

MIDTERM Report: Analog Equalizer.

Project: For the midterm project we decide to design an analog equalizer using the LM386 that contain the following features:

- LM386 as a controlled gain amplifier: by following the configuration shown in Figure 7.1, we can establish a amplifier with a variable voltage gain using the LM386 that allows us to up the volume of the music plugged to a certain level by controlling the gain.

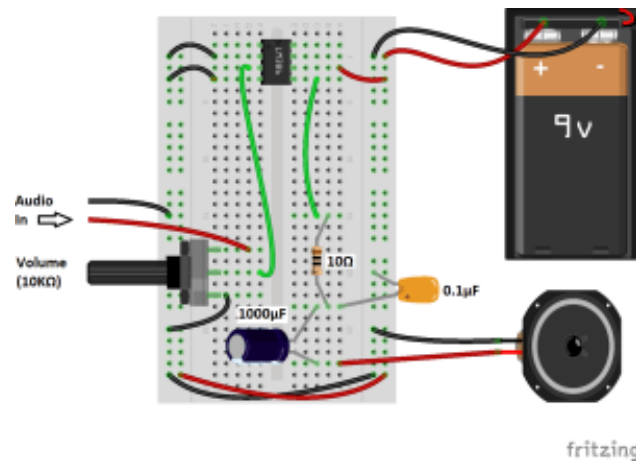


Figure 7.1: LM386 used as variable gain amplifier. This configuration presents a lot of noise and papping that can be solved by adding different components.

Image taken form: [3].

- Volume control: By connecting with a potentiometer and a 10 μF capacitor pins 1 and 8, we can modulate the gain as we want we the variable resistance and therefore control the volume of the music that is being played. Also, by adding some decoupling capacitors such as the ones being connected in the GND and VCC and the 0.1 μF capacitor between pin 4 and 6 can provide less noise by decoupling power supply; in Figure 7.2 is shown the configuration that gather the volume control by itself and the gain control of the equalizer:

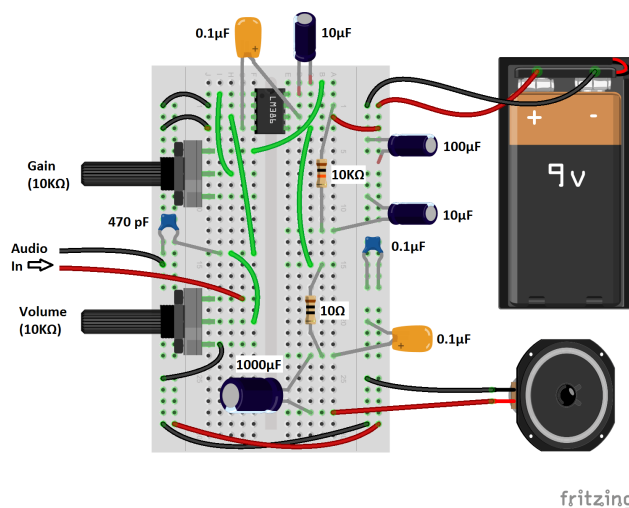


Figure 7.2: LM386 used as variable gain amplifier with volume control. A we can see in this picture, a 10 KΩ and a 10 μF to GND are connected in series with pin 7 to reduce the noise by decoupling input signal.

Image taken form: [3].

- Bass Boost configuration of the LM386 is one of the functions that have this integrated circuit that allows functioning as a modulator of low frequencies amplifier (amplifies the bass sounds). Gathering the last two functions with this one can improve the sound and also the scope of this equalizer; the whole schematic circuit is shown in Figure 7.3:

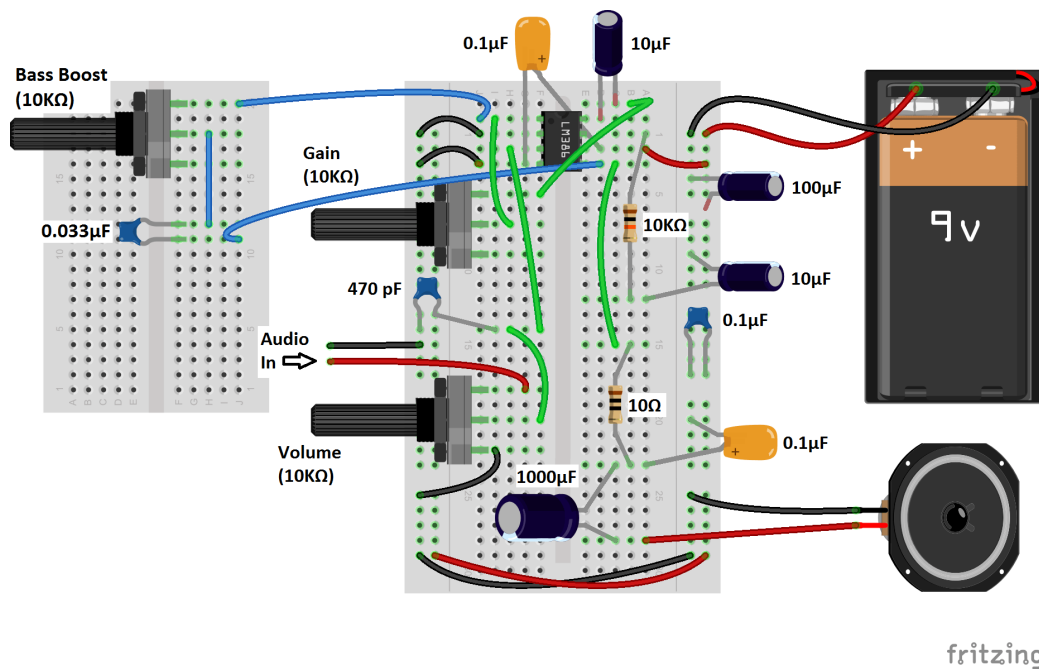


Figure 7.3: LM386 used as variable gain amplifier with volume control and bass boost. As we can see in this picture, different capacitors are placed between VCC pin and GND pin, this is in order to avoid the noise that the source generates and also that the ground presents to the circuit; the different values of the capacitors used are for filtering high and low frequencies and improving the sound in the speaker.

Image taken from: [3].

- Interactive LED's: By connecting different color LED's to the amplifier out put by using a BJT, we can make the LED's to shine according to the music being played. This is by controlling the current flowing through them by the transistor collector. Adding this feature to the equalizer can improve the design and the esthetics of the circuit functioning; and also can provide us the rhythm of the music. The schematic circuit is shown in Figure 7.4:

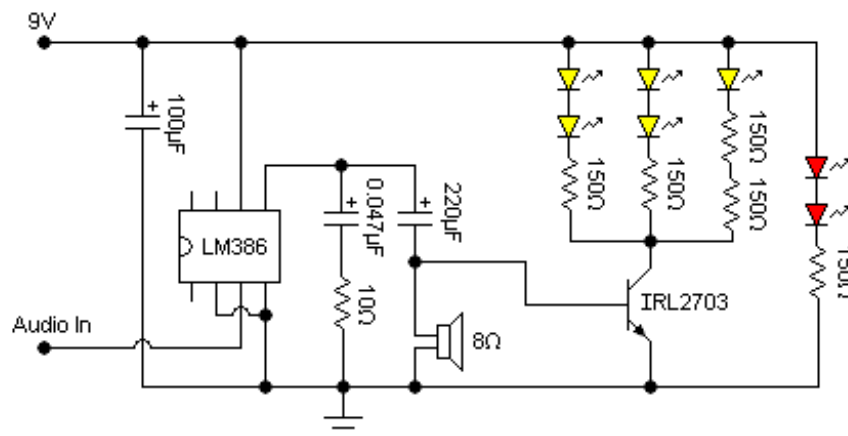


Figure 7.4: Interactive LED's configuration. It is important to mention that the configuration shown in the LM386 is different from the circuit described above; the only part that it is being used is the one with the transistor and the LED's.

Image taken from: [4].

References:

[1] Sedra/Smith. (2009). MICROELECTRONICS CIRCUITS. US: OXFORD University Press, 6th Edition.

[2] LM 386 Datasheet.

[3] CB. (2009). Build a Great Sounding Audio Amplifier (with Bass Boost) from the LM386. 23/04/2016, de Circuit Basics. Website : <http://www.circuitbasics.com/build-a-great-sounding-audio-amplifier-with-bass-boost-from-the-lm386/>

[4] RD. (2011). Potato GLaDOS. 23/04/2016, de Robot Dialogs. Website: http://www.robotdialogs.com/2011_08_01_archive.html