Unit 9: Mechatronics and Robotics

Content Area: **Technology**
Course(s): **Engineering Design 1**
Time Period: **May**
Length: **15 blocks**
Status: **Published**

Enduring Understandings

1. Building an electrical system requires combining multiple engineering disciplines.

2. Physical electrical systems can look very different than their schematic diagrams.

3. Electrical safety considerations are an integral part of every electronic related activity.

4. Mechatronics requires a combination of several areas of engineering to create electrical devices that move.

5. Mechatronics requires effective project management skills.

6. Adding programming to mechatroincs requires a careful balance of all disciplines involved.

7. Mechatronics can be autonomous or non-autonomous.

Essential Questions

1. How are mechanical systems integrated into electrical systems?

2. How can electricity be turned into motion?

3. What are some of the dangers associated with the design of electrical systems?

4. How does mechatronics incorporate several areas of engineering?

5. What are the difficulties in combining multiple disciplines into a single project?

6. How does the incorporation of programmed electrical circuits and mechanisms influence a robots design?

7. What concerns arise with fully autonomous robots?

Content

Vocabulary:

Alternating Current (AC), Ampere, Capacitor, Coulomb, Current, Direct Current (DC), Diode, Electric Motor, Farad, Light Emitting Diode (LED), Load, Polarity, Potentiometer, Resistance, Resistor, Voltage, Mechatronics, Servo Motor, Digital, Analog, Circuit, Schematic Diagram, Battery, Mechatronics

Skills

1. Formulate a design brief and identify specifications for an electrical engineering problem.

2. Apply the design process to create a physical electrical circuit that is a solution to an electrical engineering problem.

3. Create schematic diagrams of physical circuits.

4. Document the design process through the use of an engineering portfolio.

5. Work within a team to develop a design solution to a real world problem.

6. Integrate the concepts of structural, mechanical, electrical and engineering into the design of a product.

Resources

Engineering drawing tools (various)

Engineering drawing paper

Calipers

Physical objects to be measured

Teacher presentation device

Document camera

Desktop computers

Research database access

2D & 3D CAD systems

3D printer

Laser cutter

Color laser printers

Large format printer

Prototyping equipment (hand-held and power tools)

Prototyping materials

Prototyping furniture

Presentation device

Standards

TECH.8.1.12.C.CS4	Contribute to project teams to produce original works or solve problems.
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.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
TECH.8.2.12.C.7	Use a design process to devise a technological product or system that addresses a global problem, provide research, identify trade-offs and constraints, and document the process through drawings that include data and materials.
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.3	Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.D.CS2	Use and maintain technological products and systems.
TECH.8.2.12.D.CS3	Assess the impact of products and systems.