ECE 1895 - ASSIGNMENT 5 REPORT

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1 SPICE Verification

There are going to be two versions of the spice simulation: one is for the actual PCB design and one is solely for testing purpose only. The reason I would have to create a separate ones for testing and PCB design is **I was unable to find capacitors with large values (more than 1 μF) in Benedum 1223**, so I have decided to replace all capacitors with values more than 1μF with 1μF. If everything goes well, the only changes should be the frequency of oscillations and nothing else. I'll demonstrate this is the case in the upcoming sections.
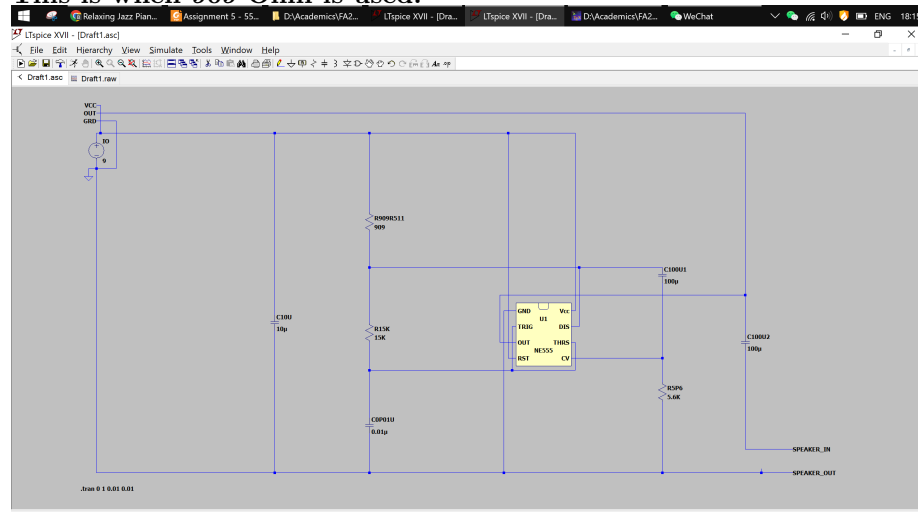
1.1 Version 1 - SPICE for PCB Design

For resistor designated with $R909$ and $R501$, I would simplify the circuit by combining them into a new resistor designated with $R909R501$, and I'll change simulate the circuit two times with each resistances.

1.1.1 Schematics

This is when 511 Ohm is used:
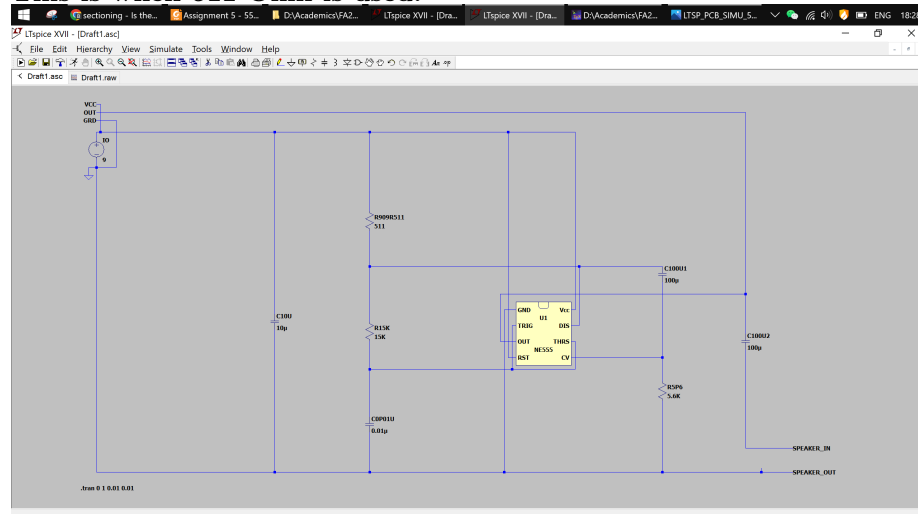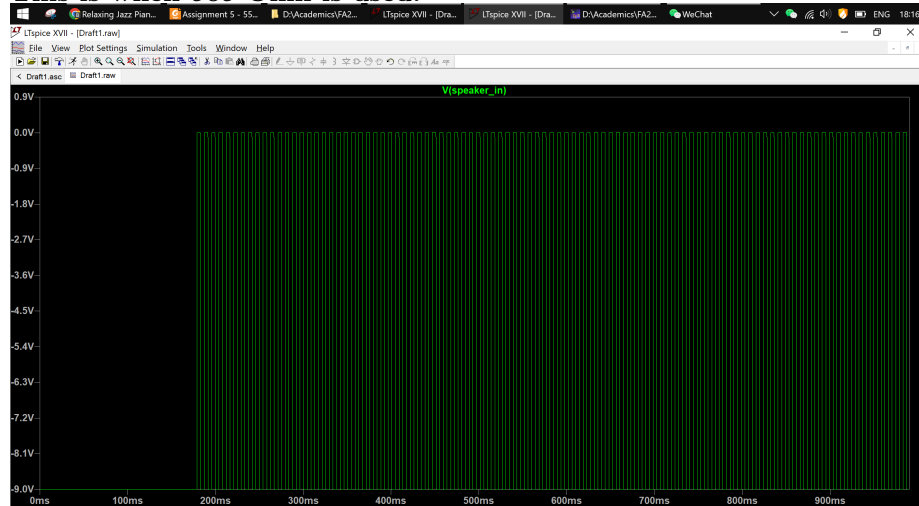

This is when 909 Ohm is used:

No other changes are made except for the resistor values.

1.1.2 Simulation

**This is when 511 Ohm is used:**

This is when 909 Ohm is used:

An interesting observation here is that the resistance of $R909R511$ is **directly proportional** to the frequency of generated output.

1.2 Version 2 - SPICE for Breadboard Testing

For resistor designated with $R909$ and $R501$, I would simplify the circuit by combining them into a new resistor designated with $R909R501$, and I'll generalize the model by using a 1K-Ohm resistor, since it's the one I found in Benedum 1223.

1.2.1 Schematics

Note that all capacitors with capacitance greater than $1\mu F$ are replaced with capacitors of $1\mu F$.
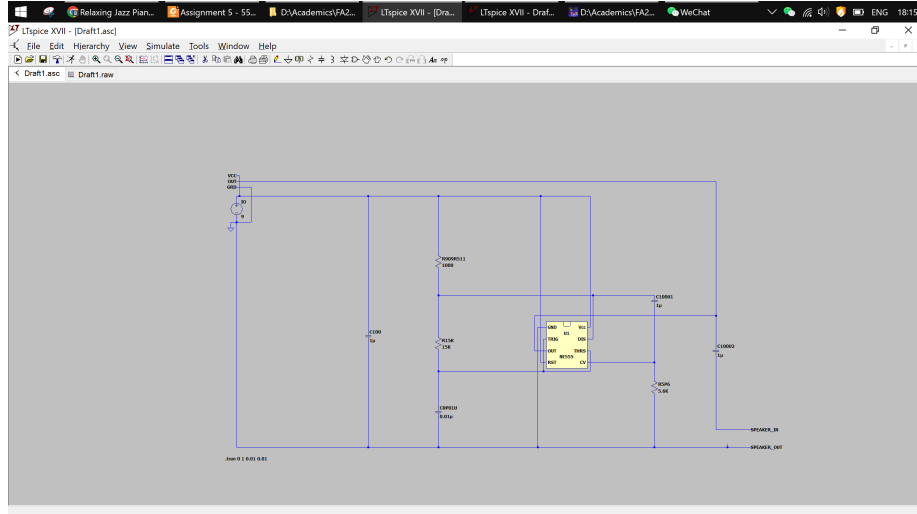
1.2.2 Simulation
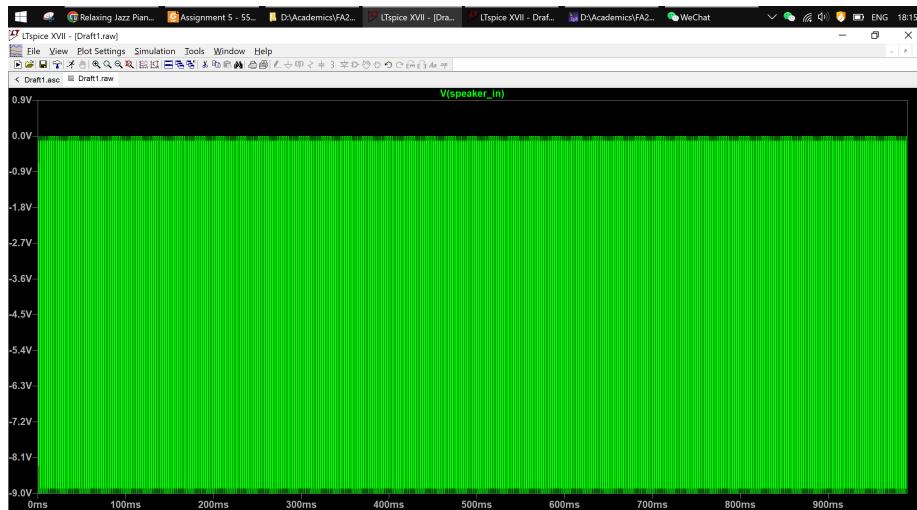
We have noticed that the frequency does increased a lot, but as long as our measured voltage oscillates, we are good to go.

2 Breadboard Verification

I have connected wires and attempted to make matching circuits with reference to the schematics we made from previous section. Here's what it looks like on breadboard:
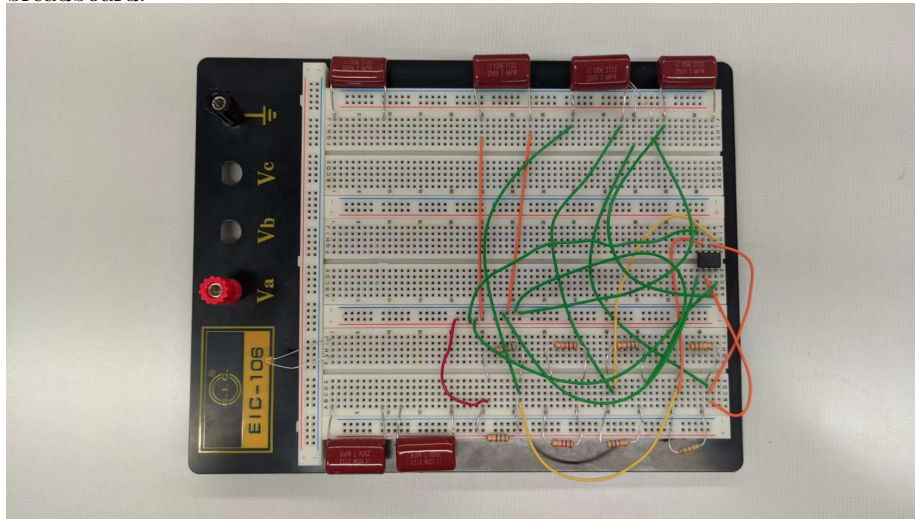
I understand it looks messy, that's why I hereby provide an visual aid with column/row numbers and wire-coloring matches.