Unit 2.4: Introduction to Programmable Logic Devices

Content Area: **Science**
Course(s): **Digital Electro**
Time Period: **Semester 2**
Length: **3 weeks**
Status: **Published**

Standards

TEC.9-12.8.1.12.F.1	Select and use specialized databases for advanced research to solve real world problems.
TEC.9-12.8.2.12.A.1	Design and create a technology product or system that improves the quality of life and identify trade-offs, risks and benefits.
TEC.9-12.8.2.12.B.2	Design and create a prototype for solving a global problem, documenting how the proposed design features affect the feasibility of the prototype through the use of engineering, drawing and other technical methods of illustration. Information accessed through the use of digital tools assists in generating solutions and making decisions.

Enduring Understandings

Understandings

Students will understand that …

1. Engineers and technicians use Circuit Design Software to enter and synthesize digital designs into programmable logic devices.
2. Programmable Logic Devices can be used to implement combinational logic circuits.
3. Circuits implemented with programmable logic devices require significantly less wiring than discrete logic, but they typically require a dedicated printed circuit board to hold the device.
4. Programmable logic devices can be used to implement any combinational logic circuits but are best suited for larger, more complex designs.

Essential Questions

Students will keep considering …

1. How is the design process impacted by use of Circuit Design Software (CDS) and Programmable Logic Devices (PLDs)?
2. How are programmable logic devices used to implement combinational logic circuits?
3. Describe the advantages and disadvantages of using a programmable logic device over discrete logic gates.

Knowledge and Skills

Knowledge

Students will ...

1. Know the role Programmable Logic Devices (PLDs) play in circuit development today.
2. Know the advantages to using PLDs.
3. Know the types of Programmable Logic Devices.

Skills

Students will ...

1. Design combinational logic circuits using a programmable logic device.
2. Describe the advantages and disadvantages of programmable logic devices over discrete logic gates.
3. Use Circuit Design Software (CDS) and a Digital Logic Board (DLB) to simulate and prototype combinational logic designs implemented with programmable logic.

Modifications

https://docs.google.com/document/d/1ODqaPP69YkcFiyG72fIT8XsUIe3K1VSG7nxuc4CpCec/edit?usp=sharing

Assessments

https://docs.google.com/document/d/1wR7bQF-8AQoRrt0g4C3hKja0yjwDjC9_BiAmONWbTcI/edit?usp=sharing

Resources

Technology Resources

- National Instruments Multiim circuit design and simulation software
- Microsoft Office Applications

Electronics Resources

- Electronics Trainers (power supply, function generator, breadboard)
- Electronics hand tools (diagonal cutters, needle-nosed pliers, wire strippers, etc.)
- Digital Multimeters
- Digital Transistor-Transistor Logic (TTL) integrated circuits