*Unit 2 Digital Circuits

Content Area: **Technology**
Course(s): **Robotics**
Time Period: **October**
Length: **7 blocks**
Status: **Published**

Transfer Skills

Digital circuits contain the building blocks to which all computing is built on and components can be used in conjunction with one another to perform simple or complex computing tasks.

Enduring Understandings

1. Engineers and technicians use scientific notation, engineering notation, and Systems International (SI) notation to conveniently write very large or very small numbers frequently encountered when working with electronics.

2. Digital electronic circuits typically have only two values of “on”, or one, and “off”, or zero. These values can also be listed as low and high.

3. Integrated circuits are categorized by their underlying circuitry, scale of integration, and packaging style.

4. A monostable circuit has two states, low and high. The circuit stays in the low phase until it is triggered then it changes to the high phase for one cycle.

5. An astable circuit continually switches between its low and high phases.

6. We would not be able to use electricity without having learned about atomic structure and change.

7. Even complex devices can be created using realatively simple circuits and digital chips.

8. The transitor revolutioned the field of electronics.

Essential Questions

1. Why is it important to express very large and very small numbers in proper scientific, engineering and Systems International (SI) notation?

2. What is the difference between analog and digital circuits?

3. What are the characteristics that categorize integrated circuits?

4. What are the steps for troubleshooting digital electronics circuits?

5. What are the uses for monostable and astable circuits?

6. How are various digital chips used in everyday products?

Content

Vocabulary: circuit, voltage, amperage, resistance, electron, conductor, insulator, potential difference, multimeter, ampere, watt, resistor, ohm, light emitting diode, light dependent resistor, potentiometer, variable resistor, switch, SPST, SPDT, DPST, DPDT, battery, 555 timer, diode, transistor, Base, Emitter, Collector, engineering notation, bread board, seven-segment display, logic gate, monostable, astable, flip flop, Boolean logic, NPN, PNP, AND, OR, NOR, XOR, NOT, NAND, CMOS, TTL, Thermistor, Hygrometer, Stress dependent resistor, Ultra violet detector, Wheatstone Bridge

Skills

1. Express numbers in scientific notation, engineering notation, and System International (SI) notation.

2. Identify commonly used electronic components given their part number or schematic symbol.

3. Create physical circuits that incorporate integrated circuits using written descriptions and schematic diagrams.

4. Create schematic diagrams of circuits that contain integrated circuits.

5. Construction monostable and astable circuits using a 555 timer.

6. Manipulate monostable and astable circuits to adjust their output.

Resources

Electrical components (various)

Digital electronics chips (various)

Multimeters

Eletrical prototyping tools

Eletrical prototyping materials

Standards

TECH.8.1.12.F.CS2	Plan and manage activities to develop a solution or complete a project.
TECH.8.2.12.C.4	Explain and identify interdependent systems and their functions.
TECH.8.2.12.C.CS2	The application of engineering design.
TECH.8.2.12.D.1	Design and create a prototype to solve a real world problem using a design process, identify constraints addressed during the creation of the prototype, identify trade-offs made, and present the solution for peer review.
TECH.8.2.12.D.4	Assess the impacts of emerging technologies on developing countries.
TECH.8.2.12.D.5	Explain how material processing impacts the quality of engineered and fabricated products.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.E.1	Demonstrate an understanding of the problem-solving capacity of computers in our world.