Logic gates are a model of computation for implementing Boolean functions. Boolean functions are arguments that assume values are from a two-element set, in this case the two value sets will be represented on as 1 and off which is represented with 0. With the combination of 1s and 0s can form different logical operations. Logic gates can represent the physical model of all of Boolean logic.

Typically, logic gates are physically implemented by using either diodes or transistors as electronic switches but can also be implemented by using vacuum tubes, relay logic, fluidic logic, pneumatic logic, optics, molecules, or even mechanical switches. The combination of different types of logic gates allow the creation of logic circuit devices such as multiplexers, registers, arithmetic logic units (ALUs), computer memory, and all the way up to microprocessors, which have more than 100 million logic gates.

Now onto the different types of logic gates represented by the table below. The types of are called, Buffer gate, NOT/inverter gate, AND gate, OR gate, NAND gate, NOR gate, XOR gate, and NXOR gate. All of these gates have a Boolean algebra equation representing the gates. Furthermore, there are schematic symbols representing the gates. There are two different types of symbols used: either the distinctive shape or the rectangular/military shape. In either type, these schematic symbols are used as a uniform method of describing the complex logic functions of digital circuits. Lastly there is a truth table representing the results of the output when a given input is inputted into the gate.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Type | Description | Distinctive shape | Boolean algebra between A & B | Truth table |
| Buffer | The Buffer gate is used to isolate the input from the output | NOT symbol | A | |  |  | | --- | --- | | Input | Output | | A | Q | | 0 | 0 | | 1 | 1 | |
| NOT  (inverter) | The Inverter or NOT gate is a logic gate that negates the output | NOT symbol | !A or | |  |  | | --- | --- | | Input | Output | | A | Q | | 0 | 1 | | 1 | 0 | |
| AND | The AND gate is a logical conjunction only outputting 1 if all inputs are 1. | AND symbol | AB or A^B | |  |  |  | | --- | --- | --- | | Input | | Output | | A | B | Q | | 0 | 0 | 0 | | 0 | 1 | 0 | | 1 | 0 | 0 | | 1 | 1 | 1 | |
| OR | The OR gate is a logical disjunction outputting 1 if any inputs are 1 | OR symbol | A+B or A V B | |  |  |  | | --- | --- | --- | | Input | | Output | | A | B | Q | | 0 | 0 | 0 | | 0 | 1 | 1 | | 1 | 0 | 1 | | 1 | 1 | 1 | |
| NAND | The NAND gate or NOT-AND gate is the complement of an AND gate. Outputting the inverse of an AND gate | NAND symbol | !(AB) or | |  |  |  | | --- | --- | --- | | Input | | Output | | A | B | Q | | 0 | 0 | 1 | | 0 | 1 | 1 | | 1 | 0 | 1 | | 1 | 1 | 0 | |
| NOR | The NOR gate or NOT-OR gate is the complement of an OR gate. Outputting the inverse of an OR gate | NOR symbol | !(A+B) or | |  |  |  | | --- | --- | --- | | Input | | Output | | A | B | Q | | 0 | 0 | 1 | | 0 | 1 | 0 | | 1 | 0 | 0 | | 1 | 1 | 0 | |
| XOR | XOR gate or the Exclusive OR output 1 when the number of 1 inputs is odd | XOR symbol | A⊕B | |  |  |  | | --- | --- | --- | | Input | | Output | | A | B | Q | | 0 | 0 | 0 | | 0 | 1 | 1 | | 1 | 0 | 1 | | 1 | 1 | 0 | |
| XNOR | XNOR gate or Exclusive NOR is the complement of XOR. Outputs 1 when number of 1 inputs are even | XNOR symbol |  | |  |  |  | | --- | --- | --- | | Input | | Output | | A | B | Q | | 0 | 0 | 1 | | 0 | 1 | 0 | | 1 | 0 | 0 | | 1 | 1 | 1 | |

Logic gate. (2021, March 31). Retrieved April 14, 2021, from https://en.wikipedia.org/wiki/Logic\_gate#:~:text=Logic%20circuits%20include%20such%20devices,semiconductor%20field%2Deffect%20transistors).