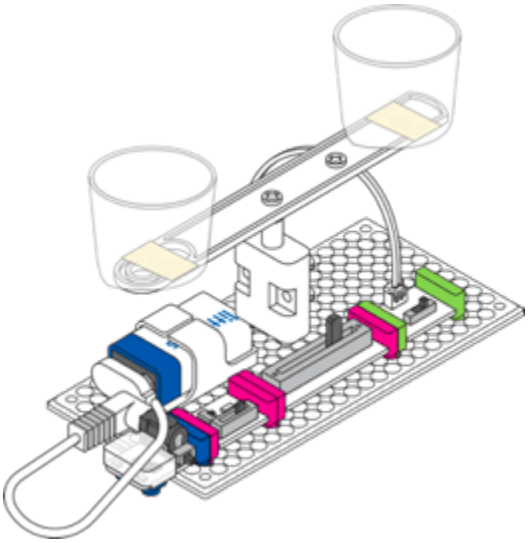
littleBits education

LESSON

Snack Robot



Overview

In this lesson, students will:

- Engineer and test a robot prototype.

THE CHALLENGE

Build a robot that serves your snacks while you study!

Lesson Tags

littleBits education

SNACK ROBOT

GRADE LEVEL:

Elementary (grade 5)

SUBJECTS:

Science, technology, engineering

DIFFICULTY:

Beginner

DURATION:

45 minutes

PREREQUISITE KNOWLEDGE:

- littleBits basics

Supplies

Bits:

- STEAM Student Set (power, slide dimmer, light sensor, DC motor, battery and cable, battery clip, mechanical arm and mounting board)
- Small treats to share with the class
- Optional: Decorations (like markers, stickers)

Other Materials:

- 2 small paper cups

Tools Used:

- Pen/pencil
- Scissors
- Tape

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: Reflect on the before and after robot sketches and consider new features.

SHARE: (Optional: Share out student inventions and remix ideas.)

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

3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

Vocabulary

Prototype
Environment
Preference

Resources

ATTACHMENTS

Snack Robot Student Handout

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 (5 mins)

Create (20 mins)

Play (5 mins)

Remix (10 mins)

Share (optional)

Close (5 mins)

Instructional Steps

Step 1: SETUP

DURATION: 10 minutes (prior to class)

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, light sensor, DC motor, battery and cable, battery clip, mechanical arms and mounting board. If you don't have a battery clip in your kit, use tape, glue dots or elastic bands to secure the battery 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.

For the demo in the introduction, fill a pitcher or large bowl with water and place it next to a dry sponge at the front of the class.

NOTES

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

Step 2: INTRODUCE

DURATION: 5 minutes

Discussion

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

1. **Writing Box #1:** Ask groups to generate a list of things or environments that make doing homework easier.
2. Capture student responses on the board as "Homework Preferences."

   a. Responses might include having a wide space to do work; listening to music; not having any distractions; writing a list of tasks; being in a comfortable space; being away from other people.
3. If any group suggests having a snack, use that to transition into the challenge. If not, ask the class if anyone likes to have a snack while they do homework! Gather student responses informally, highlighting the balance between healthy snacks and "treat" snacks.

Introduce the Challenge

Explain that they'll use littleBits and the littleBits Invention Cycle to create a robot who can serve us rotating healthy and sweet snacks while we work! The activity will be broken up into the following steps:

CREATE: Build your model following the directions given.

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

REMIX: (Optional: Make any modifications to fix or improve the model.)

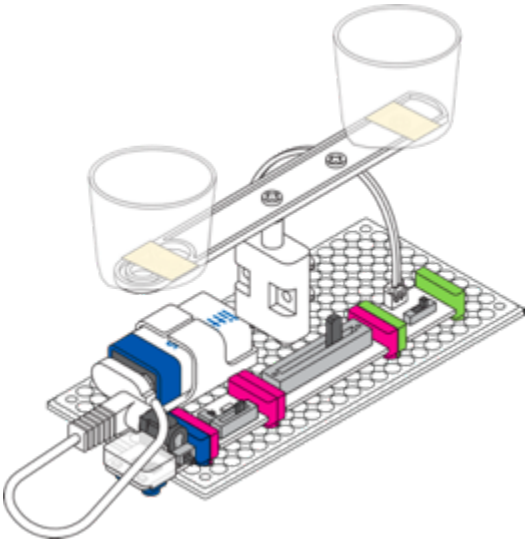
SHARE: Use the model to connect your heart beats to what is happening inside your bodies.

Divide the class into groups of 2-3 and have them set up their workstations. Before handing out the instructions: **Writing Box #2:** Ask students to look at the Bits they've been given for the challenge. Before we start building, draw a design of what you imagine our robot can do! We'll compare your group's drawing to what we actually create at the end of class.

Step 3: CREATE

DURATION: 20 minutes

Students will follow the instructions and diagrams in the student handout to build their snack robot.



NOTES

- If students need a little extra help getting started, 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 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 to test their circuit), so they can self-pace.

Step 4: PLAY

DURATION: 5 minutes

Test your invention!

Power on your robot! Experiment with how far away you need to be from the light sensor Bit to activate your robot. How does changing the position of the slider dimmer impact your robot?

As groups conclude their builds, challenge students to consider what change they could make to have the robot automatically turn on when the lights are turned on. After a few minutes of discussion and experimentation, turn off the classroom lights, allow a minute for adjustment and then turn the lights on again. Take note of which groups noticed a change. Were those robots in a darker place in the classroom?

Note: Students will need to change the light sensor Bit to “light” mode. No additional changes are required, but creativity is always encouraged!

Discussion: Why do you think our robot is enhanced by the light sensor? How could this feature help us to do our homework?

Students may respond that, as they turn on the lights in their room,the robot will activate, reminding them to do their homework! Alternatively, in dark mode, students will have to provide input (moving their hand over the light sensor) to the robot to ask for a specific snack-- which can be a fun reward for completing their work.

Step 5: REMIX

DURATION: 10 mins

Writing Box #3: Considering your sketch before we built our robot, what do you notice was different? Jot down your thoughts in a list.

Writing Box #4: Ask students to reconsider the list of “Homework Success Preferences” at the beginning of class. Pick one preference and jot down some ways that they could remix their robot to perform a new task or solve a problem.

Step 6: SHARE

DURATION: Optional

If time, ask students to share which preference they chose and their remix plans.

Step 7: CLOSE

DURATION: 5 mins

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

Step 8: EXTENSIONS

Consider the following invention or discussion prompts:

- How could we change the diameter of the robot to provide a longer reach?
- Ask students to take their ideas from Writing Box #4 and bring them to life using littleBits and other materials.