Unit 2: Robotics – Construction and Programming

Content Area: **Applied Technology**
Course(s):
Time Period: **Marking Period 1**
Length: **20 Days**
Status: **Published**

Summary

Students will be introduced to the concepts of robot design and programming with connections to everyday life, environmental issues such as climate change ,space exploration, and careers.

Revision date: July 2021

Standards

CS.6-8.8.2.8.ED.7	Design a product to address a real-world problem and document the iterative design process, including decisions made as a result of specific constraints and trade-offs (e.g., annotated sketches).
CS.6-8.DA	Data & Analysis
CS.6-8.ED	Engineering Design
CS.6-8.NT	Nature of Technology
MA.7.7	In Grade 7, instructional time should focus on four critical areas: (1) developing understanding of and applying proportional relationships; (2) developing understanding of operations with rational numbers and working with expressions and linear equations; (3) solving problems involving scale drawings and informal geometric constructions, and working with two- and three-dimensional shapes to solve problems involving area, surface area, and volume; and (4) drawing inferences about populations based on samples.
SCI.MS.ETS1.B	Developing Possible Solutions
SCI.MS-ETS1-1	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
SCI.MS-ETS1-3	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
SCI.MS-ETS1-4	Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
SOC.6.2.4	Expanding Exchanges and Encounters (500 CE–1450 CE)
WRK.9.2.8.CAP.1	Identify offerings such as high school and county career and technical school courses, apprenticeships, military programs, and dual enrollment courses that support career or occupational areas of interest.

WRK.9.2.8.CAP.3	Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income.
TECH.K-12.1.1.d	understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.
TECH.K-12.1.2.b	engage in positive, safe, legal and ethical behavior when using technology, including social interactions online or when using networked devices.

Essential Questions/Enduring Understandings

Essential Questions

What are the future impacts of robotics on our society?

How are robots beneficial to our society?

Enduring Understandings

A robot will follow only the commands that it is given; it may be able to make decisions, but it cannot think for itself.

Robots play an important role in our society, from manufacturing to uses in the military, medicine and environmental factors.

Accuracy is important when programming a robot to complete a task.

Sensors are an important element to a robot for the purpose of decision making, as a robot cannot think for itself.

Objectives

Students will know the vocabulary relevant to robotics, including: anthropomorphic, humanoid, nano-robot, prosthetic, prototype, circuits, decoders, troubleshoot, programmer, limitations, range of motion, commands, sensors.

Students will know how to use the programming commands.

Students will know how to write and download a working program.

Students will know how to use the sensors to gather information so the robot can make decisions.

Students will be skilled at troubleshooting when errors in their code arise.

Students will be skilled at creating commands that meet project requirements.

Students will be skilled at building solutions to real world problems while communicating and problem solving with others.

Students will be skilled at measuring distances for their robots to travel.

Students will be skilled at analyzing, interpreting, and collecting data.

Learning Plan

Robotics Vocabulary: Students will be introduced to the new unit by studying robotics vocabulary. Each student will work with a partner to create a Google Slide presentation on the unit's vocabulary. Partners will create Slides that show the vocabulary term visually, includes a definition, and gives an example of the term in a real world scenario. Students will then present their work to the class.

Robotics Interactive Workbook: Students will utilize a Robotics Interactive Workbook to learn about robots and how to write code. This interactive workbook will include opportunities to think about how robots are used in everyday life, examine robotic systems, review the history and future of coding, explore the coding process, and create a maze of their own design that they will code a character to move through. The culminating activity for this project is to use either the Scratch or mBlock website to design their own maze and use code to not only move their character through the maze successfully, but also include code that creates an obstacle for the character (such as returning to the start position when they hit a wall, or losing points when they hit a wall).

VEX Robot Coding: In this activity, students will practice coding a robot through a variety of challenges, including basic movement, pushing objects, detecting and collecting objects, use of conditional statements, and a challenge focused on cleaning up the ocean environment.

LEGO EV3 Challenges: This unit will culminate in a series of LEGO EV3 challenges. Students will first work on constructing their robots and learning about the sensors they will be using. Students will move through progressively harder challenges when coding their robots, including basic movement, using sensors (ultrasonic, color, touch, and gyro sensors), advanced movement (including moving around objects and moving in reverse), and advanced coding (including using sound and variables).

Assessment

Formative:

Google Forms

Robotics Interactive Notebook

Engineering Notebook completion

Summative:

LEGO EV3 Challenges

Benchmark:

Google Forms

Guided Notes

Alternative:

Checklists

Verbal Discussions

Materials

Chromebook

Projector

YouTube

Gizmos

LEGO EV3 robots

Google Slides

Google Docs

Google Forms

YouTube

Virtual coding websites (Scratch, VEX, mBlock, etc.)

Ruler

Tape

Integrated Accommodation and Modifications, Spec Ed Students, ELL, At-Risk, G&T, 504's

See attached document:

https://docs.google.com/spreadsheets/d/1pzkODxxGOSxESwthnE0jQW8hVfMaZ9ygEBg5QsKBcDA/edit?usp=sharing