Digital Logic Gates

McCoy, Zachary (School: Alma High School)

Transistor-transistor logic (TTL) is present in nearly every electronic device. TTL allows binary inputs to be manipulated and then output. Discrete component TTL can be used to understand basics in computer design, architecture, and operation. These discrete components are the building blocks of electrical circuits. The use of discrete components allows TTL circuits to be assembled, tested, and understood without dismantling microprocessors and integrated circuits. According to aspects of Boolean Algebra, Conventional Current Theory, Electron Flow Theory, and transistor theory, discrete component TTL should produce the same outputs as integrated circuits and microprocessors. To test such qualities, a half adder will be constructed using discrete components. The half adder will be compared to truth tables. To construct and test the discrete component TTL, discrete component schematics and logic symbol schematics need to be created so the logic behind the operation is correct. After the construction of each gate and TTL circuit, it should be compared to truth tables. If the logic circuit (a circuit that performs logical operations) does not produce the desired outcome, thinking, troubleshooting, and redesign are options to fix that circuit. After many hours of testing and logical evaluation, the outputs of the logic gates yielded to the truth tables and produced the same output. The successful design, assembly, and functionality of several logic gates shows that computer principles, architecture, design, and logic can be understood using discrete components that are cheap and easy to use.

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