

TECH TALES

MAKE. LEARN. SHARE.

DAY 2: STORYTELLING WITH ELECTRONICS Technology

In this session, families are using what they have been learning since Session 1 to sink in and start doing detailed work on their design project—from doing brainstorming and planning on paper to then implementing it with physical materials and electronic tools. Along the way, families continue to learn about important ideas related to electronics (input sensors) and coding (how algorithms work).

badges



materials

Light meal, disposable cutlery,
drinks with lids

Computers with Birdbrain Robot
Server and Scratch 2.0 installed

Hummingbird boards, USB cords,
and single-color LEDs

Slides and/or projected screen

Troubleshooting Guide

Laminated family discussion
questions

Backpack play page in workbook

Backpack play cameras

1. WELCOME & SHARING

Backpack play & badges
Overview the arc of the program.
Introduce the theme of the day.

2. STORYTELLING

Share a book or traditional story.
Demonstrate how to fill out the
storyboarding worksheet.

3. EXPLORING

Develop Your Story Together
Introduction to Hummingbird &
Scratch
Hummingbird Sensors
Family Discussion

4. ACKNOWLEDGING

Reflection on the day
Award badges from the day
Prepare for next week

workshop day 2

EATING & SET-UP

20 minutes

Welcome families as they arrive.

Today's theme is Technology.

ASK

"What do you think of when you hear the word technology?"

Possible answers include computers, phones, wheels, etc.

EXPLAIN

We hope to expand our ideas about technology and what it means to us today.

Review badges available for today: Storyteller and Computer Scientist

badges



materials

Light meal, disposable cutlery, drinks with lids

critical questions

background info

Today will be the first day using electronics at the family tables. To reduce spills, designate an area for liquids, and/or ensure that

all drinks have lids. Be prepared to clean up any spills right away.

set up

Set up food and paper goods on a table. Arrange any books or supplemental items on a table.

Post a schedule of the day prominently in the room, on a white board, paper, or projected on the wall.

HOME PLAY REVIEW

5 minutes

Pair families up.

Families share the pictures they took during the week and describe their hobbies and areas of expertise.

Award the researcher badge to everyone who participated in the backpack play.

STORY PAIR SHARE

5 minutes

While still in pairs, families will share their ideas for their stories. Ask families to share the following two things:

1. **Share the idea for your story.** What prompt are you using? What is your idea for your story? Why is this story important to you?
2. **Share one thing that you think you want to happen in your story.** Have families share one thing that they think will happen in their dioramas once they are built. Some examples can be: the sun rising, lights twinkle on and off, a cloud moves across the scene.

background info

Individuals practice diverse skills (“craft” and “science”) that may initially seem unrelated. It is useful for people to see that a range of knowledge and practices are needed to engage in project work of this kind.

During this time, facilitators can be listening for overlap between participants’ areas of expertise and robotics/design/art.

photo: paired families

critical questions

SHARE A STORY

15 minutes

Families gather together. Facilitator shares a book or traditional story. Refer to the storytelling worksheet and discuss how you would fill it out from the story that was shared.

Call out specific parts of the story and fill out a worksheet together.
Who are the characters?
What are they doing?
Where are they (setting)?

materials

Book, visiting storyteller. Suggested book: *Stuck*, Oliver Jeffers

Storytelling worksheet



sheet 2

TECH TALES STORYBOARDING

Pick the story you want to tell with your project

STEP 1: Pick your prompt!

There are three prompts to choose from to get you started:

1. Tell a story about an important experience in your family's past.
2. Tell a story about how your family and/or the world might change in 10 years.
3. Tell a story about a place that is important to your family.

STEP 2: Write a brief (2-3 sentence) summary of your story:

STEP 3: From your story, pick ONE SCENE that you want to make into your project.

Some things to decide on: What is your setting? Where/when does your story take place?

Who are your characters? What background elements do you want in your project?

Characters:

Background elements:

9

STEP 4: Sketch the scene from your story. Think about what parts you can have move.



10

DAILY THEME

5 minutes

SHORT DISCUSSION ON THE THEME OF THE DAY

Have a quick discussion: What is Technology? What do you think of when you hear that word?

Discuss other technologies: Wheel, canoe, navigation, weaving, medicine, art techniques... All technology is brand new at some point, even the wheel. Engineers use technologies to solve problems in life. Artists use technologies to express ideas. Scientists use technologies to find out more about the world. Sometimes the same technology can be used in many different ways.

photos of other technology: canoes, pencils, airplanes, medicine...

background info

What is Technology?

Definition:

1. The application of scientific knowledge to develop: machinery and equipment
a process or method that serves a practical end
2. The branch of knowledge dealing with engineering, applied sciences, and the industrial arts

DEVELOP YOUR STORY TOGETHER

30 minutes

Each family may choose a story based on these prompts:

1. Tell a story about an important experience in your family's past
2. Tell a story about how your family and/or the world might change in 10 years
3. Tell a story about a place that is important to your family

Families briefly describe their story using the handout that you went over together.

They identify the setting, characters, and major actions and develop a drawing of these elements.

Encourage sketching and writing in their preferred language. This doesn't have to be the final version of your story or a realistic diagram, so don't worry about making it perfect. Just get ideas on paper.

Thoughts for story development:

A story can be interesting or meaningful when interactions happen, when something changes. Characters can interact to cause a feeling, or a reaction. How does that happen in your story?

materials

Storyboarding worksheet per family

Large paper, pencils, markers

critical questions

background info

The storytelling prompts will allow families to tell personally relevant stories prompting discussions and draft writing which demonstrates an understanding of diverse cultural perspectives. The

goal is to have each family jointly decide the story they want to focus their project on. The session ends with a sharing of ideas with constructive feedback from everyone.

INTRODUCTION TO SCRATCH WITH HUMMINGBIRD

40 minutes

Each family will have their own computer out, and the facilitator will demonstrate on a projected screen.

EXPLAIN

“We’re going to learn how to tell these robotic parts what we want them to do.”

INTRODUCE

Introduce each electronic component:

- Hummingbird board (brain),
- LED (output),
- distance sensor (input),
- USB cable (communication),
- computer (instructions).

What is the Hummingbird?

Hummingbird is the name of the device you’ll be using to control your diorama. It’s basically a little computer that controls robotics parts like motors, lights, and sensors. It has a little brain that understands what you tell it to do and talks to those parts. *(point out microcontroller chip on the Arduino board)*

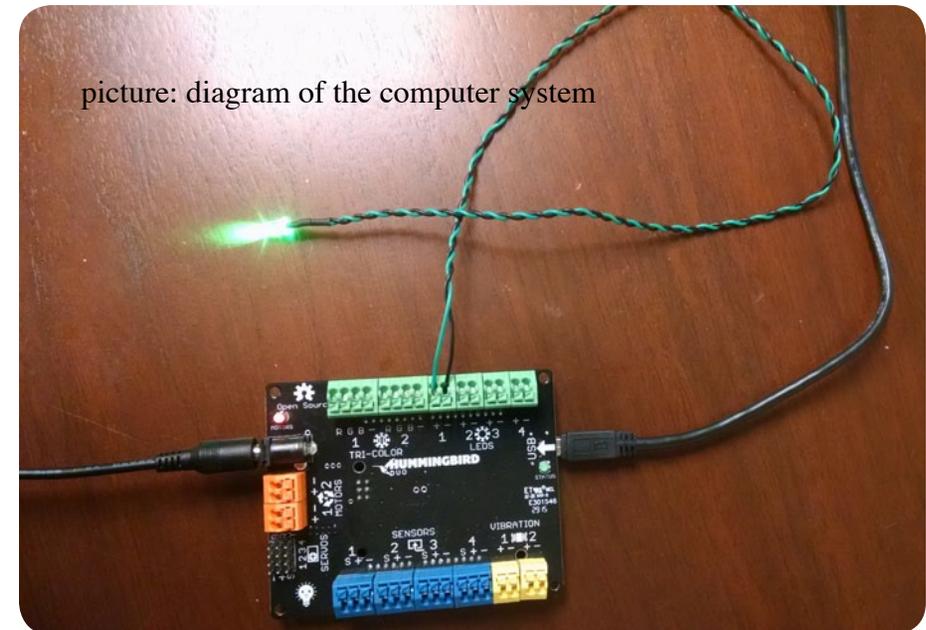
materials

Computers with Birdbrain Robot Server and Scratch 2.0 installed

Slides and/or projected screen

Hummingbird boards, USB cords, and single-color LEDs

Troubleshooting Guide



picture: diagram of the computer system

We call the motors, lights, or sensors robotic “components.” There are lots of different kinds, so the general term “component” is used to refer to all of them.

How do you talk to it?

In order to communicate with the components, we type out instructions that the Hummingbird understands on our personal computers and send those to the Hummingbird. Let's look at how those instructions are written.

INTRODUCE SCRATCH

Practice:

- Turning on computer
- Launching Birdbrain Robot Server and Scratch
- Connecting a **component** (reference polarity) to the **micro-controller**
- Sending a **command** to the component
- Telling it **WHEN** to react (on space bar, flag click): **Condition**
 - What are other conditions in life? E.g., **if/when** you finish dinner, you can have dessert
- Saving files

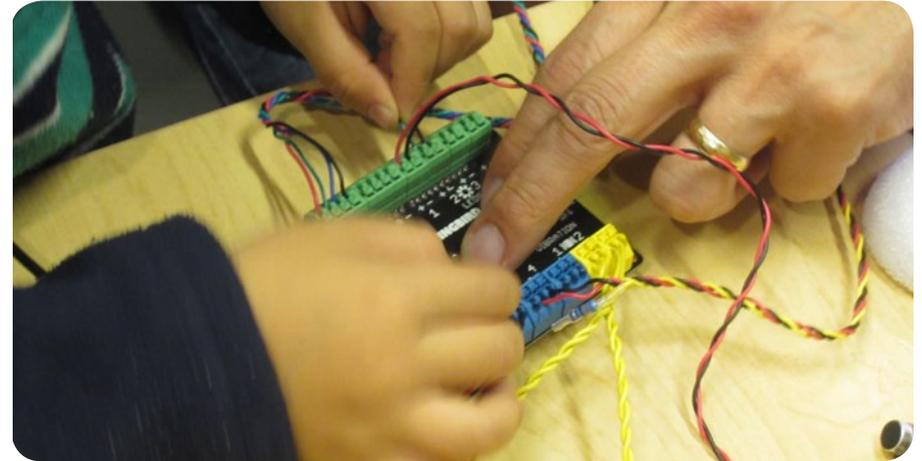
STEP BY STEP

Follow through the step by step instructions using slides and/or your own programs projected to all.

You will all walk through programming a single LED to blink on and off forever.

materials

LED Blink slides or Scratch program, projector



background info

The Hummingbird is called a microcontroller because it controls components like lights, motors, and sensors. It's small, too, which is why it's a microcontroller. It has a little computer "brain" for sending and receiving instructions, and ports to plug lights, motors, and sensors into it.

slowly, particularly at first, and make sure everyone is caught up. Using a trackpad or a mouse may not be familiar to all. Encourage patience and helping each other as they all become familiar with the equipment. Avoid letting some get too far ahead of the group.

There may be a wide range of familiarity around using a computer. Be sure to go

FAMILY DISCUSSION

10 minutes

Hand families a set of 5 question handouts and have each family member ask at least one of them. They will discuss these answers within their own families.

- **Question 1:** What kinds of things do people in our family make or build in our jobs or family life?
Examples: clothes, art, bikes, jewelry, or others! Think about extended family too!
Do we think that the things our family makes is connected to robotics and computer science?
- *Engineers and computer scientists work in teams. Please think about how your family works as a team by talking about the rest of the questions.*
- **Question 2:** How do we work together as a family?
- **Question 3:** How do we help each other learn?
- **Question 4:** How do we make decisions as a family?
- **Question 5:** How do we make sure we listen to everyone's ideas?

materials

Laminated family discussion questions



REFLECTION

5 minutes

DISCUSSION

All the things we played with use **energy** (electricity, in this case). A set of instructions is an **algorithm** (toothbrush robot, adult robot).

The computer program you wrote is an algorithm.

What **technologies** did we explore today? (possible answers include sensors, LEDs, computers, pulleys, writing, pencils, etc)

What are some **technologies** that are important to you and your communities?

BADGES

5 minutes

For the badges awarded today (computer scientist and storyteller), explain technology doesn't just do things for us but it can also be a way in which we express ourselves. Storytelling and coding are very similar, just different languages. Like computer scientists and storytellers, today you've begun to use robotics and programming to tell your family story.

Each member of the family writes down their name and what they are most proud of that they accomplished during the workshop. When they turn in the sheet the family gets a family badge.

materials



critical questions



background info

Individuals and families will be able to track their progress and areas of specialization with badges. Badges are awarded for individual work and collaborative family work. The primary learning goal of the badge systems is to make visible to participants potential

learning opportunities. In addition, badges allow participants to see each others' developing areas of expertise and may foster collaboration across skill sets.

AT-HOME PLAY

15 minutes

AT-HOME ACTIVITY

- Self-documenting programmed objects (you be a researcher)
- Explore art, science and engineering materials (books)

materials

Books, website, cameras
Backpack play page in workbook

badges



text

background info

Families will work together to do the self-documentation of programmed objects they encounter in their daily lives