

AE663 Project Proposal

Logic Circuit Simulator

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1 Problem Description

We are going to Implement Logic Circuit Simulator using Python. Simulator will simulate any logic circuit, which is designed by user using following components,

- Basic Logic gates (e.g. AND, OR, NOR, etc.)
- Combinational Logic circuits (e.g. Half adder, Full adder, Mux/Demux etc.)
- Sequential Logic circuits (e.g Flip-Flop, Counters, Shift registers etc.)
- Digital signal sources (e.g. clock source)

2 Implementation details

- We are going to implement hierarchical class structure which will contain logic elements used in simulation.
- There will be main five base classes, i.e. gates, connector, combinational element, sequential element and graph plotter.
- Each class will have member functions which will implement the logic and I/O properties.
- Connect will be used for connecting all elements of circuit and maintain data flow, implementation details are under development.

3 Issues involved

- Designing hierarchical class structure.
- Implementation of complex combinational and sequential blocks using basic elements.
- Maintaining data flow and connectivity of circuit.
- Managing ERROR in circuit like floating pins.

- Plotting the input and output.
- Implementing basic signal sources like constant source, user configured periodic source, clock source etc.
- Providing user friendly input methods.

4 Tentative division of project work

All following tasks are divided equally between group members.

- Each will implement part of basic logic gates, sequential blocks and combinational blocks (4 hrs per person).
- Generic functionality for plotting data input/output (2 hrs per person).
- Generic implementation of circuit connection function as whole (4 hrs per person).
- Implementation of Digital signal sources (3 hrs per person).
- User input/output methods (3 hrs per person).

5 Additional work

If time permits we are going to provide elegant GUI support.