GEORGIA | PEACH STATE PATHWAYS

Career, Technical, & Agricultural Education

ENGINEERING & TECHNOLOGY

PATHWAY: Manufacturing

COURSE: Robotics and Automated Systems

UNIT: 8- Advanced Programming

INTRODUCTION

Annotation: In this unit students will design solutions for problems combining basic programming techniques, available sensors, previous units and problem solving techniques.

Grade(s):

	9th
X	10th
X	11th
X	12th

Time: 10 hours

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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-RAS-3. Students will discuss the systems and applications of automation including: AGV, PLC, CNC, CIM, CAD, CAM, and robotics as essential to succeeding globally in a manufacturing market.
ENGR-RAS-4. Students will outline the utilization of programmable control devices and data transfer.
ENGR-RAS-5. Students will apply the principles of PLC, CIM, CAD, CAM, and robotics in the manufacturing of a product.
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 understand how programming combined with technological concepts and equipment provides students with an advanced set of tools to accomplish manufacturing tasks.

Essential Questions:

- How is programming integrated with equipment to control manufacturing processes?
- What jobs might a robotic programmer have to perform in a real world setting?

Knowledge from this Unit:

- Students will be able to identify concepts of programming
- Students will be able to integrate process steps, lab equipment, and materials using autonomous, and semi autonomous routines to accomplish the mission.

Skills from this Unit:

- Students will be able to create simple programs to interact with available engineering components to accomplish a unique task.

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.

- ____ Pre-test
- ____ Objective assessment - multiple-choice, true- false, etc.
  - __ Quizzes/Tests
  - __ Unit test
- X Group project
- X Individual project
- ____ 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
  - __ Practice quizzes/tests
- X Subjective assessment/Informal observations
  - __ Essay tests
  - _x_ Observe students working with partners
  - __ Observe students role playing
- ____ Peer-assessment
  - __ Peer editing & commentary of products/projects/presentations using rubrics
  - __ Peer editing and/or critiquing
- ____ Dialogue and Discussion
  - __ Student/teacher conferences
  - __ Partner and small group discussions
  - __ Whole group discussions
  - __ Interaction with/feedback from community members/speakers and business partners
- X Constructed Responses
  - __ Chart good reading/writing/listening/speaking habits
  - _x_ Application of skills to real-life situations/scenarios
- ____ Post-test

Assessment(s) Title:

Assessment(s) Description/Directions:

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:
   Review programming and sensor units as needed
   Step 2:
   Have students select advanced programming opportunity.

Attachments for Learning Experiences:

Notes & Reflections:

Review programming basics as necessary. Based on the equipment available to your lab, have students create interesting and unique programs for the automation of your robotic equipment.

This is an opportunity to re-teach those who did not completely comprehend programming concepts the first time around. For the more advanced students, this is a time they can spend working with and building upon what they already have acquired.

As programming will differ from district to district, and school to school based on the availability and choice of equipment, programming and advanced programming are a wide open opportunity to expand your students problem solving skills. If no programming opportunities are available, the time of this Unit can well be spent incorporated into other Units.

It is hoped that by moving into another unit away from programming, and then returning to the process of robotic control, students will not grow tired or encounter blocks against their creative thinking. Remember the order of units is a recommendation. You can alter the order to suit your lab and needs.

Use this time to problem solve and create scenarios that will be fun and interesting to your students.

CULMINATING PERFORMANCE TASK (Optional)

Culminating Unit Performance Task Title:

Advanced Robotic Programming

Culminating Unit Performance Task Description/Directions/Differentiated Instruction:

Students will use previous lessons to facilitate their challenge to create a more advanced program

Attachments for Culminating Performance Task:

UNIT RESOURCES

Web Resources:

Attachment(s):

Materials & Equipment:

What 21st Century Technology was used in this unit:

	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		