

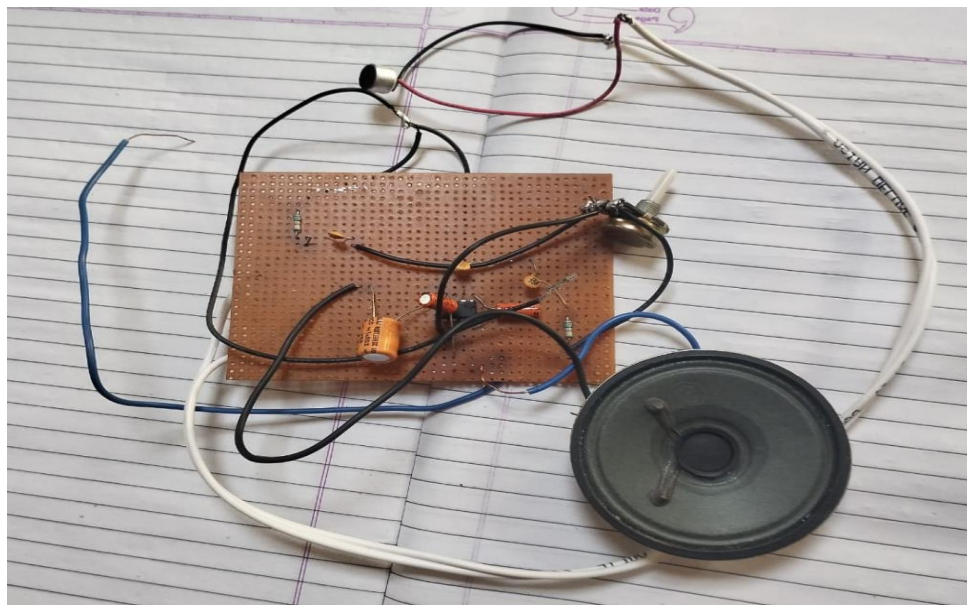
## ELECTRONIC DEVICES AND CIRCUITS

[ 2EC301 ]

- **HARDWARE PROJECT**

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- **TOPIC:-  
AUDIO AMPLIFIER**



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-:Submitted to:-

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-: Introduction :-

LM386 Audio Amplifier: Elevating Audio Performance:-

An LM386 audio amplifier stands as a vital electronic device meticulously crafted to magnify the magnitude of an input audio signal. Its fundamental purpose lies in taking a feeble electrical signal or waveform and skillfully reproducing a more potent rendition at the output, all orchestrated by tapping into an external power source. Amplifiers, a diverse category of electronic marvels, neatly fall into three classifications based on their transformative impact on input signals: Current Amplifiers, Voltage Amplifiers, and the focus of our exploration, Power Amplifiers.

Power Amplifiers:-

Within the spectrum of amplifiers, Power Amplifiers carve a niche by concentrating on the augmentation of a weaker audio signal's power. Their utility extends across a plethora of electronic devices, propelling the speakers in televisions, mobile phones, and a myriad of other gadgets. The output prowess of an audio power amplifier spans a remarkable spectrum — from a few milliwatts, as observed in headphone amplifiers, to the commanding several-thousand-watt presence found in the heart of high-fidelity (Hi-Fi) and home theatre systems.

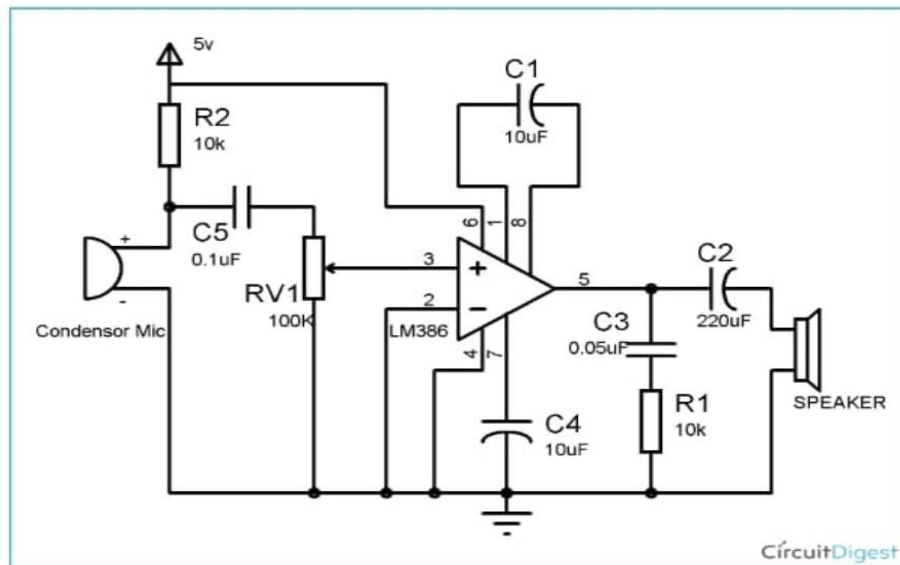
The paramount significance of LM386 power amplifiers lies in their remarkable capacity to fortify the vigor of audio signals. This augmentation ensures not only optimal performance but also unwavering fidelity in diverse audio playback systems. Whether nestled within the compact confines of headphones or orchestrating the symphony of sophisticated home entertainment setups, LM386 power amplifiers emerge as indispensable catalysts, orchestrating the delivery of crystal-clear, robust sound reproduction.

-: Components Required :-

- LM386 IC
- Battery (12V)
- Capacitor: 3 X (0.1 uf), 2 x (10 uf) , 220 uf
- Connecting wires
- PCB

- Speaker (10 W)
- Resistor : 2 X (10K $\Omega$ )
- Condensor mic
- 100K Potentiometer

## -: Circuit Diagram :-



## Working :-

The LM386 is a popular and widely used audio amplifier integrated circuit (IC). It is specifically designed for low-power audio amplification applications, making it suitable for use in various electronic devices like portable radios, intercoms, and small audio amplification systems. Here's a basic overview of the working principle of the LM386 audio amplifier:

### 1. Power Supply:

- The LM386 typically operates on a low voltage power supply, often in the range of 4V to 12V. The power supply voltage affects the gain and output power of the amplifier.

### 2. Pin Configuration:

- The LM386 IC comes in an 8-pin Dual Inline Package (DIP). The key pins for its operation are:
- Pin 6 (Vs): Supply voltage pin.
- Pin 4 (Vout): Output pin.
- Pin 5 (Gnd): Ground pin.

### 3. Gain Setting:

- The LM386 has an internal amplifier with adjustable gain. The gain can be set by connecting a capacitor (C1) and a resistor (R1) between Pins 1 and 8 (Gain).
- The formula for calculating gain is approximately  $\text{Gain} = 20 \times \log(R1/8)$ , where R1 is the resistance connected between Pins 1 and 8.

### 4. Input Signal:

- The audio input signal is typically fed into Pin 3 (IN-). The amplifier is designed to accept both AC and DC signals.

### 5. Internal Amplification:

- The LM386 contains an internal operational amplifier that amplifies the input signal based on the configured gain.

### 6. Output Stage:

- The amplified audio signal is available at Pin 5 (Vout). An external capacitor (C2) is often used to couple the audio signal to the output, blocking the DC component.

### 7. External Components:

- In addition to the gain-setting components, external capacitors (C1, C2), and a resistor (R2) connected to Pin 7 (Bypass), are often used to enhance stability and filtering.

### 8. Speaker Connection:

- The amplified signal can be connected to an external speaker between Pin 5 (Vout) and ground (Gnd).

In summary, the LM386 operates as a versatile audio amplifier by taking a low-power audio signal at the input, amplifying it based on the configured gain, and providing an amplified audio

output suitable for driving a speaker or other audio devices. It's a simple and cost-effective solution for various low-power audio applications.

- **Advantages :-**

1. Greater power output
2. Higher conversion efficiency
3. Negligible power loss with zero signal

## Applications of LM386 Audio Amplifiers:

The LM386 audio amplifier finds applications in a variety of electronic devices where low-power audio amplification is required. Here are some common applications:

### 1.Portable Radios:

The LM386 is often used in portable AM/FM radios and other handheld communication devices. Its low power consumption and ability to provide sufficient audio amplification make it suitable for battery-operated devices.

### 2.Intercom Systems:

In residential or commercial intercom systems, the LM386 can be used to amplify audio signals for clear communication between different rooms or locations.

### 3.Small Audio Amplification Systems:

The LM386 is suitable for small audio amplification systems, such as those used in classrooms, small meeting rooms, or DIY audio projects where a compact and low-cost amplifier is needed.

### 4.Alarm Systems:

The LM386 can be employed in alarm systems where audio signals need to be amplified for sirens or other alerting devices.

### 5.Television and Multimedia Systems:

The LM386 can be used in the audio amplifier circuitry of televisions, multimedia speakers, and home entertainment systems to amplify audio signals from various sources.

### 6.Toy Projects:

Due to its simplicity and low cost, the LM386 is often used in DIY electronic toy projects that require audio amplification for sound effects or voice playback.

### 7.Educational Projects:

The LM386 is a popular choice for educational electronics projects, especially for those learning about audio amplification circuits. It provides a hands-on opportunity to understand the basics of amplifiers and their applications.

#### 8.Low-Power Audio Systems:

Any application where low-power audio amplification is sufficient, and a compact and cost-effective solution is required, can benefit from the LM386.