Week 10 Logbook

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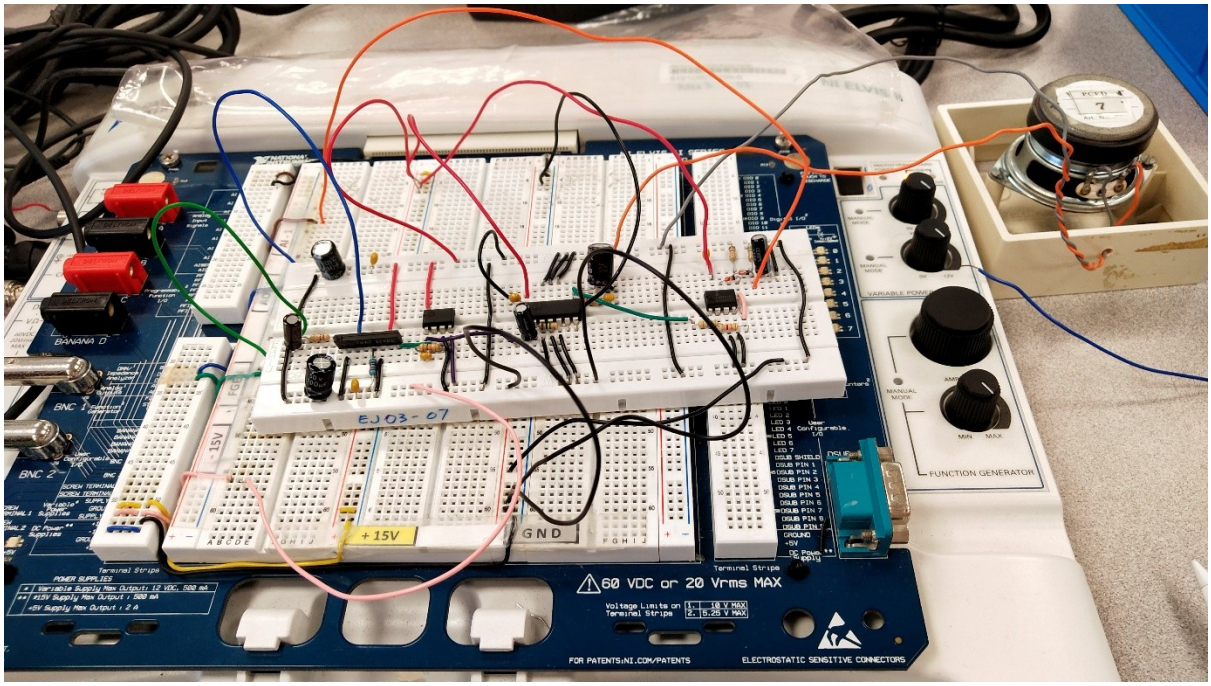
1. Circuit Connection

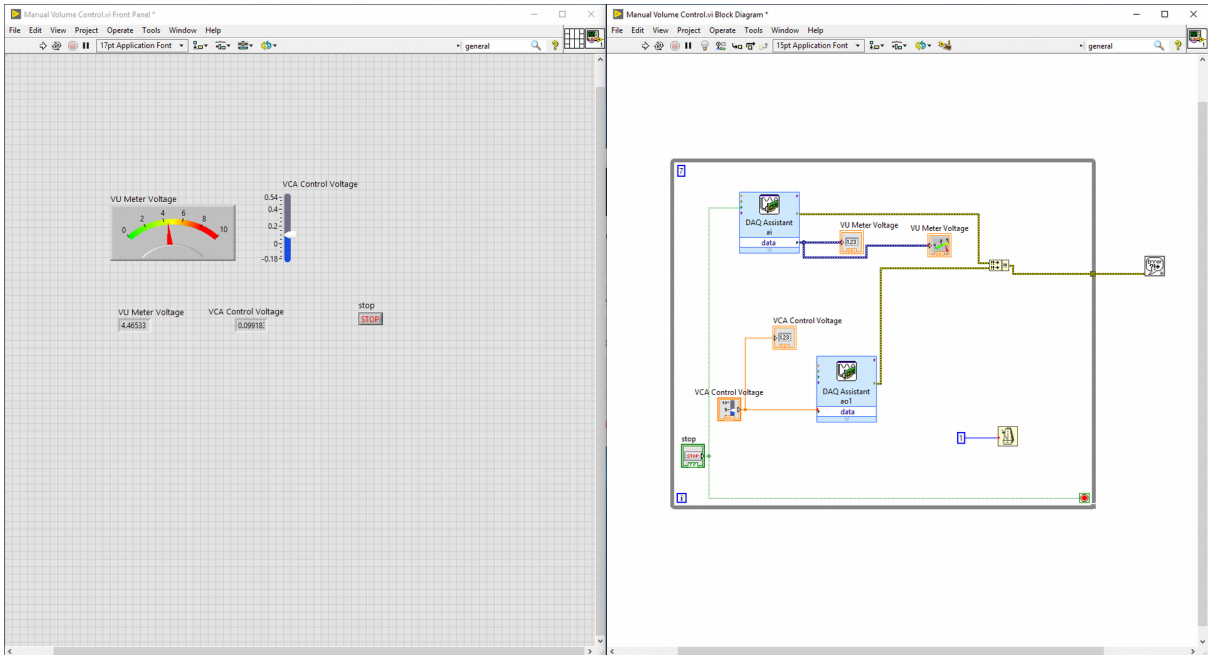
We connected our circuit as the diagrams shows like below.



The speaker replaced the 22ohm load resistor. Vin connected to FGEN, pin 3 of 2180C chip connected to AO-1, output3 of VU Meter connected to AI-1. Therefore, the AO-1 can change the control voltage and thus control the gain of volume amplifier.

2. Build the Manual Volume Control.vi

We built the Manual Volume Control.vi by following the instructions on the Lab Manual, as below.



The DAQ assistants control AO-1 and AI-1 as one is analog voltage output and the other one is analog voltage input. We also used two numeric indicators connected separately to VCA Control Voltage and VU Meter Voltage to show their values simultaneously. The Scale of VCA Control Voltage is also limited to -0.18V to 0.54V in case of breaking the circuit or components.

3. Testing

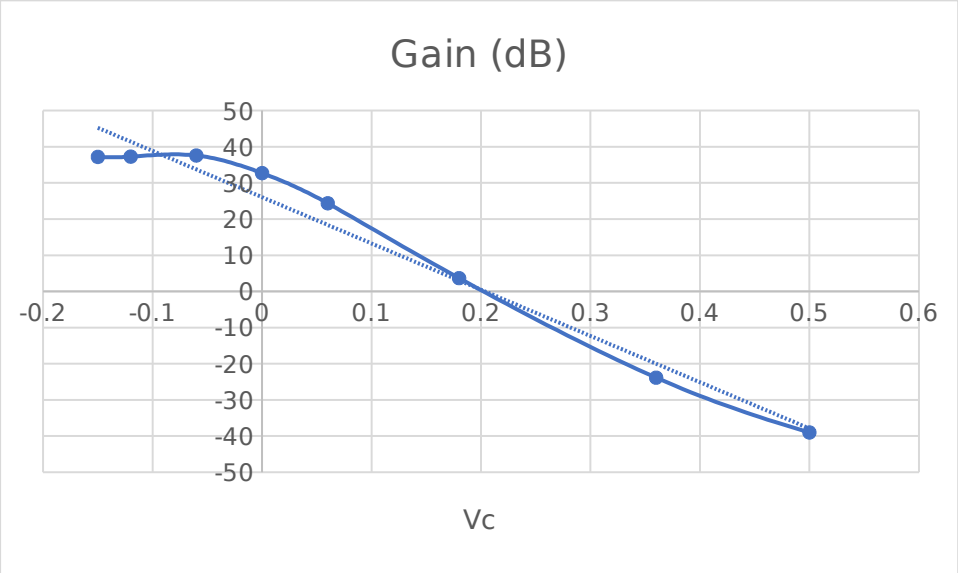
We opened the Function Generator and set frequency to 300Hz, Vpp to 1V. As we opened the power supply, the speaker generates a sound with certain frequency. While changing the control voltage manually, the volume increases as the Vc drops. The process is like below:

Vc > around 0.25V → almost no sound
0.2V > Vc > -0.05 V ➔ the volume increases as Vc decreases
-0.05V > Vc → the sound is intermittent as the volume is too high so that sometime it has sound but sometime it does not have.
Then we remained Vc unchanged.
We increased the frequency of Function Generator signal, the sound also became more high-pitched. And when we increased the Vpp of Function Generator signal, the volume increased.

4. Thinking

Last week we measured the relationship of Vc and Gain as we measured the Audio Output and Input voltages. It shows as below:

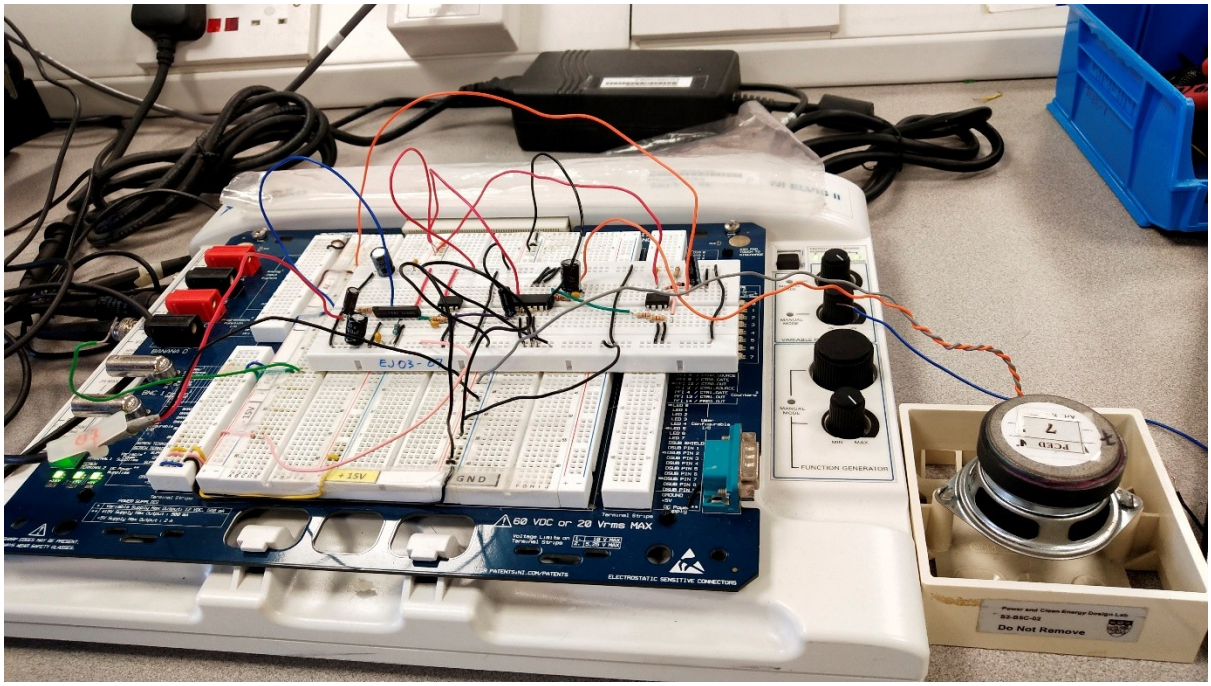
Audio Input (V)	Vc (V)	Audio Output (V)	Gain (dB)	VUouput3 (V)
1.1	0.5	0.01232	-39.02	4.067
0.59	0.36	0.03782	-23.86	4.067
0.52	0.18	0.79155	3.65	4.07
0.32	0.06	5.287	24.36	4.799
0.31	0	13.378	32.7	6.551
0.19	-0.06	14.375	37.58	6.688
0.19	-0.12	13.864	37.26	7.124
0.18	-0.15	13.021	37.19	7.158



When we change the Vc, if the Gain is below 0, we can hardly hear the sound, if the Gain is too high (around 37dB), the speaker cannot play the sound successfully due to the high volume. And as the Vc deceases, the Gain increases, and thus the volume becomes higher.

5. Improvement

For improvement, we removed the FGEN wire but connect the Vin to the normal speaker output of the Personal Computer board as shows below.



In this way, we played some music on YouTube and they were successfully played by the speaker and also the volume could be adjusted not only by the system volume control but also our VCA Control Voltage control bar.