Electronic Devices & Control

EE – 215

End Semester Project

Project Title: Audio Amplifier

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Dedication:

I would like to dedicate this end-semester project report to all those who have supported and encouraged me throughout my academic journey.

To Ma'am Dr. Mohaira Ahmad and Sir Qazi Waqas Mohiuddin, thank you for your guidance, inspiration, and motivation. Your wisdom and expertise have shaped my academic journey, and I have learned valuable lessons from each one of you.

To my parents, who have always been my pillar of strength and motivation, thank you for your unwavering love, support, and belief in me. Your constant encouragement has helped me overcome every obstacle in my path, and I am forever grateful for your sacrifices.

To my friends, who have been my constant companions and cheerleaders, thank you for your love, laughter, and encouragement. Your support has made every challenge easier to overcome, and I am grateful for the memories we have created together.

Finally, I dedicate this report to myself and my group members, for the endless hours of hard work, dedication, and perseverance. I am proud of what I have accomplished, and I know that this project is just the beginning of a journey filled with learning and growth.

Thank you all for being a part of my journey, and for helping me become the person I am today.

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Abstract:

This project presents the **Design and Implementation** of an **Audio Amplifier**. Audio Amplifier circuit mainly uses a **PNP** and **NPN Transistors** to increase the power of an audio signal. Other components used are resisters and Capacitors. The output of the amplifier is connected to a **Speaker** for sound reproduction. It also involves the measurement and analysis of the frequency response, gain, bandwidth, and phase shift of the amplifier and filter circuits using an oscilloscope and a function generator.

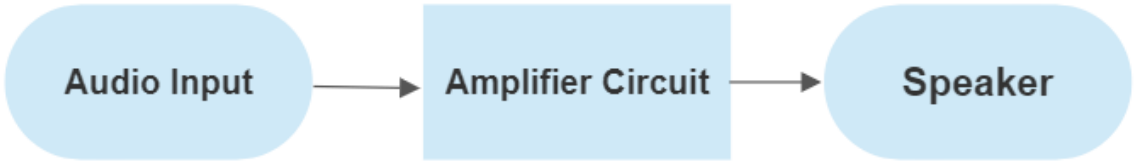
Introduction:

Audio Amplifier is an electronic device that increases the power of an audio signal such as a microphone output or a music player output. Audio amplifiers are widely used in various applications such as Theaters, Public address systems, Musical instruments, Headphones etc However, not all audio signals have the same frequency range or characteristics. Some audio signals may contain unwanted noise or interference that can degrade the quality of the sound. Therefore, it is often desirable to filter out certain frequencies from the audio signal before amplifying it. For removing unwanted noise we can use **Filter circuit or Noise Cancelation circuit**. It is an electronic circuit that selectively passes or attenuates certain frequencies from an input signal. There are different types of filters such as **Low-pass filter**; allows low frequencies to pass through and attenuates high frequencies, **High-pass filter**; allows high frequencies to pass through and attenuates low frequencies and **Band-pass filter**; allows a certain range of frequencies to pass through and attenuates both lower and higher frequencies. This report will only focus on the design and implementation of a Audio Amplifier.

Components Used:

- Breadboard
- Potentiometer x1
- Resisters: 50k(x2), 15k(x3), 100(x1), 10(x1), 150 (x1), 1.35k (x1),
- Capacitors: 10uF (x1), 250uF(x1), 0.05uF (x1)
- Diodes: 1N4007 (x2)
- Speaker (x1)
- Transistors: BC547(x5), BC557(x5)
- Wires

Flow Chart:

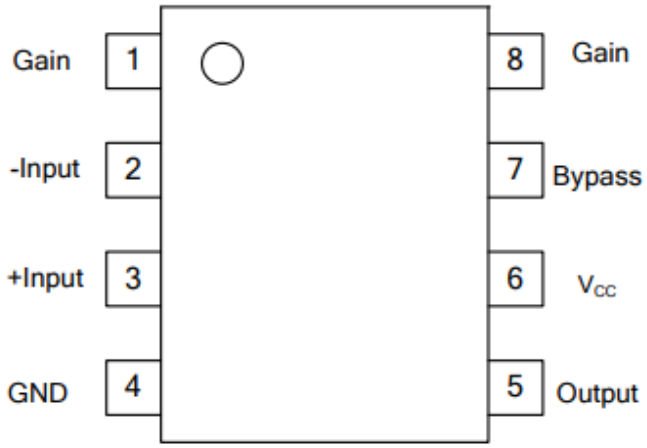


Methodology:

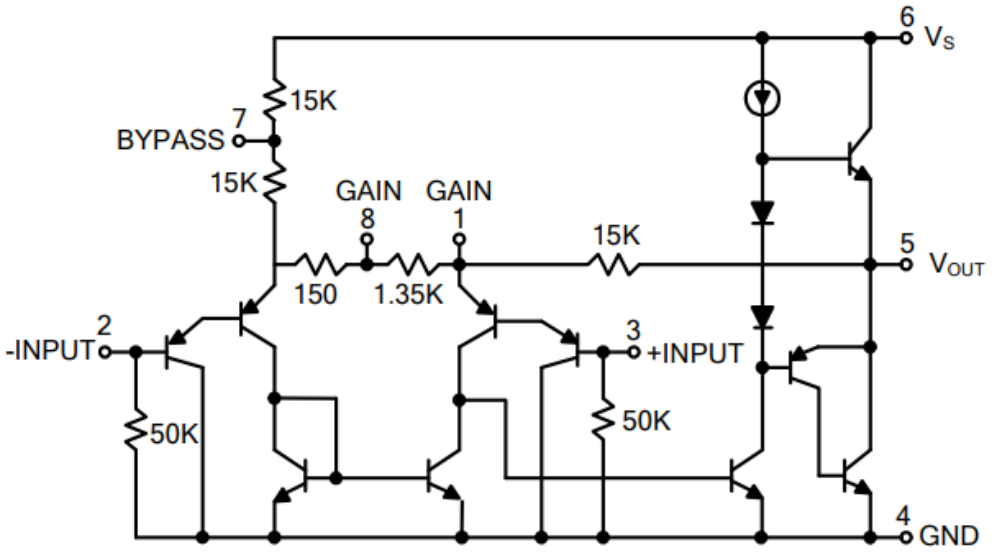
First we implemented the using op-amp LM386. It was working good butt was noisy. Then we studied ic and implemented by it by making internal circuit of LM386 to get better understanding of the circuit.

OP-amp:

Pin Configuration:

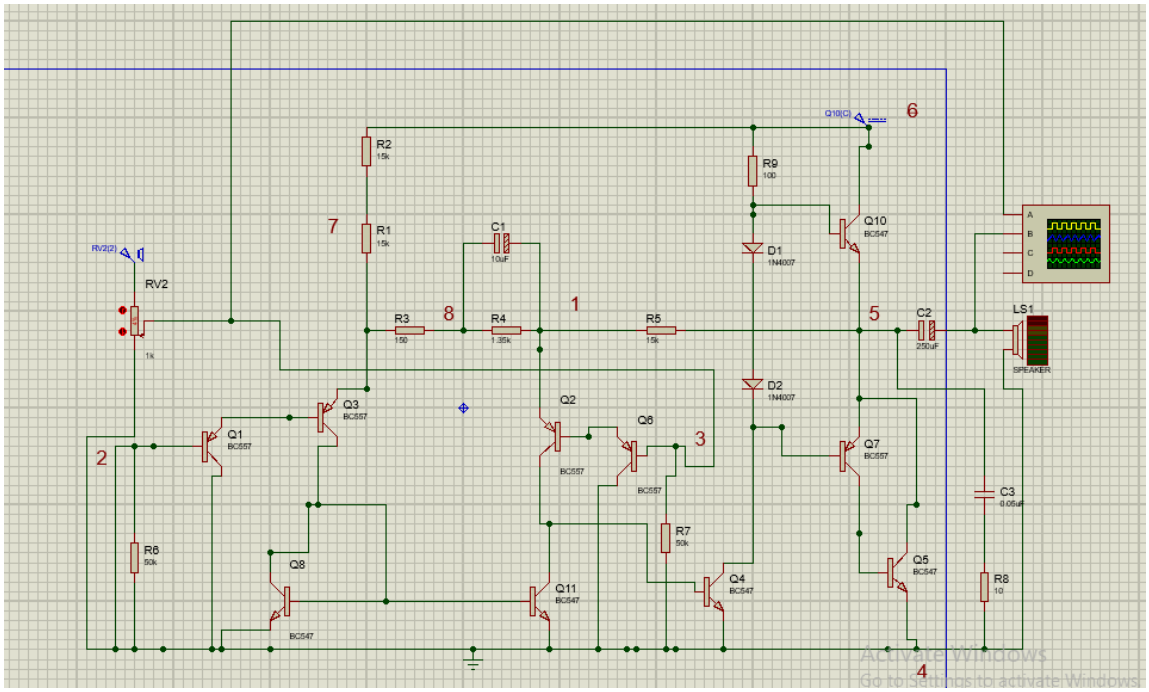


Internal Circuit:

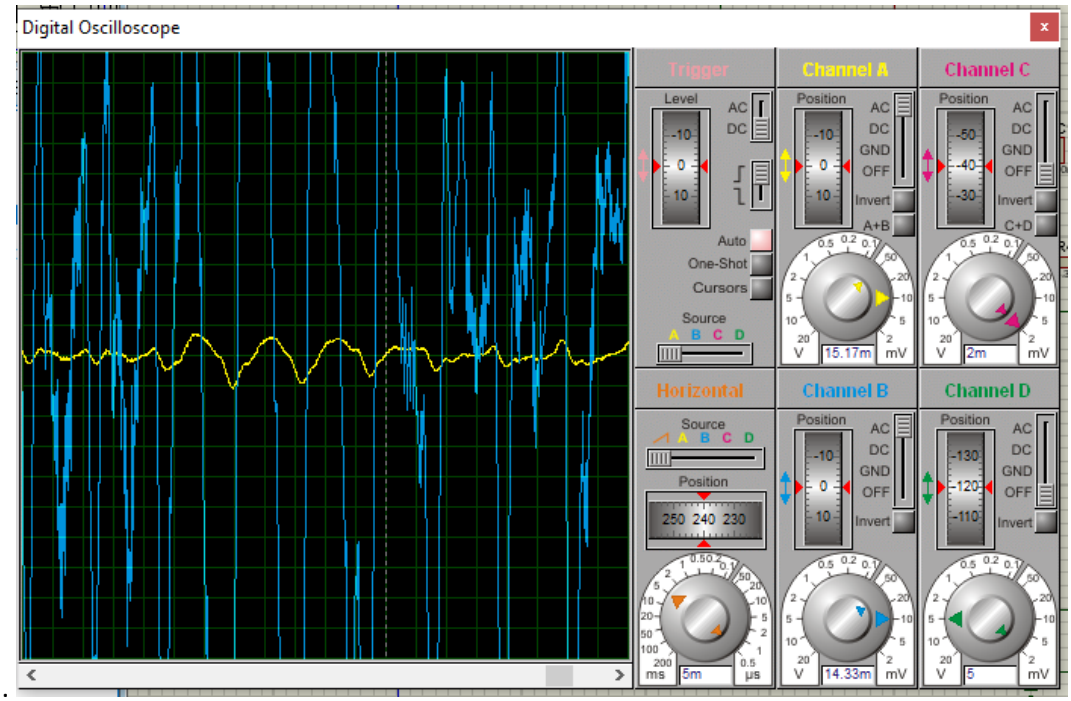


Results:

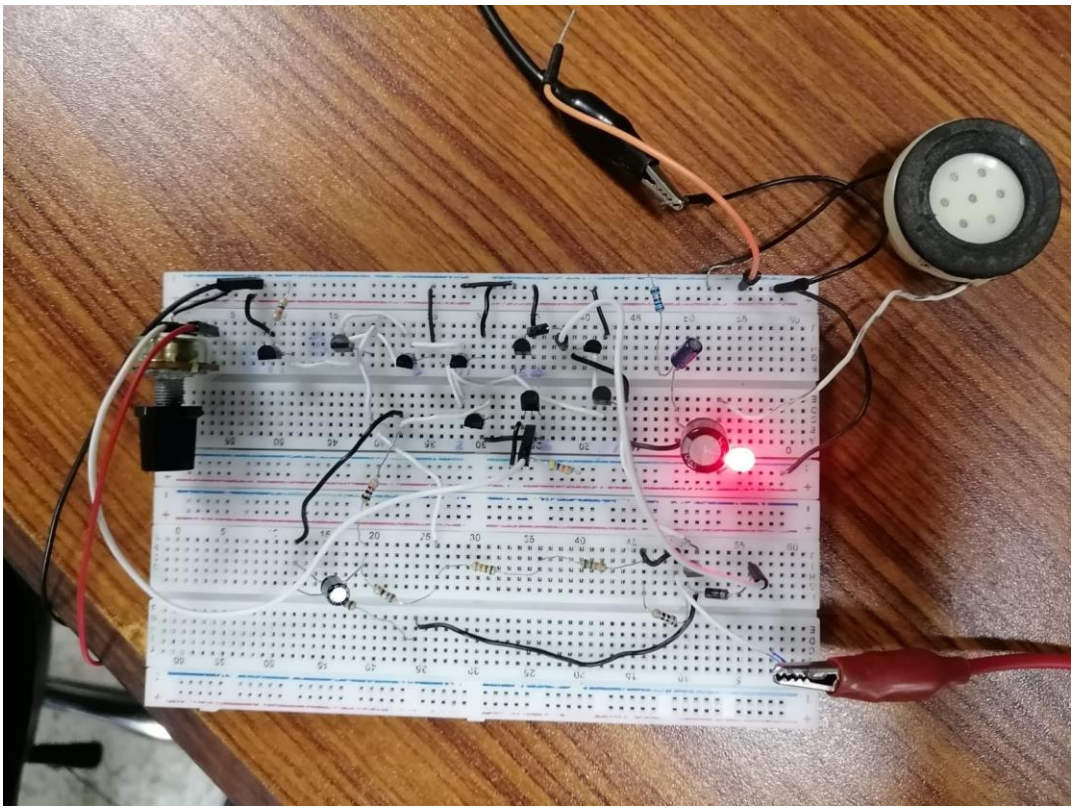
Simulation:



Output wave:



.Implementation:



Applications:

Audio amplifiers have a wide range of applications across various industries and sectors. One primary application of audio amplifiers is in the field of entertainment and audio production. They are commonly used in home theater systems, stereo systems, and music production studios to enhance the audio signals and deliver high-quality sound with improved clarity and power. Additionally, audio amplifiers find extensive use in public address (PA) systems, where they amplify the sound signals to reach a large audience in places like stadiums, concert venues, and auditoriums. They are also crucial components in musical instruments, such as guitars and keyboards, as they boost the weak electrical signals from the instruments, allowing them to be heard at higher volumes. Moreover, audio amplifiers are utilized in telecommunications to amplify voice signals in telephones, intercom systems, and two-way radios, ensuring clear communication.

Future Work:

For future work on the project report of the audio amplifier, there are several areas that can be explored to enhance its functionality and performance. Two specific aspects that can be considered are incorporating a Bluetooth option and implementing noise filtering techniques.

1. **Bluetooth Integration:** In the era of wireless connectivity, integrating Bluetooth capabilities into the audio amplifier would be a valuable addition. This would allow users to connect their smartphones, tablets, or other Bluetooth-enabled devices directly to the amplifier, eliminating the need for physical connections. Implementing Bluetooth technology would enable seamless audio streaming, providing convenience and flexibility to users.
2. **Noise Filtering:** Noise interference can degrade the audio quality and affect the overall listening experience. Implementing noise filtering techniques in the audio amplifier can help minimize or eliminate unwanted noise. This could involve utilizing advanced signal processing algorithms, such as adaptive filtering or digital signal processing (DSP), to identify and suppress noise components while preserving the desired audio signals. Effective noise filtering would result in cleaner and clearer sound output.

Conclusion:

Audio Amplifier project has been a valuable learning experience that allowed for a deeper understanding of amplifier circuitry, electronic components, and audio signal processing. Initially, our intention was to design an audio amplifier to enhance the audio signal.

One significant limitation we encountered was the use of discrete components in our amplifier design. While discrete components offer flexibility and customization options. Given the constraints of our resources and time, we decided to focus on other critical aspects of the amplifier design, such as audio fidelity and power efficiency.

References:

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https://www.ti.com/lit/ds/symlink/lm386.pdf