Unit 3: Robotics

Content Area: **Technology**
Course(s): **Technology**
Time Period: **Generic Time Period**
Length: **8 Weeks**
Status: **Published**

Unit Overview

Students will work in groups with Lego robotics. This unit introduces students to engineering and the engineering design process. Students will learn about robotic engineers.

Standards

TECH.8.2.2.C.6	Investigate a product that has stopped working and brainstorm ideas to correct the problem.
TECH.8.2.2.C.CS3	The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving
TECH.8.2.2.D.1	Collaborate and apply a design process to solve a simple problem from everyday experiences.
TECH.8.2.2.D.2	Discover how a product works by taking it apart, sketching how parts fit, and putting it back together.
TECH.8.2.2.D.3	Identify the strengths and weaknesses in a product or system.
TECH.8.2.2.D.CS1	Apply the design process.
TECH.8.2.2.E	Computational Thinking: Programming: Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.
TECH.8.2.2.E.1	List and demonstrate the steps to an everyday task.
TECH.8.2.2.E.2	Demonstrate an understanding of how a computer takes input through a series of written commands and then interprets and displays information as output.
TECH.8.2.2.E.3	Create algorithms (a sets of instructions) using a pre-defined set of commands (e.g., to move a student or a character through a maze).
TECH.8.2.2.E.4	Debug an algorithm (i.e., correct an error).
TECH.8.2.2.E.5	Use appropriate terms in conversation (e.g., basic vocabulary words: input, output, the operating system, debug, and algorithm).
TECH.8.2.2.E.CS1	Computational thinking and computer programming as tools used in design and engineering.
TECH.8.2.5.D.3	Follow step by step directions to assemble a product or solve a problem.
TECH.8.2.5.D.5	Describe how resources such as material, energy, information, time, tools, people and capital are used in products or systems.
TECH.8.2.5.E.1	Identify how computer programming impacts our everyday lives.
TECH.8.2.5.E.2	Demonstrate an understanding of how a computer takes input of data, processes and stores the data through a series of commands, and outputs information.
TECH.8.2.5.E.3	Using a simple, visual programming language, create a program using loops, events and

	procedures to generate specific output.
TECH.8.2.5.E.4	Use appropriate terms in conversation (e.g., algorithm, program, debug, loop, events, procedures, memory, storage, processing, software, coding, procedure, and data).

Essential Questions

- What is a robot?
- What is Programming?
- How can you use the computer to make your robot do different things?
- How do you edit, compile, run, and test a program using Scratch?
- What is engineering?
- What do engineers do (including non-traditional)?
- What around you in life involves engineers?
- What is the difference between engineering and science?
- How do engineers solve problems?
- What are the steps of the design process?

Application of Knowledge: Students will know that...

- Belts and pulleys transfer mechanical energy from place to place and can go longer distances than gears.
- Computers are used to program robots.
- Engineers have an impact on the world they live in and their daily lives.
- Gears transfer mechanical energy from place to place.

Application of Skills: Students will be able to...

- Understand basic programming elements in Scratch to move the sprite several steps forwards or backwards.
- Communicate using digital media
- Create algorithms using a pre-defined set of commands
- Identify the strengths and weaknesses in a product.

Assessments

The teacher will informally assess students throughout the unit by:

- Observing students performing their task of building a robot.
- Checking for cooperative learning skills and for performance of the task.
- Checking for understanding of key concepts, during discussion.

Suggested Activities

- Students will start each class by navigating to Google Classroom and responding to a writing prompt. In responding to the writing prompt, students will be collaboratively conversing with each other and their teacher digitally, using their schema of keyboarding and mouse skills.
- Engineer of the Week: Each week, a new engineer will be briefly introduced to the class, highlighting their impact on their current world.
- Soccer challenge Lego WeDo Robotics- These LEGO models will introduce students to a variety of mechanical elements, sensors, and programming techniques.
- Simple Machines Website- Science game to identify simple machines around the house, and simple machines that make up compound machines in the tool shed.
- Code.org Stage 2- Learn the basic concepts of Computer Science with drag and drop programming. This is a game-like, self-directed tutorial starring video lectures by Bill Gates, Mark Zuckerberg, Angry Birds and Plants vs. Zombies. Learn repeat-loops, conditionals, and basic algorithms.
- Hour Of Code-Anna and Elsa Frozen Challenge- Anna and Elsa as they explore the magic and beauty of ice. Students will program snowflakes and patterns as they ice-skate and make a winter wonderland
- Introduce Scratch as well as Sprites- Scratch is a free programming language and online community where you can create your own interactive stories, games, and animations.

Activities to Differentiate Instruction

- Provide individualized checklists of the directions for a task in support of the thorough execution of directions.
- Proximal seating for all large group work
- Behavior modification reward system to encourage time on task so that work is completed
- Partner with a capable learner. Closely monitor partner work
- Work on Code.org Stage 2

Enrichment Opportunities:

- The Great Marshmallow Challenge- Students will use a worksheet to create a robot that kicks marshmallows.
- https://drive.google.com/drive/u/2/my-drive
- Use different form of programming such as Python to program an already prebuilt robot.

Integrated/Cross-Disciplinary Instruction

Science-

- transmission of motion and transfer of energy through the machine
- Identify the pulley and belt drive mechanism
- Effect of changing the belt has on the direction and speed of movement

Engineering-

- Build and test dancing birds' movements
- Modify the dancing behavior by changing the pulleys and belt to affect the speed and direction of motion

Math

- Understand and use numbers to represent the amount of time the motor is turned on in seconds and in tenths of second.

Resources

- WeDo Robotics Kits
- Code.org Stage 2
- Simple Machines Website
- NAO robot if available