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Fundamentals of Programming and Computer Science

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Competitive Analysis

For my competitive analysis, I will be analyzing how my project will be similar to and different from three other circuit simulator projects. The first project that I will be comparing my project is the Circuit Lab Simulator found online. Thereafter, I will do a competitive analysis on two previous student projects and then proceed to explain my project in comparison for each one. It is important to note that my goal project will not necessarily have all of the features displayed in all of these projects but will attempt be better in some aspects.

First of all, I’m going to compare my project to the Circuit Lab web app (please refer to the bibliography for more information). In the Circuit Lab, we can see that the circuit lab starts off with a panel and then displays all of the circuit elements that a circuit will have. Given the scope of my project, I simply cannot write classes for all of the circuit elements, meaning I will only stick to resistor, inductors, capacitors (RLC) as my passive elements, and current sources & voltage sources for my power sources (V&I). Now, I will have a similar drag and drop schematic working for my elements except that when I click on an element on the panel, it will change color and then I can drag around the circuit element. Additionally, both my project and Circuit Lab will have a transient analysis option, in which the program will determine the voltage and current through any element as a function of time and plot it; I will use numpy and matplotlib to execute this transient analysis. As for differences, my project will display voltage and current in the top right corner both at time = 0 and at time = ∞ (i.e V0, V∞, I0, I∞); the Circuit Lab doesn’t display these two values for each individual circuit element. I plan to display these values! Secondly, if I do well on my project, I plan to also use OpenCV to detect a hand-drawn circuit. Now, this aspect of the project will be difficult in that I have to use both circle recognition and line recognition to determine the voltage and current sources; thereafter, I have to use more line recognition to determine resistors, capacitors, and inductors. Once again, this add-on to my project is contingent on me completing the basic circuit calculator and transient analysis.

Next, I’m going to compare my project to a student’s circuit simulator. This student’s name is Madison Scott. First of all, it is important to note that Madison Scott utilized diodes for her term project. Again, I will only stick to resistors capacitors, and inductors. However, my term project will also have the snap and drag motion, as in each element will snap onto the grid. In addition, I will allow users to input new values for components by simply right clicking any component; additionally, the user will be able to see V0, V∞, I0, I∞ by left clicking each component. Similar to the student’s project, my project will also have load, save, and help options at the bottom. As mentioned before, I will have a transient analysis graph option for my circuit simulator and then potentially proceed to an image recognition feature for my project using OpenCV.

Lastly, I will do a comparative analysis with one more student circuit project (Tianming Chen). The one similarity I aspire to make with Tianming’s project is his use of image recognition to load images of existing circuits on paper. However, there are still several ways I plan to differentiate myself from him. First of all, I will have AC elements, but I won’t have a separate “mode” for AC elements. They will all be there in one panel. Secondly, as a style feature, I will have the circuit elements openly display their circuit values (i.e the resistors will openly display its ohmic value, capacitors their farad value etc) rather than have that be concealed. In addition, I will attempt to make a drag-and-drop feature for my wires rather than having a person click on them multiple times over and over again. The one thing I will not do is display power or display voltage at nodes. I know power can easily be calculated by using P = IV, so I find it unnecessary to display it. Secondly, I also find it unnecessary to display voltage at a node since I really only care about the voltage and current through each element, not the voltage and current at a particular node.

If my project goes as plans, it will ultimately combine the GUI of the initial CircuitLab with the drag, snap, and drop of the CircuitLab and Madison Scott’s project, and then potentially add-on image recognition as displayed by Tianming Chen’s project.

Bibliography

Chen, Tianming. "15-112 Term Project: Circuit Analyzer by Tianming Chen."*YouTube*. YouTube, n.d. Web. 23 Nov. 2015.

"Getting Started with CircuitLab." *YouTube*. YouTube, n.d. Web. 23 Nov. 2015.

Scott, Madison. "15-112: Circuit Solver." *YouTube*. YouTube, n.d. Web. 23 Nov. 2015.