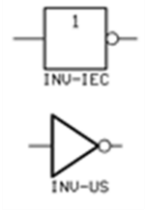
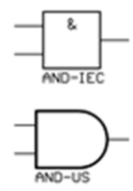
Logic Gates

Every engineer will at one point or another be acquainted with the concept of logic gates. These small devices are used to allow "logic" to be introduced into any circuit! Some can be confusing at first but all it takes is a little bit of practice. Below are the most commonly used logic gates and examples of where they are used. Each gate will be accompanied with a truth table, which is a handy way of seeing the different inputs and outputs of a gate (1 is on, 0 is off).



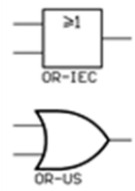
A	Output
0	1
1	0

An inverter or NOT gate inverts a signal. For example, imagine a light switch where flipping it up is off and flipping it down is on.



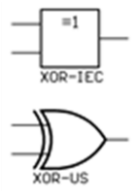
A	B	Output
0	0	0
0	1	0
1	0	0
1	1	1

An AND gate only results in 1 or ON when both inputs are on. Imagine having to flip two light switches for a light to be turned on.



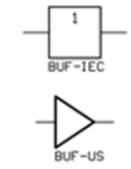
A	B	Output
0	0	0
0	1	1
1	0	1
1	1	1

An OR gate allows a current to pass as long as any switch is turned on. This is like having two light switches in a room and as long as one of them is on, the light will be on.



A	B	Output
0	0	0
0	1	1
1	0	1
1	1	0

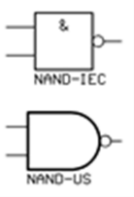
A XOR gate is only turned ON when only ONE of the inputs are ON. If both are on or off it outputs 0. They can be used to construct computation circuits.



A	Output
0	0
1	1

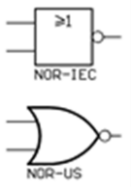
A buffer is essentially the opposite of an inverter. It outputs the same signal but BOOSTS the STRENGTH of the signal.

For more information on the HSI program at FAU visit: http://eng.fau.edu/research/hsi/



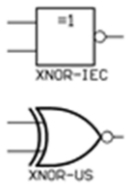
A	B	Output
0	0	1
0	1	1
1	0	1
1	1	0

A NAND gate does exactly the opposite of the AND gate. As long as one of the inputs are OFF it outputs a ON signal.



A	B	Output
0	0	1
0	1	0
1	0	0
1	1	0

A NOR gate does exactly the opposite of the OR gate. ONLY when BOTH inputs are OFF does the signal output ON.



A	B	Output
0	0	1
0	1	0
1	0	0
1	1	1

An XNOR gate only outputs ON when both of the inputs are the SAME. It is commonly used in error detection circuits as well as arithmetic.

FAU Courses

EGN1002 – Fundamentals of Engineering
EEL3111 – Circuits I
CDA 3201C – Logic Design
EEE3300 – Electronics 1

Sources

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