Reversible

Problems

- How can a reversible classical circuit be modeled via modeling software?
  - Must work both forwards AND backwards
  - Maintain information throughout/no loss of information
- Can the model be achieved in the real world?
  - Same requirements, with real world limitations

What is Reversible Classical Computing?

- All information persists
- Able to reverse from output back to input
- Normal gates lose information
  - Via having 2 input and 1 output
- Reversible classical adder has persisting information
  - Via having equal inputs and outputs
- Halfway step between classical computing and quantum computing

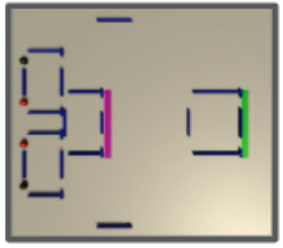
Classical

Billiard Ball Model

- Consists of billiard balls and various walls
- 1: presence of a ball, 0: no ball present
- Calculations come from collisions

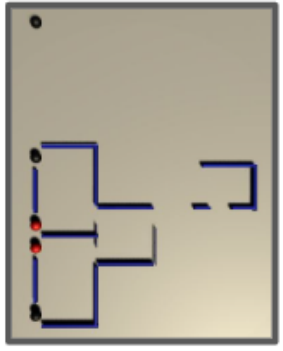
Half-Adder

- Uses three AND Gates and an XOR Gate
- The first two Gates are AND Gates used with a control to duplicate the inputs



Or Gate

- Utilizes 4 gates to make an OR gate
- Two NOT Gates followed by an AND gate
- Another NOT Gate at the end

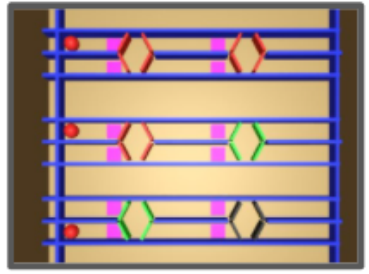


Computing

Lane Model

Half-Adder

- Uses Toffoli Gate, C-Not gate and Identity gate
- Sensor pads determine will the balls are at
- Doors open based off of the sensor data



Comparison

Billiard Ball

- Shows gate interaction
- Requires extreme precision to work as intended

Lane Model

- More reliable
- Requires sensors and motors