Robotics & Coding 101

v3.0

Unit Overview:

In this unit, students will get familiar with the Spark:bit robotics controller and the software (MakeCode) that is used to program it. Students will gain confidence in their ability to write simple programs that can be uploaded to the Spark:bit.

Recommended Grade Level:
3 - 8

Kid Spark STEM Lab:
STEM Pathways **or**
Engineering Pathways (w/Spark:bit)

Alignment to STEM Standards:

The table below highlights how this unit is aligned to the Computer Science Teachers Association (CSTA) K-12 Computer Science Standards and the Next Generation Science Standards (NGSS).

- CSTA K-12 CS standards introduce the fundamental concepts of computer science to all students, beginning at the elementary level. **Click here** to view the standards.
- NGSS Disciplinary Core Ideas (DCI) are standards related to content knowledge.

Lessons & Assessment	CSTA	NGSS - DCI
Lesson 1: The Spark:bit (60 Min.) In this lesson, students will learn how the Spark:bit works and how it can be used to control a simple mechanism. Students will upload an example program to the Spark:bit and test and observe the connected inputs and outputs.	**1B-CS-01** Describe how internal and external parts of computing devices function to form a system. **Concept:** Computing Systems | **Subconcept:** Devices	Engineering Design
Lesson 2: Introduction to MakeCode (60 Min.) In this lesson, students will learn how to use MakeCode software to create a series of simple programs that can be uploaded to the Spark:bit. Students will learn how to program the Spark:bit to control connected output modules.	**1B-CS-02** Model how computer hardware and software work together as a system to accomplish tasks. **Concept:** Computing Systems | **Subconcept:** Hardware & Software	Engineering Design
Lesson 3: Pauses (60 Min.) In this lesson, students will learn how pauses can be used in a program. Students will assemble a mechanism and then create a series of programs in MakeCode that utilize pauses.	**1B-AP-10** Create programs that include sequences, events, loops, and conditionals. **Concept:** Algorithms & Programming | **Subconcept:** Control	Engineering Design
Lesson 4: Functions (60 Min.) In this lesson, students will assemble a ball maze that can be controlled using the Spark:bit. Students will learn how to create custom functions in MakeCode which will enable the maze operate autonomously.	**1B-AP-10** Create programs that include sequences, events, loops, and conditionals. **Concept:** Algorithms & Programming | **Subconcept:** Control	Engineering Design
Lesson 5: Free Build Challenge (60 - 120 Min.) In this lesson, students will apply the knowledge and skills they have acquired throughout the Robotics & Coding 101 unit to develop a custom design or invention.	**1B-AP-13** Use an iterative process to plan the development of a program by including others' perspectives and considering user preferences. **Concept:** Algorithms & Programming | **Subconcept:** Program Dev.	Engineering Design
Unit Assessment: Robotics & Coding 101 In this performance-based assessment, students will complete a series of tasks as they demonstrate their understanding of the core ideas and concepts that were covered throughout this unit.		

Target Vocabulary

The following key terms will be used throughout this unit. It may be helpful to explain these terms as they show up in lessons and challenges.

Spark:bit - A robotics controller that can be programmed to detect information from sensors that are connected to the input ports, process that information into relevant commands, then send the commands to modules connected to the output ports.

MakeCode - An online programming environment that can be used to create custom programs for the Spark:bit.

Pause - A delay in the execution of a program for a specified amount of time.

Function - A named section of a program that performs a specific task.

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