LogiSim : An Android Logic Simulator

Problem Statement

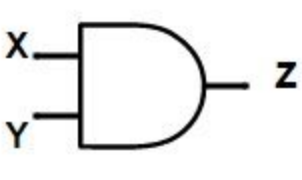
Consider students moving from Discrete Mathematics (CSC28) to Computer Organization (CSC137) at Sac State. Such students have some familiarity with evaluating logic expressions but it would be helpful if they could test out simple circuits in real time to validate their intuition. In CSC137 students will eventually learn to work with a sophisticated logic simulation language called Verilog, but while that software is very capable, it is not particularly intuitive or immediate.

What would be helpful would be a simple logic simulator that can run on Android devices. This logic simulator would allow students to experiment with simple logic circuits in real time and get immediate feedback on their understanding. This simulator would primarily be used during the early part of the course prior to the use of Verilog, hence, it only need simulate the simplest of logic circuits.

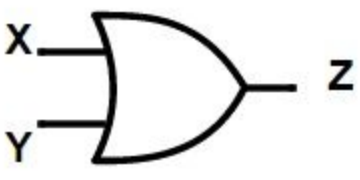
High Level Requirements Overview

1. The software must run on an Android tablet or phone
2. The software must use a single screen for all operations
3. The software should have a very clean and simple interface
4. The software must implement AND, OR, and NOT gates
5. The software must implement toggle switches for inputs and LEDs/LAMPs for outputs.
6. The software must allow the user to implement arbitrary small logic circuits. That is, users should be able to add and remove gates as well as wiring them as they see fit.
7. The size of logic circuits does not need to exceed what can fit on a single screen along with the remainder of the UI elements.
8. The software should allow the user to both edit the schematic and run the simulation.
9. When running the user should be able to turn switches on and off and immediately see the result on the output LEDs/Lamps
10. The software will only be used for basic functional understanding of combinatorial circuits and does not need to consider timing issues such as propagation delay.
11. The software should use standard logic symbols for visual representation of the gates and, additionally, images of switches and lamps that show both their on and off state.
12. The software does not need to be able to save and load different circuits, but the current circuit should be saved and loaded when the application stops and restarts.

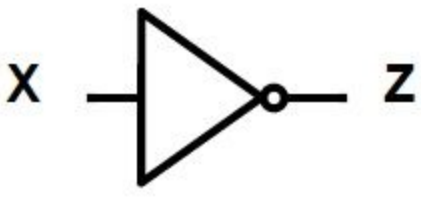
Images of logic gates for reference



AND gate



OR gate



NOT Gate