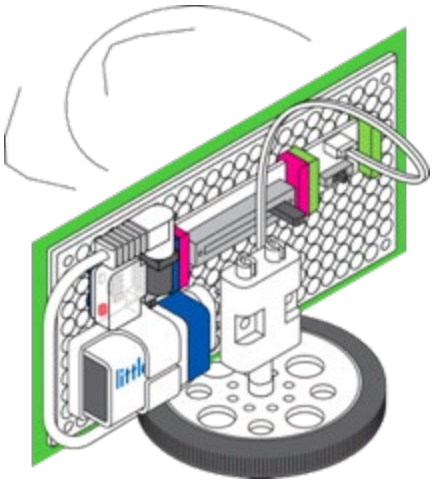
littleBits education

LESSON

# Environmental Sign



## Overview

In this lesson, students will:

- Brainstorm environmental conservation concerns to protect a nature park.
- Engineer a rotating sign that captures people's attention when triggered in the park.

**THE CHALLENGE**

Design an activation system that displays an environmentally conscious sign to park visitors.

## Lesson Tags

**GRADE LEVEL:**

Elementary (grade 3)

**SUBJECTS:**

Science, technology, engineering, art

**DIFFICULTY:**

Beginner

**DURATION:**

45 minutes

**PREREQUISITE KNOWLEDGE:**

- littleBits basics

## Supplies

### Bits:

- STEAM Student Set (power, slide dimmer, DC motor, battery and cable, battery clip, wheel and mounting board)

### Tools Used:

- Markers/drawing materials
- Tape/glue
- Scissors

### Other Materials:

- Construction/colored/cardstock paper
- Optional: Decorating materials (stickers, glitter, pipe cleaners etc.)

## Description

### LESSON OUTLINE:

**INTRO:** Introduce the lesson prompt and assess students' current knowledge.

**CREATE:** Groups of 2-3 students start to build their inventions.

**PLAY:** Students test their prototypes to make sure that it works.

**REMIX:** Students adjust and customize their design to improve functionality, or meet the assigned standard.

**SHARE:** Students add final touches and prepare to share (either in-class or via a photo/video).

### ASSESSMENT STRATEGIES:

**FORMATIVE ASSESSMENT:** Circulate the classroom as students work, assessing their use of the Bits, teamwork, and any other relevant skills you wish to focus on. Depending on students' level of experience, you might look for students putting Bits together backwards (e.g. trying to force them together and not aligning the right sides and getting a magnetic snap), students not adding a power source etc.

**SUMMATIVE ASSESSMENT** Students should complete the student handout. You may choose whether this is an individual or group submission.

## Standards

### NGSS

**3-LS4-4** Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

## Vocabulary

Environment
Prototype
Protect
Habitat
Trespass

## Resources

### ATTACHMENTS

Environmental Sign: Student Handout

### SUPPORTING LINKS

National Parks Foundation: Helping Kids Explore the Park

### TIPS & TRICKS

#1: Keep an eye on the clock, and where students are at. Some students will want to spend too much time in the Create stage, and some students will try to speed through it.

#2: We occasionally update our Bits and accessories, so some of the names and images included in the student handout may look different from those in your STEAM Student Set. Use your Invention Guide from within your Kit to support students with the parts that they have accessible to them. Use a rubber band or glue dots if you don't have a battery clip in your Kit. The invention will function the same!

### PACING (45 mins)

Prep + Setup
Intro (10 mins)
Create (20 mins)
Play (5 mins)
Remix (5 mins)
Close (5 mins)

# Instructional Steps

## Step 1: SETUP

**DURATION:** 10 minutes (prior to class)

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This lesson can be done individually or in small groups (2-3 students). Each group will need one STEAM Student Set and a lesson handout. Set up a central location in the classroom for assorted materials and tools.

Each group will need a power Bit, slide dimmer, DC motor, battery and cable, wheel, battery clip and mounting board. If you don't have a battery clip in your kit, use tape or elastic bands to secure it to the board. Younger students can start out with just these materials, so they aren't overwhelmed and don't try to add unnecessary Bits. Older/more confident students can have access to any Bits in their Kits/packs.

Consider "Designating Jobs" within student groups. Some possible roles to consider are Materials Technician, Artist/Scribe, Builder, and Presenter.

**NOTES**

- You should use a classroom timer or digital timer to help keep students on track.

## Step 2: INTRODUCE

**DURATION:** 10 minutes

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### Discussion

Elicit student responses to gauge understanding and warm-up for the activity.

1. **Writing Box #1** (in their student handout): Make a list of behaviors people should do in nature parks to be respectful to nature. Add to the list what behaviors people should do in nature parks to stay safe. For example, you could suggest to students that we should always throw away our trash, or that we should be quiet so we don't disturb the wildlife.
2. Have each group share out their list. At the end, ask students if they have any additional ideas after hearing all of them. Call attention to any instances where people should be "cautioned" to do something: not to step on plants, not to throw trash on the ground, not to be too loud at night, etc.
3. Discussion: Ask students, "How could we notify people about these good ideas?" Suggest that we engineer an attention-grabbing sign to remind people of the best way to interact with the nature park.

4. Questions to engage student thinking might include: What should our signs say? How can we explain what people should do in just a few words? Should we include pictures? Or movement?

### Introduce the Challenge

Explain that they'll use littleBits and the littleBits Invention Cycle to build their environmental signs to protect the nature park using the following steps:

**CREATE:** Build your invention following the directions given.

**PLAY:** Test your circuit and invention to see how well it works.

**REMIX:** Make changes to your inventions based on how testing went, or address a new prompt.

**SHARE:** Share your inventions with the class.

Divide the class into groups of 2-3 and have them set up their workstations.

## Step 3: CREATE

**DURATION:** 20 minutes

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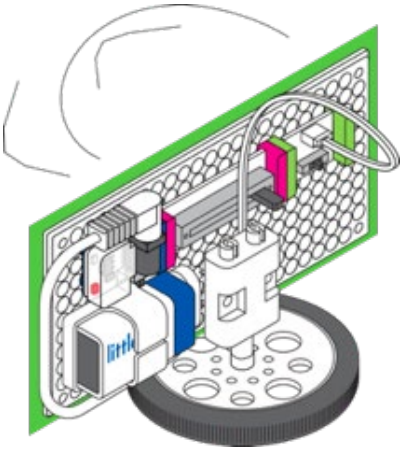
Students will follow the instructions in the student handout to build their sign prototype.

**NOTES**

- If this is your first lesson with littleBIts or your students need a little extra help getting started, have students reference the Bit Index in their STEAM Student Set Invention Guide or the littleBits website to learn how specific Bits work.
- The Create phase may take more or less than the allotted time, depending on the group and students' familiarity with littleBits. You may want to give students guidance on what they should do after assembling their circuit (e.g. move on to the Play phase), so they can self-pace.



## Step 4: PLAY

**DURATION:** 5 minutes

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### Test your invention!

Students' signs should rotate when the power Bit is on and the slide dimmer is moved some degree to the

right. If students are stuck, make sure that the DC motor was set to variable mode and that the circuit is properly snapped together.

## Step 5: REMIX

**DURATION:** 5 minutes

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**Writing Box #2:** Take it further! Ask students:

a. "How could we engineer our sign to spin more slowly, making it easier to read?" Students should point out that they can use the slide dimmer Bit to control the speed of the DC motor. Moving the slide dimmer to the left will slow down the sign.
b. "What about making the sign stand out even more?" Students may suggest adding lights or a buzzer to their circuit or incorporating different craft materials.
c. "How about if we wanted to make it only turn on during the day?" Students would use the light sensor in their circuit, after the power Bit and before the DC motor.

## Step 6: SHARE

**DURATION:** 5 minutes

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**Writing Box #3:** Ask students to write a few sentences explaining where their sign would be located in a park, and what their sign communicates.

If time allows, have each group present their creation and its purpose.

## Step 7: CLOSE

**DURATION:** 5 mins

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Students should take apart their inventions and put away the Bits according to the diagram on the back of the Invention Guide. Students should clean up their workspace and return any usable materials/tools.

**NOTES**

- Remember that Bits aren't made out of titanium, so a calm and productive clean-up closing section is important to keep Bits safe.

- ***Tip:*** *Before this lesson, practice having students clean up Bits in a low-stress interactive model. Have students highlight best practices they see as they clean up.*

## Step 8: EXTENSIONS

Consider the following discussion and invention extension questions:

- Should any of these signs be implemented around our school? Which ones and why?
- How could we weatherproof a sign?
- Could we design a littleBits system where two signs are signaled at once?