Unit 2: Robotics – Construction and Programming

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

Section Title

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.

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TECH.K-12.1.1.a	articulate and set personal learning goals, develop strategies leveraging technology to achieve them and reflect on the learning process itself to improve learning outcomes.
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.
TECH.K-12.1.1.c	use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.
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.
TECH.K-12.1.6.d	publish or present content that customizes the message and medium for their intended audiences.
8.1.8.AP.3	Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals.
8.1.8.AP.6	Refine a solution that meets users' needs by incorporating feedback from team members and users.
8.1.8.AP.9	Document programs in order to make them easier to follow, test, and debug.
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).
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.

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.
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.
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.

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 based on code input, 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.

Objectives

Students will know the vocabulary relevant to robotics, including: prototype, troubleshoot, programmer, limitations, range of motion, commands, and 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.

Students will be skilled at demonstrating safe work habits when using tools, equipment, and technical

processes.

Learning Plan

Robots in Society: Students will utilize be introduced to how robots impact society, the benefits they provide, and consider how they may improve/contribute to society in the future. This activity will include opportunities to think about how robots are used in everyday life and examine robotic systems. Students may conduct their own research about robots, watch videos, participate in class discussions, or similar activities.

Introduction to Code - Scratch: Students will be introduced to the Scratch website. The students will complete a series of tutorials that will allow them to become familiar with the functions of the website and coding. The students may include tutorials that introduce them to the basic functions of Scratch such as: Adding a Sprite, Adding a Backdrop, Animating a Name, Using Arrow Keys, Animating a Sprite, Making a Chase Game, or similar activities.

Scratch Coding: In this activity, students will practice their coding skills by completing a variety of challenges, including basic movement, pushing objects, detecting and collecting objects, and use of conditional statements.

Lego Spike Prime Challenges: The students will complete a series of Lego Spike Prime challenges. Students will first work on constructing their Lego 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).

Lego Spike Prime Choice Build: This unit will culminate by allowing students to work in small groups to choose a Lego Spike Prime build and code it to complete a task. The students will have the option to choose which Lego robot they would like to build, including the structure and sensors utilized. The students will then determine what task their Lego Robot will complete and code it to be able to do so. After successfully constructing and coding their robot, the students will present their robot to the class, demonstrate the task it was coded to complete, and share the code. Students will then have the opportunity to test each other's build and code.

Assessment

Formative:

Google Forms

Scratch Codes

Lego Spike Prime Challenges

Summative:

Lego Spike Prime Choice Build

Benchmark:

Google Forms

Guided Notes

Alternative:

Checklists

Verbal Discussions

Materials

Smart Board

YouTube

Lego Spike Prime Robots

Google Slides

Google Docs

Google Forms

YouTube

Scratch

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