

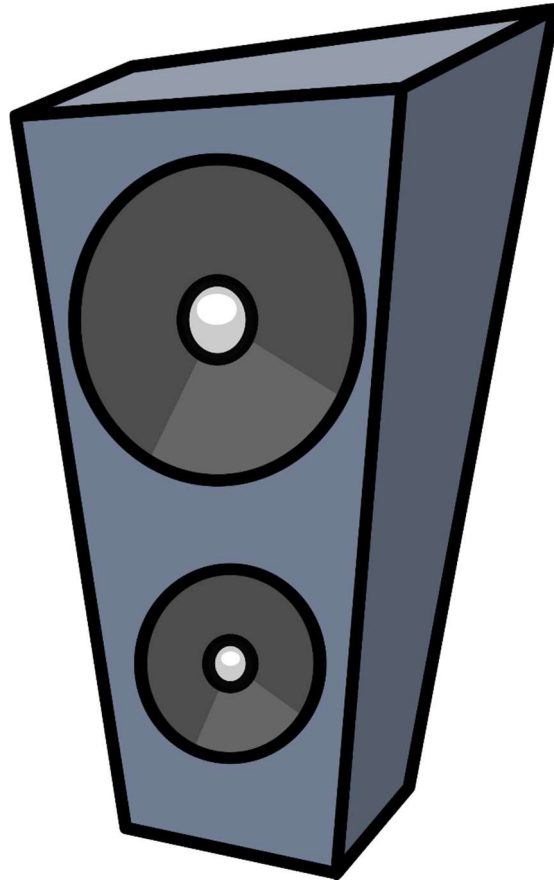
Audio Amplifier

Electronic Circuit Project Report

Team:

Abdallah Mohamed Mohamed Galal
Abdelrahman Salah El-dein Abdelaziz
Mohamed Ahmed Mohamed Hassan
Farida Waheed Abd El Bary
Razan Ahmed Fawzy

Under the supervision of Dr. Said Emam
and Eng. Engy George.

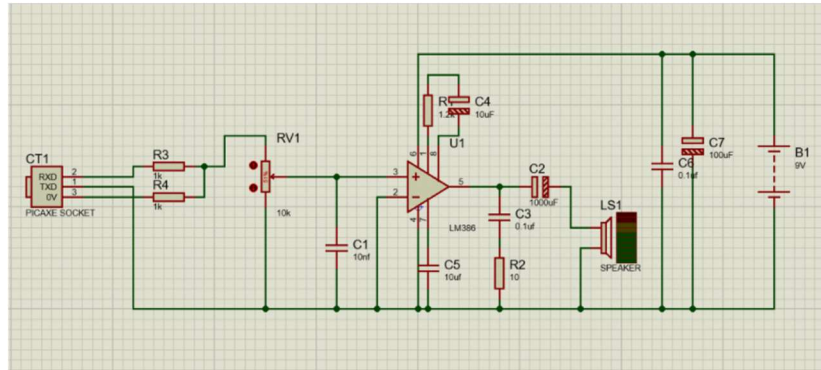


Audio Amplifier is any electronic device that amplifies an electrical signal whose vibrations are limited to the audio frequency range, or the range that can be heard by humans. Audio amplifiers are used in every device that transmits, records, or otherwise processes voice sounds electronically. Devices with audio amplifiers include voice-recognition or voice-synthesis systems, communications or eavesdropping equipment, hearing aids, entertainment systems, and talking toys.

Amplifying the input, because the electrical signal that can be obtained directly from sound waves impinging on a microphone is feeble.



The project was initially designed by selecting the components and selecting appropriate types and values for each. We set up our circuit on one of the simulator programs to test it before we go out and buy the components. Proteus (version 8.1) will be used in this project to simulate the circuit because it is a more user-friendly and intuitive tool, especially for students of electronics, mechatronics, and telecommunications engineering. There are various simulation tools available.

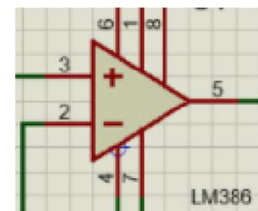


Let's now discuss our components, what they are, and how they are used:

1-LM 386:

It is a low-voltage audio power amplifier integrated circuit. For battery-operated equipment like radios, audio amplifiers, and DIY electronics projects, it is appropriate.

Lm 386 is regarded as one of the most widely used and reasonably priced integrated circuits (ICs) that serve as speakers. It is also one of the simplest and easiest to produce because it has a limited number of components.



As points 2 and 4 are connected to the ground, point 3 is connected to the potentiometer, points 1 and 8 are connected to the capacitor and resistor, Point 6 is connected to the battery in parallel with two grounded capacitors, Point 5 is connected to a capacitor that is in series with the speaker and parallel with a different capacitor and resistor that are also in series.

The input signal must be appropriate for the lm386 in order for it to function.

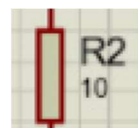
Used in this project as a number and value: one LM386.

2-Resistor:

It is a part of an electrical system. Consist of a passive two-terminal circuit element that uses electrical resistance. It is constructed with copper wires that are wound tightly around a ceramic rod, and the resistor's outside is painted with insulating paint.



Resistors are used to control or regulate the flow of electrical current in an electronic circuit and to modify signal levels. They also provide a set voltage for active devices like transistors.



Used in this project as a number and value: four resistors, R1 1.2K ohm, R2 10 ohm, R3 1K ohm, R4 1K ohm.

3-Capacitor:

A capacitor is a device that uses two metal plates separated by a non-conductive material to store electrical energy (dielectric). Electrical charges with opposite polarities must be applied to each plate of the capacitor for charging. The amount of storage (capacitance), which is measured in farads, depends on the size of the capacitor. Compared to a battery, the discharge happens much faster.

Act as an electrical filter between signals of high and low frequencies and that's the function of capacitor (C1). Once the capacitor is charged, it limits current flow to block DC voltage, but an AC signal keeps going through a capacitor and that's the function of capacitor (C2).

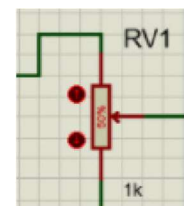
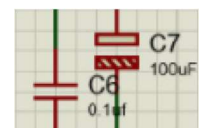
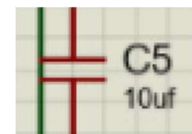
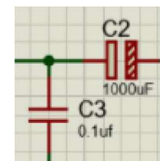
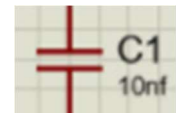
These are passive electronic parts that are made up of two or more conducting portions that are spaced apart by an insulating substance. It has the ability to store energy as an electrical charge that creates a potential difference between its plates. Its duty is to minimize power ripple in the output to maintain a steady DC value.

Without the capacitor (C4), the input only increases by 20 times, so we add another one to help reduce any audio distortion. The capacitor is used to amplify the input by a factor of 200. We use the capacitor (C3) and the resistor (R2) that are connected in series to dampen the oscillation that is produced for no apparent reason if you hear it even without utilizing the input signal since it is produced inside the system possibly from the components. And we use capacitors (C6), (C7) to eliminate the small changes in the battery voltage.

Used in this project as a number and value: seven Capacitors C1 10nf, C2 1000uf, C3 0.1uf, C4 10uf, C5 10uf, C6 0.1uf, C7 100uf.

4-Potentiometer:

It is an instrument used to measure unknown voltage by comparing it to known value. It is a three-terminal resistor with a sliding or revolving contact that creates an adjustable voltage divider. It is frequently used to regulate electrical devices, such as volume controls on audio equipment, and may be used to measure the emf and internal resistance of a given cell as well as to compare the emf of multiple cells.



Because they are passive devices, they don't require a power source or additional circuits to operate.

It used to adjust the sound also eliminates saturation since if it is turned up too high, it will approach saturation or cut off the sound as desired in the lining region.

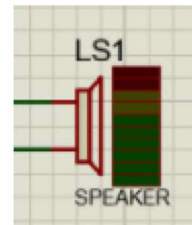
Used in this project as a number and value: one potentiometer, RV1 10k.

5-Speaker:

It transforms the analogue or digital inputs it gets from computers or audio players into sound waves. Due to its compact size, it can be utilized in a variety of applications where space is at a premium.

Speakers can be utilized in robotics projects as well as general warning alert and simple amplifier projects for TV and music systems.

8-ohm speaker is a speaker that has a resistance of 8 ohms. This indicates that a particular amount of power can be applied to the speaker before damage occurs. A transducer that produces sound waves up to 0.5 watts in power is a speaker.

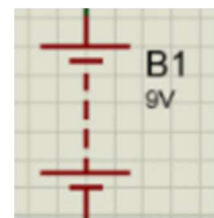


Used in this project as a number and value: one Speaker, 4ohm 3w.

6-Battery:

A battery, which consists of one or more electrochemical cells with external connections for powering electrical equipment, directly converts the chemical energy included in its active components into electric energy. When a battery is supplying power, its positive terminal is the cathode and its negative terminal is the anode.

Batteries are mostly used to power backup devices during power outages, including tiny projects like our audio amplifiers, remote controls, torches, wall clocks, flashlights, and hearing aids.



Used in this project as a number and value: one Battery, 9v.

As soon as the circuit was created, we tested it using the Proteus simulator tool.

We next proceeded to print our design on the PCB.

The printed circuit board (PCB) is a connection medium that enables communication between electronic components, helps shield those components from harm, and protects them from interference.

We then purchased the above-mentioned components as well as the following components.

- **Terminal**

A terminal is an electrical accessory. It is an endpoint and acts as the reusable endpoint to a conductor, where you can connect circuits. In this sense, a terminal is almost a connector.

This component is also known as a terminal block, is made of metal and is sealed inside a plastic casing.

A terminal has openings that can be used to insert wires at both ends. A terminal block is typically used to connect power terminals, printed circuit boards (PCBs), and internal and exterior wire.

In a number of industrial applications, wires are connected using terminal block connectors.

For our project we got the 3-pin and 2-pin terminal connector.

- **Battery connector**

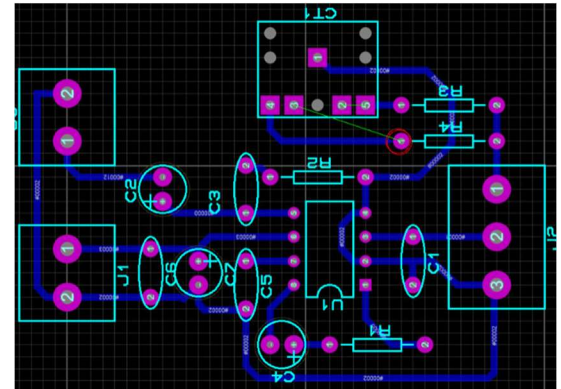
Battery connector are the electrical contacts used to connect a load or charger to a single cell or multiple-cell battery.

- **Soldering Iron**

A soldering iron is composed of a heated metal tip and an insulated handle. It supplies heat to melt solder so that it can flow into the joint between two workpieces.

- **AUX Cord**

The cord that you used to use to connect your phone to the speakers.



- **Switch**

A device that opens and closes an electric circuit. It uses a lever that is moved up and down.

- **Female AUX Jack**

The central conductor of a female connector, often known as a jack, has a hole cut out of it to receive the male pin. As it is a little phone jack that links any portable music player to the amplifier and speakers of the car.

- **Battery Connector**

The purpose of battery connectors is to connect a battery in a small electronic product.

Using the breadboard, we checked the components of our circuit to make sure they functioned.

Then we joined the components to the PCB using a soldering iron. And after using the aux to connect the phone to the speakers and playing a song, the speaker functioned.

