Lesson 13: Mini-Project - Interactive Pet

90 minutes

Overview

In this lesson, students create an interactive "pet" using the sensors on the micro:bit, the LED Display to represent expressions, and physical materials. Students explore how the micro:bit can augment physical materials to create an interactive experience. This project does not use the App Lab screen except to help with debugging - otherwise, users only interact with the interactive pet itself.

Standards

Full Course Alignment

CSTA K-12 Computer Science Standards (2017)

- ▶ **AP** - Algorithms & Programming
- ▶ **CS** - Computing Systems

Agenda

Warm Up (10 minutes)

Activity (75 minutes)
(Optional) Gallery Walk

Wrap Up (5 minutes)
Reflection

Objectives

Students will be able to:

- Create a project that combines output from the micro:bit with physical materials
- Create a project that seamlessly integrates the micro:bit with physical materials

Preparation

- Review the Project Guide and Rubric to understand the scope of the project.
- (Optional) You may decide to show one of these projects to students to help spark ideas.
- Gather prototyping materials, such as:
  - Structural material (cardboard, construction paper, etc)
  - Connective material (tape, glue, hot glue, etc)
  - Construction tools (scissors, staplers, etc)
  - Other materials (cups, binder clips, paper plates, etc)
- Check the **"Teacher's Lounge"** forum for verified teachers to find additional strategies or resources shared by fellow teachers

Links

Heads Up! Please make a copy of any documents you plan to share with students.

For the teachers

- **Mini-Project: Interactive Pet** - Slides
  ▾ Make a Copy

For the students

- **Problem Solving Process with Programming** - Resource ▾ Make a Copy
- **Project Guide - Interactive Pet** - Activity Guide ▾ Make a Copy
- **Student Rubric - Interactive Pet** - Rubric ▾ Make a Copy

Teaching Guide

Warm Up (10 minutes)

Remarks

> We've used our micro:bit's to create different expressions, like a smiley face or frowny face. We're going to watch a video of a little "character" created with a micro:bit - try to identify any new expressions or emotions you notice in this character.

Video: Show the video **Microbit Character Demo** by maker Tiffany Tseng. You may need to watch the video 2 times.

Teaching Tip ▲

Dive Deeper: If you would like to explore this interactive character and the process the artist went through, **click here to explore the maker's website**. It includes a deep-dive into the problem of expressing emotion with only a 5x5 grid, but also offers some templates and "cheat sheets". You may decide to explore this with your students as a full class after the discussion prompt below.

Prompt:

1. What expressions or emotions did it seem like this character was communicating?
2. Were there times it felt like the character was interacting with the user or its environment?

Discussion Goal: Encourage students to explore possible emotions that this character might be displaying, like boredom or excitement. Also encourage students to notice how it may be interacting with the environment (like if it's blinking) or with the user (like "looking at the user" when they press a button). There's no right answer here - instead, encourage students to think beyond the simple emoticons they've seen in lessons so far and start considering what it could mean to express a range of emotions or expressions.

Remarks

> Today, we're going to make our own interactive character or "pet". We will use physical materials to build an interactive pet of your choosing, and use the sensors on the micro:bit to detect input from the user and react. Your device won't use a screen at all except to help debug - the user will only interact with your physical device.

Teaching Tip ▲

Other Examples: The idea of "interactive designs" extends beyond just interactive pets - makers and designers use interactive designs for a variety of purposes such as live shows, museum exhibits, or specialized artistic displays. You may decide to show some other examples to students, such as:

- **Otherworld**, an immersive art installation
- **Meow Wolf**, an interactive artist community
- **iLuminate**, a dance troupe that uses electronics in time with their dances

Activity (75 minutes)

Teaching Tip

Facilitating Mini-Projects: Mini-Projects act as checkpoints in the curricula and cover the subset of skills students have seen so far in the unit. They are designed for 1-2 days of implementation as a way to check-in with how well students understand the course content so far. You may decide to extend these projects as a way to support or challenge students, which could allow you to revisit difficult concepts or support students who may have missed lessons and are trying to catch up. However, we recommend deciding this ahead of time and being firm with students about how much time they have for each project - otherwise, it's easy for projects to drag-out to multiple days and for student's work to spiral beyond the scope of this project.

Distribute: (Optional) pass out copies of the project guide. Students will use this to plan their project, and includes items that can be used for assessment at the end of the project.

Teaching Tip

Facilitating Group Projects: If students are working in pairs or small teams to complete projects, consider showing these two videos to the class:

- **How Teamwork Works**
- **Dealing with Disagreements**

Depending on your goals with this project, consider having teams complete a **Student Guide to Team Planning**, which reinforces the message in the video

Slides: Present an overview of the project and the steps students will take to complete it.

Transition: Send students to Code Studio.

Teaching Tip

Scoping Student Projects: Students may ideate projects that are beyond the skills they currently have or that would take longer than the allotted time to implement. Rather than asking students to choose a different project, consider asking students to imagine a more scaled-down version of their initial idea. As an analogy, if students initial idea is the "Run" step, imagine a less intense version that represents what the "Walk" step would look like. If necessary, you can keep going back further to a "Crawl" step as well.

Digging Deeper: This is sometimes referred to as the Minimal Viable Product - you can learn more about this process and adapt it into your project strategies by reading this article: **Making Sense of MVP** by Henrik Kniberg

1-3 Interactive Pet

1 2 3

Troubleshooting Devices: If student devices aren't able to connect, they can click the Help and Tips tab and then access the Maker Setup page (click the image to see more). This will let them re-reconnect their board to App Lab.

If students continue to have issues, refer to the Troubleshooting section of our **Maker Support Article**

Teaching Tip

Debugging Strategies: As students design and implement their own project ideas, they may find themselves with new bugs that they need to untangle and you may find yourself looking at completely unfamiliar code as students look for help troubleshooting their errors. To help smooth out the debugging experience, consider the following strategies:

- Review the **Teacher Guide to Debugging** for some common questions and strategies to help support students in debugging their code
- Have students follow the steps in the **Student Guide to Debugging** and use the **Bug Report Quarter-Sheets** as an initial step in the debugging process. This helps students prepare and communicate their issue before asking for help.
- If students haven't seen it yet, consider showing the **Debugging Video** to the class to reinforce debugging best practices.

Digging Deeper: Consider supplying students with an object to talk to as part of the debugging process. This is sometimes known as Rubber Duck Debugging - you can learn more on the website **https://rubberduckdebugging.com/**

(Optional) Gallery Walk

Allow students to walk around the room and interact with each other's devices. Celebrate all of the different ideas that students were able to implement with the same basic code.

Wrap Up (5 minutes)

Reflection

Prompt: *What was your favorite part of the app you created? What is something you wish you had time to improve?*

You may decide to have students share these with a partner, or you may decide to have students keep their responses private. Either way, the goal of the prompt is to have students reflect on the apps they've created and celebrate what went well and acknowledge what could be improved for next time.