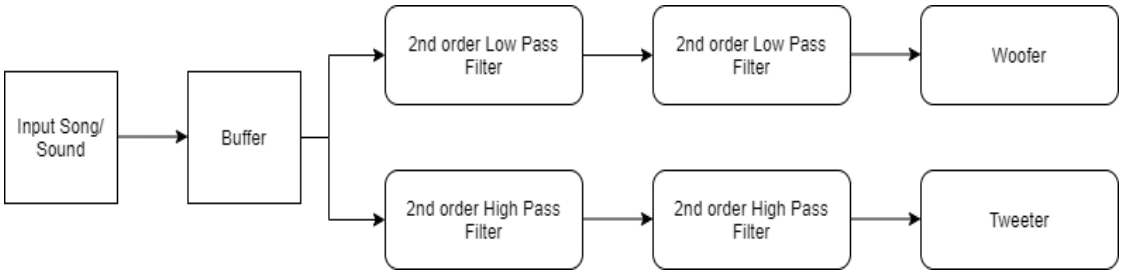
2-Way Crossover Filter

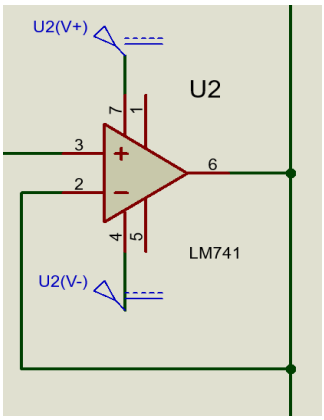
Govind J S(b180544ec), G Arunteja Reddy(b180679ec),
Gedela Akhil (b180609ec), G Santosh Babu(b180326ec)

1. **Aim of the project**: To design and implement a 2-way cross over filter
2. **Block diagram**:

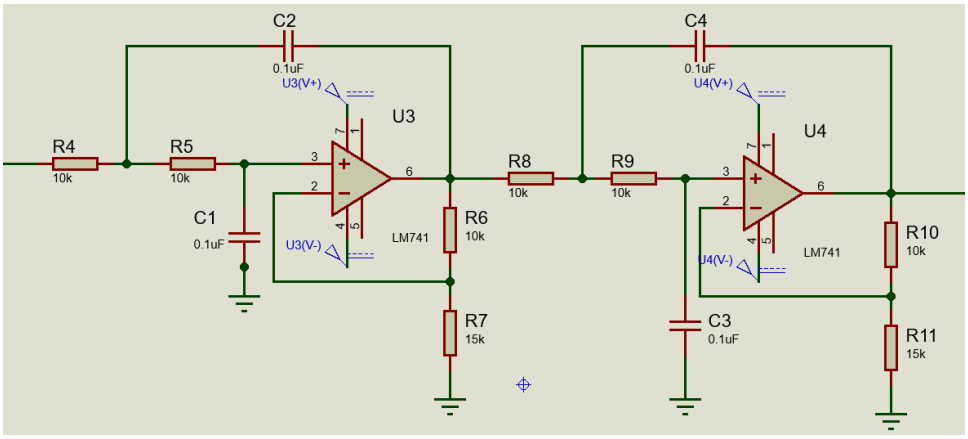


3. **Design**:

Buffer Circuit: The buffer circuit is simply a voltage follower to increase the current gain.



4th order low pass filter:



Desired Cut-off Frequency = 160 Hz

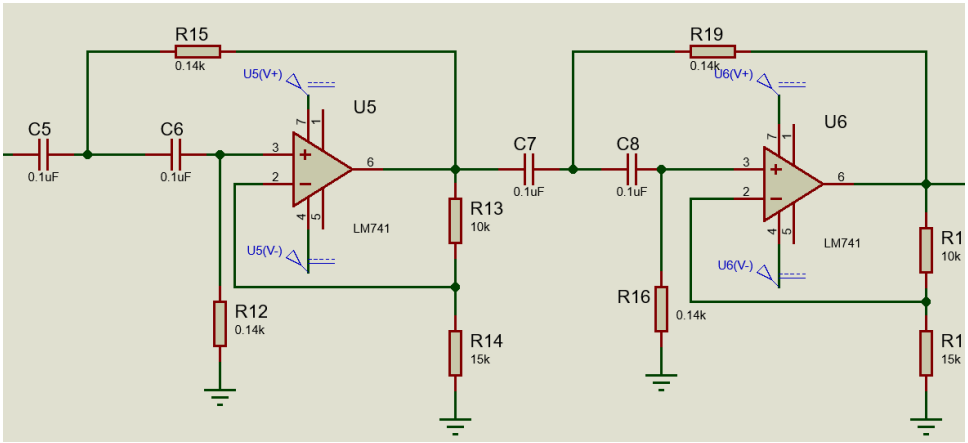
Cut-off frequency of LPF= 1/2π RC

Assume C = 0.1uF

Doing necessary calculations, we get R = 10k

Now we cascaded two 2nd order filters to generate a 4th order LPF with higher gain value.

4th order high pass filter:



Desired Cut-off Frequency = 11kHz

Cut-off frequency of LPF= $1/2\pi RC$

Assume C = 0.1uF

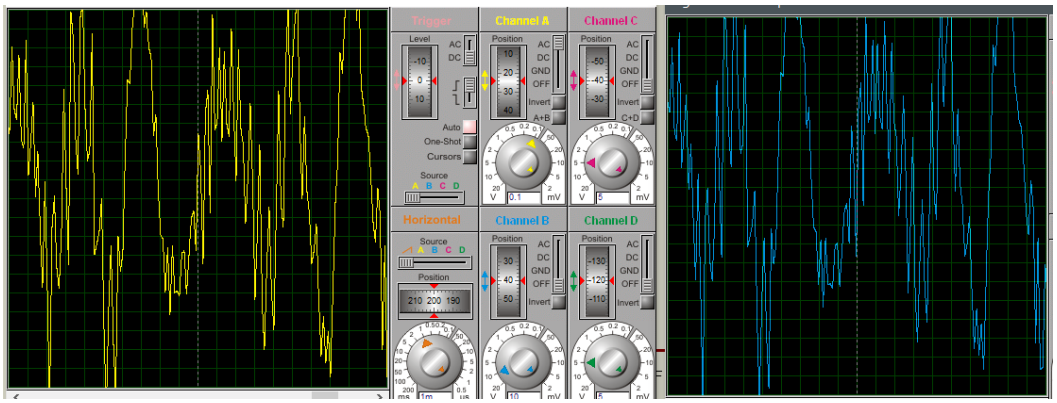
Doing necessary calculations, we get R = 0.14k

Now we cascaded two 2nd order filters to generate a 4th order LPF with higher gain value.

4. Simulation Results

a.

Voltage Follower:

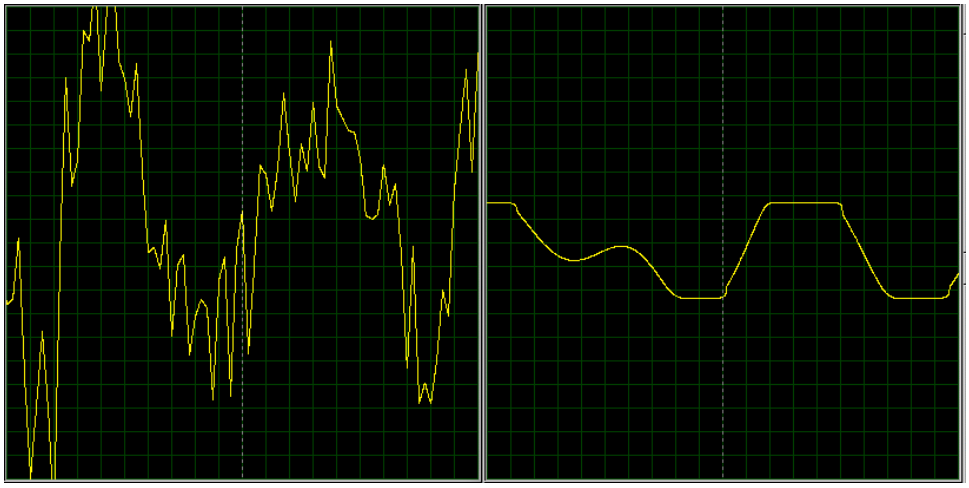


Input Output

Scale: On Y Axis 1 division = 0.1V

On X axis 1 division = 1ms

2nd order Low pass filter

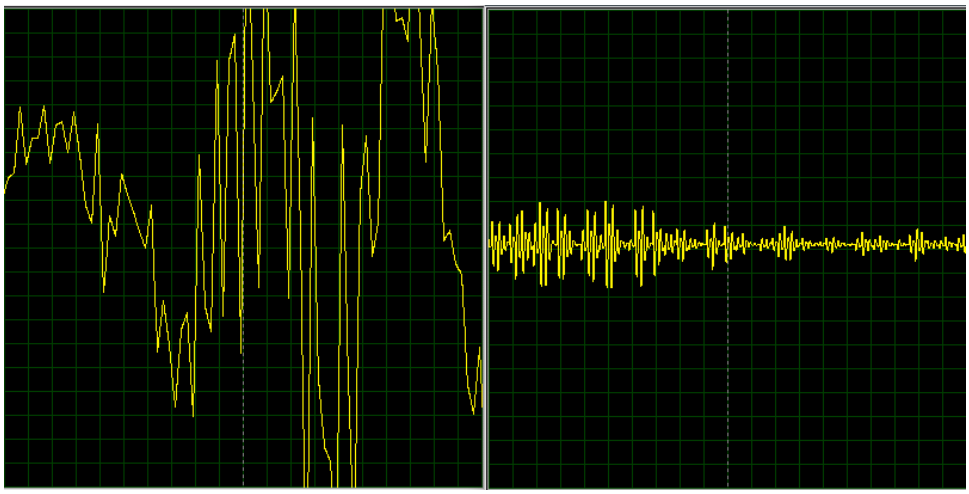


Input Output

Scale: On Y Axis 1 division = 0.1V

On X axis 1 division = 0.1ms

2nd order High pass filter

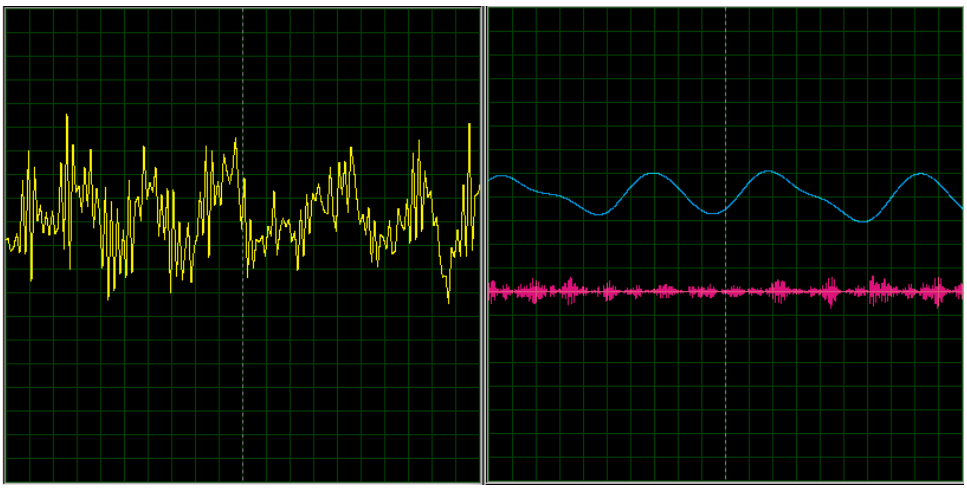


Input Output

Scale: On Y Axis 1 division = 0.1V

On X axis 1 division = 0.1ms

b.



Overall input Overall output

Woofer (LPF) output: Blue

Tweeter (HPF): Pink

Scale: On Y Axis 1 division = 0.1V

On X axis 1 division = 0.1ms

5. Results

A proper 2-way active crossover filter was designed by using relevant equations and implemented in a simulation. The simulation was given input audio and output was obtained in two separate speakers within simulation separated by a specific frequency.