

Digital Bread Board Simulator

Term Project

July-November 2012

System Software Lab(CS 241)

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Problem Statement:

Make a digital breadboard simulation software which will generate a text file containing information about the connections made i.e. containing information about the coordinates of end points of wires, legs of various circuit components.

Objectives:

1. A person working on some hardware project but not present in the laboratory can coordinate with his co-workers about what kind of circuit he is thinking about.
2. A scientist could instruct his assistants to implement some idea that he thought but could not implement himself as he is not present in the lab.
3. The above are very few of the purposes this software can solve. Basically, this software could help anyone who has some circuit in mind but is not able to implement it straightaway in reality so he can simulate that circuit and save the important information.

How to Use :

1. **Power :** This button is used to bias the circuit i.e. you can set the reference voltages. To use this button first you have to select one of the radio-buttons present at the top. Then, click the power button. You will see the top-most row being completely red and the bottom-most being completely blue. You can change the bias by just checking the desired radio-button. If you want to remove the bias click the clear button and the biasing will be removed.
2. **Slot Selection :** You can select a slot by clicking on it once. The selected slot will be filled with green color. To deselect this slot click on this again and the slot is back to white again.
3. **Drawing Wires :** A wire is drawn by choosing an initial point and then dragging the wire from that point to final position. If the final position is valid then a wire will be drawn else it will disappear. To remove a drawn wire just click at the initial point and the wire will disappear but the slot will be selected to deselect it click on the slot once more.
4. **LED :** This button is used to insert LEDs in your circuit. First, you have to select the slot where the left-most leg of the LED will be inserted. Then click this button and the LED will be inserted at the desired place with one of the other two legs inserted in a row above and vertically adjacent to the first one and the other will be inserted in the same row leaving one slot vacant in between.

5. **IC6 :** This button is used to insert a 6-legged IC in your circuit. First, you choose the slot where the first-leg(i.e. the left-most leg on the top-side) of the IC will be inserted and then click this button. A 6-legged IC will be inserted at the desired place. But there is a constraint that the IC's can only be inserted in the 8-th row of the breadboard.
6. **IC8 :** This button is used to insert a 8-legged IC in your circuit. The functionalities of this button is same as that of IC8. And, inserting IC8 also has the constraint that it can be inserted in the 8-th row only.
7. **Resistor :** Resistor play one of the most important role in any electrical circuits. You can insert a resistor by choosing the starting point for it by clicking at the desired slot and it will get selected then you press this button to insert at this slot.
8. **Capacitor :** Inserting a capacitor is similar to that of a resistor i.e. first you choose a slot for the left leg of the capacitor and then you click on this button. The capacitor will be inserted with its left leg at the desired slot.
9. **Generate :** This button is clicked when you want to generate the text file containing the information about the connections made in your circuit. After you click this button a text file will be generated named 'out.txt' in your present working directory i.e. the directory in which you are executing this software.

The content of this file will be simple English statements stating the name of the circuit component and the coordinates of its endpoints. For e.g. if you insert an IC6 at 8th row and 3rd column the output will be of the form 'An IC6 having legs at (8,3), (8,4), (8,5), (9,3), (9,4), (9,5).' The output coordinate of the form (x,y) means that the slot in row x and column y is our desired slot.

10. **Clear :** Last but not the least is the clear button which clears everything you have drawn uptill now. This button clicked whenever you have made a mistake or if you have messed up your circuit. Nothing will be generated if you click generate after clicking the clear button.

Features :

1. User friendly interface, for e.g. buttons have their function mentioned on them by a keyword.
2. Fixing voltage references using radio-buttons.
3. A number of circuit components (resistor, capacitor, ICs etc.) to operate with.
4. Beautifully designed components.
5. Drag and drop wires from one point to another.
6. Remove a wire by clicking at starting point.
7. Output file generated is easy to read and interpret.
8. 'Clear' button is present to rectify your mistakes.