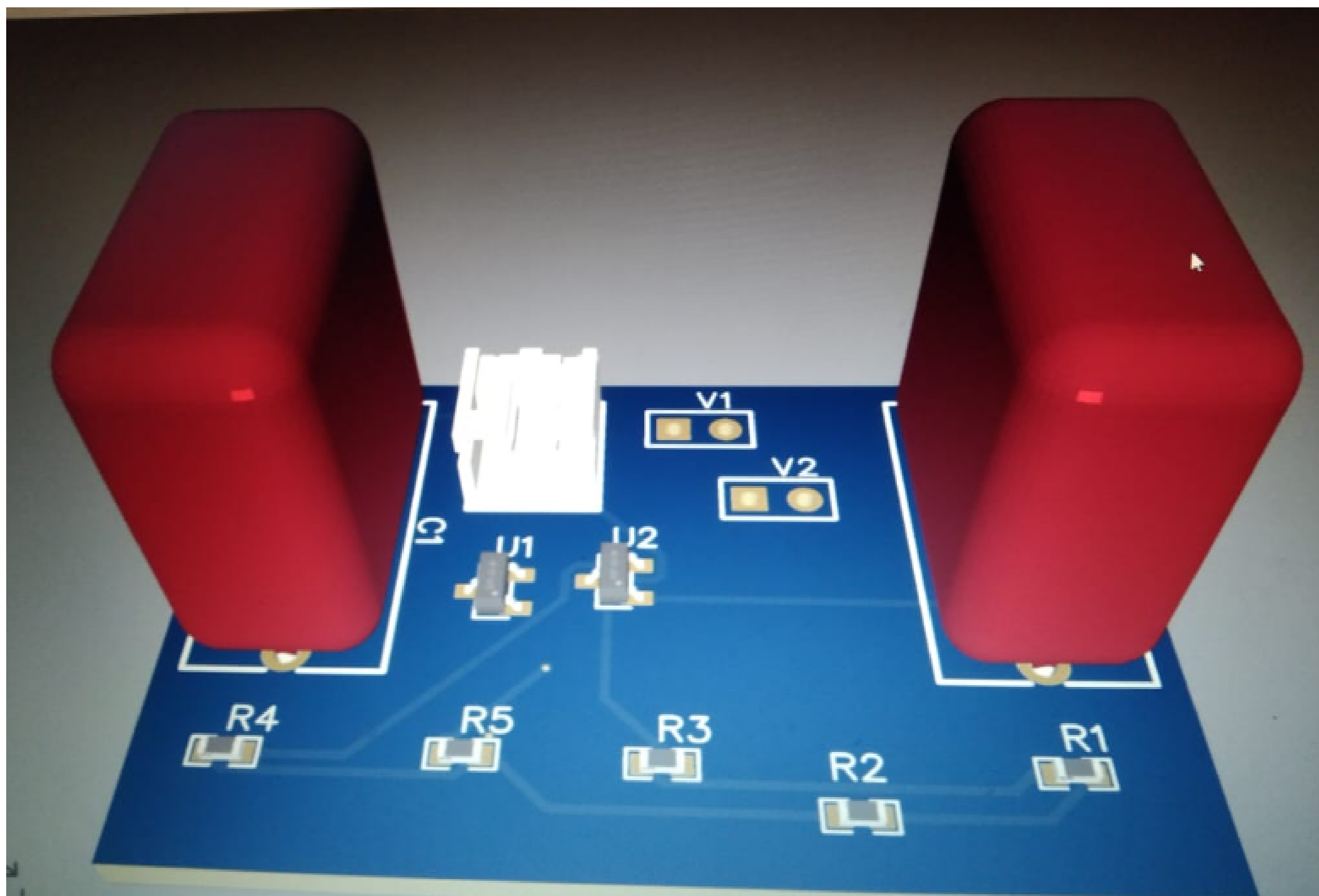


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PCB CIRCUIT



3D CIRCUIT



Step 5: Hardware Implementation

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1. ***Procure Components***: Obtain the required components based on your design.
2. ***Assemble on Breadboard***: Before moving to PCB, it is often useful to assemble the circuit on a breadboard to test functionality.
3. ***Test***: Power up the circuit and test with an audio input. Use an oscilloscope to check the output waveform.
4. ***Assemble on PCB***: If the breadboard test is successful, proceed to solder the components onto the PCB.
5. ***Final Testing***: Perform final testing with the PCB assembled circuit. Connect it to the audio source and speaker to ensure it functions as expected.

Step-by-Step Procedure

1. ***Schematic Design***:
 - Use Easy EDA to create a schematic.
 - Place components: MOSFET, resistors, capacitors.
 - Connect components to form the amplifier circuit.
2. ***Simulation***:

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- Simulate the circuit in Tinker CAD to verify the design.
 - Make adjustments as needed based on simulation results.

3. *PCB Design*:

- Design the PCB layout in Easy EDA.
- Ensure proper placement of components and routing of traces.
- Export Gerber files for manufacturing.

4. *Breadboard Testing*:

- Assemble the circuit on a breadboard.
- Test with an actual audio signal.

5. *PCB Assembly*:

- Solder components onto the fabricated PCB.
- Test the final assembly with audio input and a speaker.

6. *Final Adjustments*:

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- Make any necessary adjustments to component values for optimal performance.
- Ensure the amplifier is stable and produces clear sound.

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