

Visual Circuit Builder

Jared Wiesman

Project Description

Design a pedagogical tool that provides a visual editor allowing users to build circuits of their choice and a means to follow the logic flowing through the circuit.

Goal: Help struggling students with Boolean expressions and their associated truth tables.

Requirements

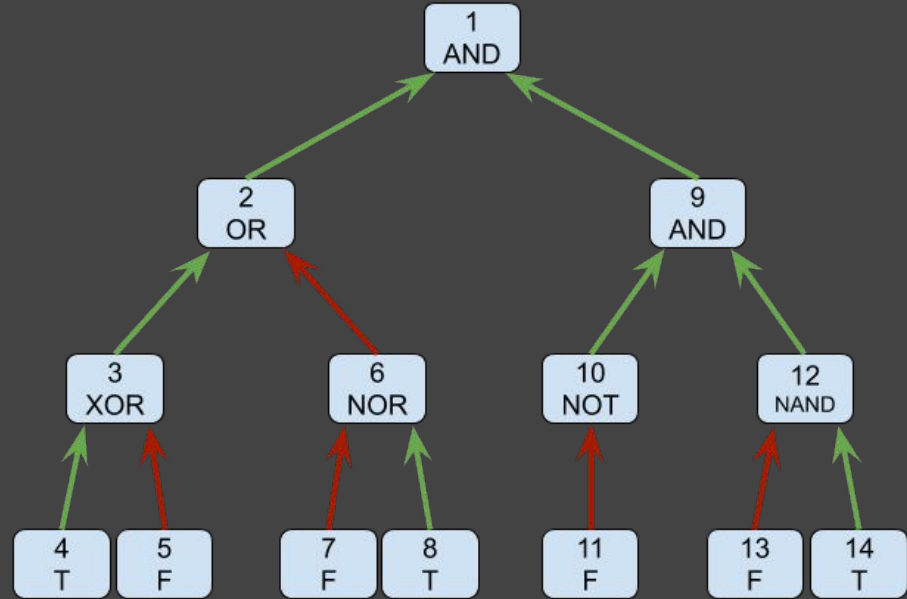
1. Provide visual NOT, AND, NAND, OR, NOR, and XOR gates.
2. Allow users to provide inputs, toggle inputs, and follow calculation of outputs.
3. Animate the logic flow through each gate of the circuit. The user should be able to step through the circuit one gate at a time, execute up to a given gate, **back up to a previous state, and execute the entire circuit by setting the speed of the animation.**
4. Provide a meta-circuit builder that forms/stores new circuits from existing configurations. New circuits can then be used in circuit construction.

Requirements Continued

5. Define a file format that describes a circuit. Your application must be able to save to and read from such a file but you might consider allowing the file to be altered outside of the application as well.
6. Allow the user to print the visualization of the circuit as well as the circuit's file description.
7. Provide functions to move, copy, paste, insert, delete portions of a circuit visually.
8. Of course, provide examples of valid circuits, sample problems to solve, and a help option.

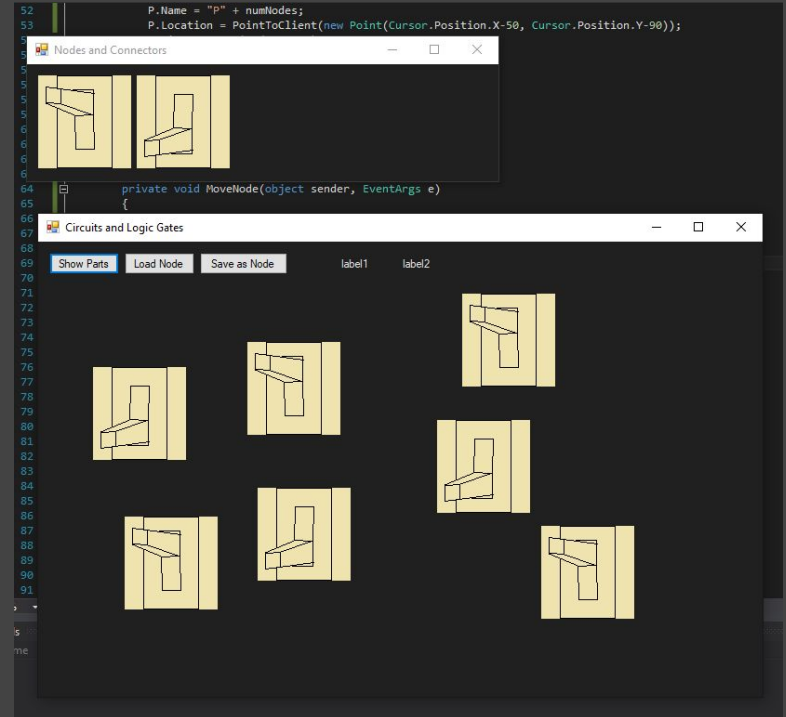
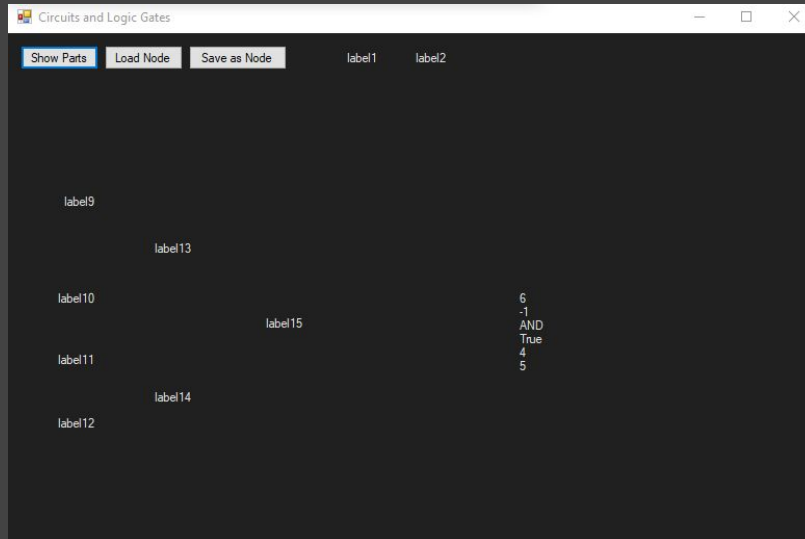
First Steps

- C# Windows Form
- Drag and drop
- Create class to define a circuit
- Independent class from view

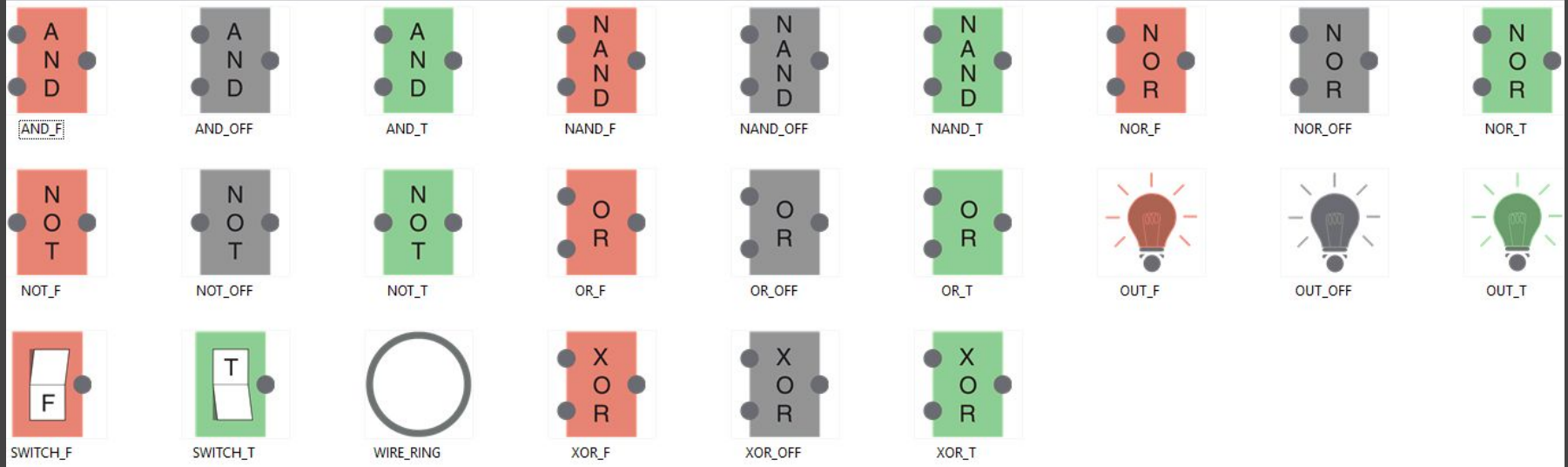


Fast Start

- Set up Git Repository
- Drag and drop working
- Finished Circuit, Node, and Wire classes



Final Designs



Strategies

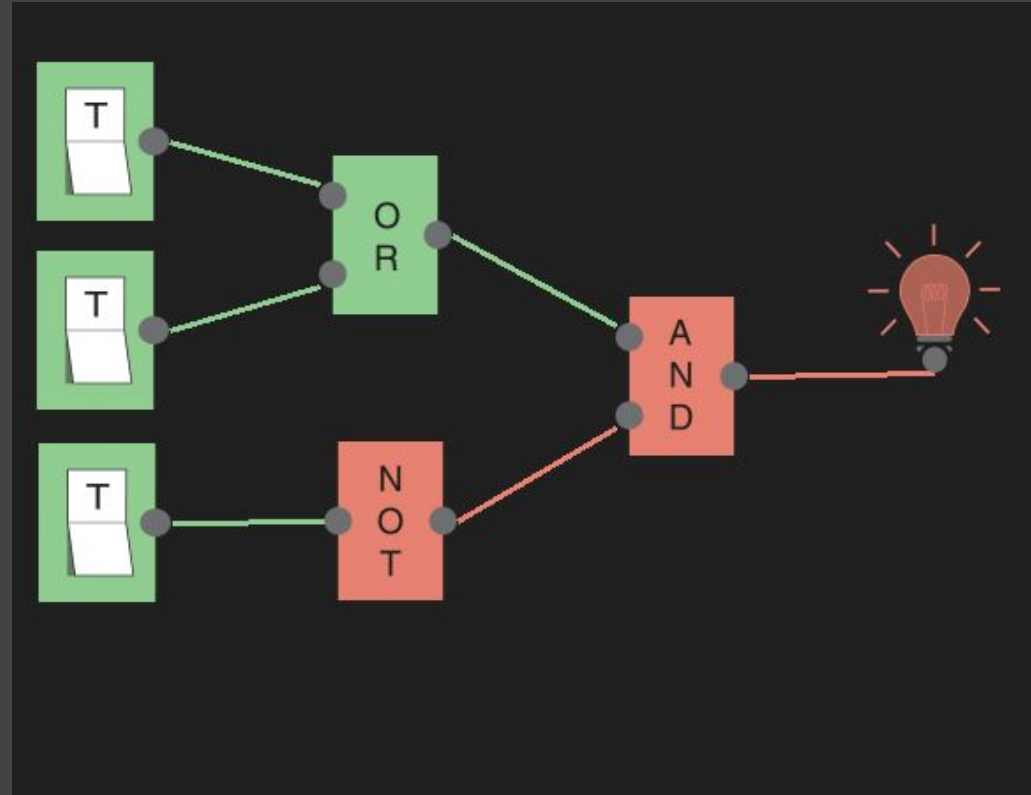
StackOverflow

Microsoft Documentation

Professors and Peers - Poster Board sessions

Graphical Truth Tables

p	q	r	$p \vee q$	$\neg r$	$(p \vee q) \wedge \neg r$
T	T	T	T	F	F
T	T	F	T	T	T
T	F	T	T	F	F
T	F	F	T	T	T
F	T	T	T	F	F
F	T	F	T	T	T
F	F	T	F	F	F
F	F	F	F	T	F



Demo

Extensions

- Allow user to pan and zoom around screen
- Allow user to name SWITCH nodes (p, q, r, etc...) and dynamically name the remaining nodes (p and q, not r, etc...)

Relevant Classes

- CSCI 205/220
- CSCI 350

Changes

- Change deletion and memory so that node IDs filter down
- Different IDE, Unreal Engine 4?

Questions?