

Lesson 3

All About Lights

Overview

In this lesson, students will review the learned coding blocks associated with common input devices including the keyboard and the mouse. Students will then be introduced to the Events blocks. Students will also explore new input and output devices – light sensors and LED bulbs and display panels – to expand their understanding of the I/O System.

Objectives

By the end of class, students will be able to...

- Understand the concept of Events;
- Use appropriate blocks (Events blocks included) to design light effects.

Materials

- mBot
- mBlock
- Lesson 3 Activity Sheet
- Lesson 3 Slideshow

Content Standards

Type	Indicator	Standard
ISTE	1d	Students leverage technology to take an active role in choosing, achieving and demonstrating competency in their learning goals, informed by the learning sciences.
	3a, 3c	Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts and make meaningful learning experiences for themselves and others.
	4a	Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.
	5a, 5d	Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.
CSTA	1B-CS-01	Describe how internal and external parts of computing devices function to form a system.
	1B-CS-02	Model how computer hardware and software work together as a system to accomplish tasks.
	1B-AP-10	Create programs that include sequences, events, loops, and conditionals.
	1B-IC-18	Discuss computing technologies that have changed the world, and express how those technologies influence, and are influenced by, cultural practices.
	1B-IC-20	Seek diverse perspectives for the purpose of improving computational artifacts.



Vocabulary

Term	Definition
Output	Any data or display that is the result executed by a program.
LED*	Stands for Light Emitting Diode and is a type of light.
Sensor*	A device sensitive to light, temperature, sound, or other conditions that let mBot understand the world around it.
Light Sensor*	A Light sensor can detect the intensity of the ambient light in the environment.

* New term



Pre-lesson Checklist

- Print out and/or digitally distribute the Lesson 3 Activity Sheet.
 - If students will use paper versions of activity sheets, make sure the resources are easily available for students. This can be done by providing the links on your LMS, etc., or printing the resources out for each group to utilize during the class.
- Make sure any necessary computer equipment is ready to go.
- Familiarize yourself with key points and notes detailed within this lesson plan and its slideshow as well as the demo programs as follows:



Agenda (60 minutes)

Time Interval	Content
5 minutes	Warm Up This phase aims to review what has been learned in the previous lesson. Pay attention to the input devices associated with the chatbot project.
15 minutes	Phase 1 In this phase, students will summarize blocks associated with input information from the keyboard and the mouse. Students will be introduced to the concept of Events.
15 minutes	Phase 2 In this phase, students will create their first code for mBot. Students need to figure out there are two modes: Upload Mode and Live Mode.
15 minutes	Practice This phase will introduce a new electronic device. Students can either program the LED bulbs or explore other LED animation by using Show blocks.
5 minutes	Wrap Up
5 minutes	Clean Up

Activities

Warm Up: Slides 2-4 [5 minutes]

Objectives:

- This phase aims to review what has been learned in the previous lesson. Pay attention to the input devices associated with the chatbot project.

Procedures:

Slide 2

- Show Slide 2 to inform the class about the agenda and tasks in this lesson.

Slide 4

- Have students recall and reflect on their chatbot projects completed in the previous lesson.
 - Have students talk about the programming scripts they used to make the bot “say” or display something.
 - Invite students to share how they made the bot “smart” to understand and respond to human words.

Phase 1: Slides 5-11 [15 minutes]

Objectives:

- In this phase, students will summarize blocks associated with input information from the keyboard and the mouse. Students will be introduced to the concept of Events.

Procedures:

Slides 6-7

- Pose questions for discussion:
 - “How many blocks associated with the input device have you learned?”
 - “Which input device does the block relate to?”
- Instruct students to complete Task 3-1 to circle the correct input device for the coding block.

Slides 8-9

- Introduce the meaning of Events in association with the example of turning on the light.

Slide 10

- Ask students to discuss any other real-life examples they know that can explain the Events.
 - Ask students to first think of a situation;
 - Then, instruct students to identify the input device in the situation;
 - Ask students to consider what the input device does:
 - Act as a button?
 - Collect any information?
 - Adjust the degree of something?

Slide 11

- Point out the input device while using mBlock: the keyboard and the mouse.
- Indicate the relevant Events blocks and where they can be found.

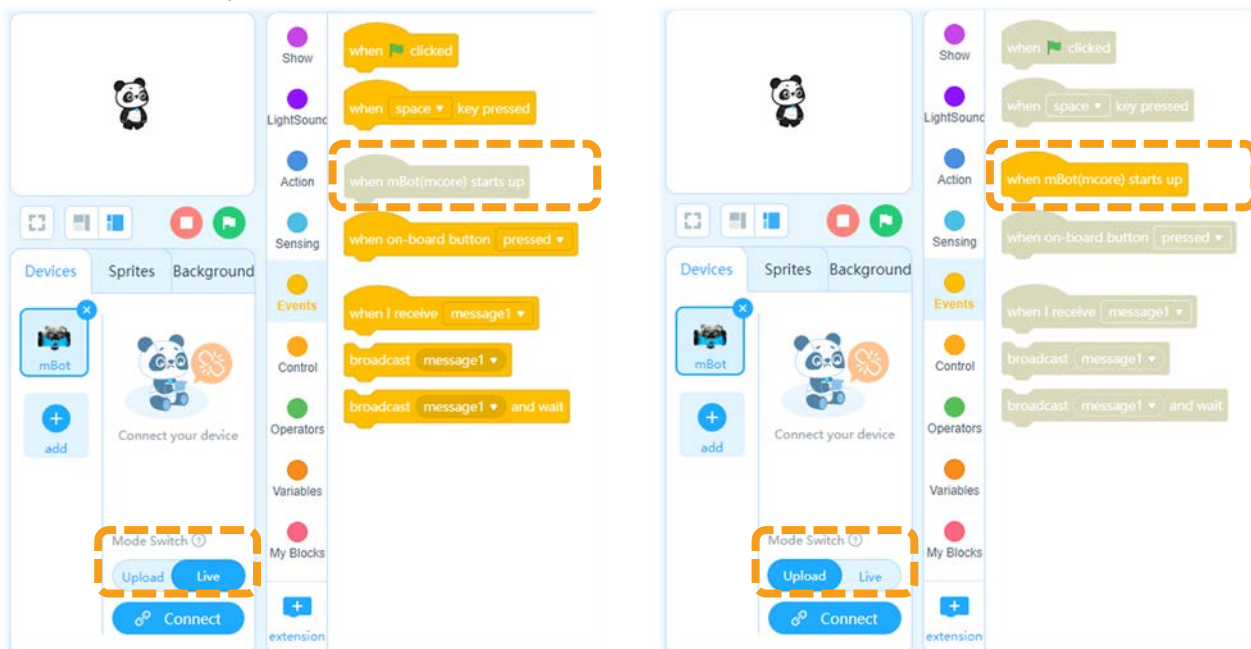
Phase 2: Slides 12-21 [15 minutes]

Objectives:

- In this phase, students will create their first code for mBot. Students need to figure out there are two modes: Upload Mode and Live Mode.

Procedures:**Slides 13-15**

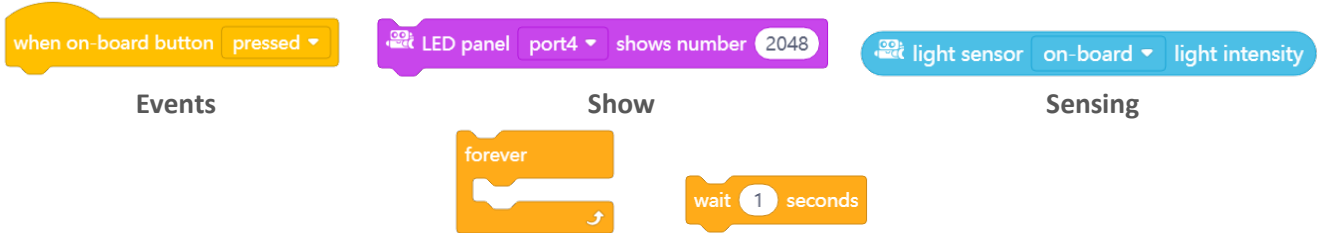
- Instruct students to open mBlock and then find the “Mode Switch” in the information box at the bottom of the Stage Area.
 - Ask students to click on different buttons associated with the mode, and parallelly, open the panel of the Events category in the Blocks Area. Have students observe the difference.
 - Briefly explain the use of the two different modes:
 - “In the Upload mode, you need to upload the compiled program to the device. After being successfully uploaded, the program can still run properly on the device no matter whether the device is connected to the computer or not.”*
 - “In the Live mode, you can view the program execution effect in real time, which facilitates the commissioning of the program.”*
 - “Also, you can implement the interaction between devices and sprites by using the broadcast and variable blocks.”*
 - For more information, please refer to the online tutorial available from: <https://www.mblock.cc/doc/en/hardware-basic/mode.html>.

**Slides 16-18**

- Instruct students to complete Task 3-2 in the activity sheet.
 - Two to four students share an mBot.
 - Have students assemble the LED panel onto mBot and connect it to the computer.
 - Remind students that they should pay attention to the number of the occupied mBot's port (Port 1 to 4).
 - Select the Upload mode in mBlock and click on the “Connect” button.
 - Model the demo program in mBlock, upload to mBot, and run the program.

Slides 19

- Present the four types of blocks needed in this exercise.



Events

Show

Sensing

Control

Slides 20

- Remind students that when using the Show block, remember to select the correct port in the block.
- Also, remind that they should choose the “LED panel show number” block.
- Let students execute the program with their partners.
- Encourage them to try different means to change the brightness condition around mBot.

Slides 21

- Have students report the means they used to affect the light sensor.
- Also, ask them to point out the input device and output device functioned in this experiment.

Practice: Slides 22-26 [15 minutes]

Objectives:

- This phase will introduce a new electronic device. Students can either program the LED bulbs or explore other LED animation by using Show blocks.

Procedures:

Slide 23

- Briefly introduce the LED bulbs in mBot as well as the associated LightSound blocks.
- Instruct students to choose one light effect to practice.
 - Choice 1: Program the light effect through the two LED bulbs.
 - For example, press different number key to trigger different colors of lights.
 - Choice 2: Continue to explore the light animation through the LED panel.
 - For example, doodle or write something and displayed it on the LED matrix.

Slide 25

- Show Slide 25 to summarize the key points of this lesson.

Wrap Up & Clean Up [10 minutes]