GEORGIA | PEACH STATE PATHWAYS

Career, Technical, & Agricultural Education

ENGINEERING & TECHNOLOGY

PATHWAY: Manufacturing

COURSE: Robotics and Automated Systems

UNIT: 5.3 Design and Mechanics—Fundamental Electronics

INTRODUCTION

Annotation:

In this unit students will learn to recognize and understand the operation of the use of basic electronic components and symbols, use of binary, and task analysis.

Grade(s):

	9th
x	10th
x	11th
x	12th

Time:

15 hours

Author:

Jodie Marshall

Additional Author(s):

Students with Disabilities:

For students with disabilities, the instructor should refer to the student's IEP to be sure that the accommodations specified are being provided. Instructors should also familiarize themselves with the provisions of Behavior Intervention Plans that may be part of a student's IEP. Frequent consultation with a student's special education instructor will be beneficial in providing appropriate differentiation.

FOCUS STANDARDS

GPS Focus Standards:

ENGR-STEM-1. Students will recognize the systems, components, and processes of a technological system.
ENGR-STEM-3. Students will design technological problem solutions using scientific investigation, analysis and interpretation of data, innovation, invention, and fabrication while considering economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability constraints.
ENGR-STEM-4. Students will apply principles of science, technology, engineering, mathematics, interpersonal communication, and teamwork to the solution of technological problems.
ENGR-STEM-5. Students will select and demonstrate techniques, skills, tools, and understanding related to energy and power, bio-related, communication, transportation, manufacturing, and construction technologies.
ENGR-STEM-6. Students will enhance reading by developing vocabulary and comprehension skills associated with text materials, problem descriptions, and laboratory activities associated with engineering and technology education.

GPS Academic Standards:

ELAALRC2. The student participates in discussions related to curricular learning in all subject areas.
ELAALRC3. The student acquires new vocabulary in each content area and uses it correctly.
ELAALRC4. The student establishes a context for information acquired by reading across subject areas.

National / Local Standards / Industry / ISTE:

UNDERSTANDINGS & GOALS

Enduring Understandings:

- Students will recognize symbols of electronic components
- Students will understand how electronic components impact circuitry
- Students will understand the process of task analysis.

Essential Questions:

- What is the relationship between material needs and drawing measurements?

Knowledge from this Unit:

- The students will demonstrate an understanding of photocells, diodes, SCR's, capacitors, and the continuity tester by completing simple circuitry labs.
- Students will demonstrate an understanding of the relationship between Engineering task analysis and the Binary code program the students develop for the Mask.
- Electronic Component recognition by physical and symbol appearance.
- The students will understand the importance of an Engineer or Technician's ability to read, writes, and evaluate task analysis of a process.

Skills from this Unit:

- The students will be able to describe an object verbally or through written expression.
- The students will be able to communicate task analysis of a process through verbal and written expression.

ASSESSMENT(S)

Assessment Method Type: Select one or more of the following. Please consider the type(s) of differentiated instruction you will be using in the classroom.

- x Pre-test
- x Objective assessment - multiple-choice, true- false, etc.
  - _x_ Quizzes/Tests
  - _x_ Unit test
- x Group project
- ____ Individual project
- x Self-assessment - May include practice quizzes, games, simulations, checklists, etc.
  - __ Self-check rubrics
  - __ Self-check during writing/planning process
  - __ Journal reflections on concepts, personal experiences and impact on one's life
  - __ Reflect on evaluations of work from teachers, business partners, and competition judges
  - __ Academic prompts
  - _x_ Practice quizzes/tests
- x Subjective assessment/Informal observations
  - __ Essay tests
  - _x_ Observe students working with partners
  - __ Observe students role playing
- x Peer-assessment
  - _x_ Peer editing & commentary of products/projects/presentations using rubrics
  - __ Peer editing and/or critiquing
- x Dialogue and Discussion
  - _x_ Student/teacher conferences
  - _x_ Partner and small group discussions
  - _x_ Whole group discussions
  - __ Interaction with/feedback from community members/speakers and business partners
- ____ Constructed Responses
  - __ Chart good reading/writing/listening/speaking habits
  - __ Application of skills to real-life situations/scenarios
- ____ Post-test

Assessment(s) Title:

Binary Electronic Quiz
Electronic Test (may be used as pre/post test)
Mask/cyborg operation

Assessment(s) Description/Directions:

Students are introduced to Basic Electronics component and simple circuit concepts and incorporating the information into a simple circuit system.

Attachments for Assessment(s):

LEARNING EXPERIENCES

Sequence of Instruction

1. **Identify the Standards. Standards should be posted in the classroom for each lesson.**
2. **Review Essential Questions.**
3. **Identify and review the unit vocabulary.**
4. **Assessment Activity.**

Step 1:
Discuss basic electronic components and circuit types using the basic electronic power point and basic electronic student notes worksheet.
Discuss general basic electronic safety rules according to the tools and components available in your lab.

Step 2:
Discuss how to read resistors by color code and potentiometers using the resistor power point and student notes worksheet for resistors.

Step 3:
Guide Web Searches for servo motors using web search worksheet.

Step 4:
Students build and complete basic electronic labs provided by state or preferred companies of instructor.

- Photocell Lab
- Diode and Multimeter lab
- Capacitor Lab
- SCR lab

Step 5:
Discuss ohms law using the provided ohms law power point. Have the students complete the practice sheet to verify knowledge.

Step 6:
Introduce the binary numbering system using the supplied power point and provided work sheets. Discuss the importance of an Engineer or Technician being able to complete detail work orders and how binary is used as repair codes for equipment. Have them describe how to make a sandwich using ingredients that you have picked then allow one partner to read the instructions while the other partner makes the sandwich. This will give your students practice for the binary action program they will write.

Step 7:
Project: Students will build a mask (that can't be seen out of) with attached LED's connected to a remote switch box that controls the Lighting of the LED's. Each lit LED will mean a directional move, body movement, or physical requirement of the student wearing the mask. The four LED's will represent four positions of the binary numbering system.
One student will operate a remote switch box while the other student wears the mask and completes the binary action codes.

Step 8:
Test the students' knowledge of the unit through the provided electronics test and the operational testing of the mask/cyborg

Warm Up Activities through out the unit:

- Binary Electronic Quiz
- Electronic Crossword

Attachments for Learning Experiences:

Notes & Reflections:

Instruct the students to select the individual electronic parts from the provided kits. Students should also be filling in correct answers on the basic electronic sheets during the power point lecture.

Resistor Lab: complete the first resistor reading with the class to insure operational understanding
A resistor color code chart is provided for students to utilize during labs.

I have the students explain the circuit to me in their own words before I sign off on the lab. This gives me one on one time with each student and it requires my students to slow down and digest the information instead of rushing through the labs and not learning the information.

CULMINATING PERFORMANCE TASK (Optional)

Culminating Unit Performance Task Title:

Mask/cyborg Operational Test

Culminating Unit Performance Task Description/Directions/Differentiated Instruction:

Students will build a mask/cyborg (that can't be seen out of) with attached LED's connected to a remote box that controls the lighting of the LED's. Each lit LED will mean a directional move, body movement, or physical requirement of the student wearing the mask.

Attachments for Culminating Performance Task:

UNIT RESOURCES

Web Resources:

Attachment(s):

Materials & Equipment:

What 21st Century Technology was used in this unit:

x	Slide Show Software		Graphing Software		Audio File(s)
	Interactive Whiteboard		Calculator		Graphic Organizer
	Student Response System		Desktop Publishing		Image File(s)
	Web Design Software		Blog		Video
	Animation Software		Wiki		Electronic Game or Puzzle Maker
	Email	x	Website		