

# backpack family guide

ROBOTIC BACKPACK ACTIVITY

## i-i-esh, a Yakama story



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Your Family's Name

# TECH TALES

MAKE. LEARN. SHARE.

<https://techtales.online/>



**What's that  
weird square?**

**This a QR code,  
like a barcode that  
will take you to a  
website when you  
scan it.**

**To scan QR codes with a  
smart phone,  
try Google Lens,  
or  
with an iPhone or  
iPod touch, open your  
camera app and focus  
on the QR square**

**On a computer,  
QR Code for Windows 10**

*Dear community,*

Thank you for checking out our backpack!  
We hope you have fun indulging in all the activities we have planned out for you. We hope that you learn more about your family and yourself through these activities.

We chose this story from the Yakama Nation. This story is important to us because of its lessons and its teachings about perseverance, not judging a person by how they act, and the value of passing on knowledge to others. We encourage you to explore these lessons in this story too.

We are **Native Girls Code**, a group of intertribal young Native American women (6th to 12th grade) who work on projects that explore technology and the stories of our people. You can learn more about our program on the next page.

## Go code a new world!

Paradise Gladstone (Blackfeet/ Kainai, 11th grade)

Ellie Tail (Cherokee, 10th grade)

Arianna Chang (Chinook, 6th Grade)

Elise Andrew (Kiowa, 8th Grade)

Xochitl Nevarez (Arapaho, 6th grade)



## Native Girls Code:

A Club for Native Girls ages 12-18 in the Seattle area

This year-round club for young Native women meets bi-monthly throughout the school year and during school breaks. NGC provides positive role modeling through strong teachers, mentors and program partners. We foster development of a strong identity and resiliency with grounding in traditional knowledge. Cultural wisdom is passed to the next generation through cultural arts, plant and medicine knowledge, healthy foods, and experiential learning within ecological restoration projects. Our STEAM (science, technology, engineering, arts and math) curriculum emphasizes computer coding skills and expands opportunities for healthy futures.

<http://www.naahillahee.org/ngc.html>





## About the Yakama Nation

Upon central Washington's plateau and along the Columbia River reside tribal people called the Yakama's. The Cascade mountains shelter this central portion from marine showers. The rolling foothills and Yakima River are the eastern border.

The Nation of Yakama is a confederation of many tribes and bands including the Yakama Palouis, Pisuouse, Wenatchsahpam, Klikatat, Klingquit, Kow-was-say-ee, Li-was, Skin-pha, Wish-ham, Shyiks, Ocehchotes, Kamilt-pha, and Se-ap-Cat.

The Yakama Nation shares more information on their website:  
<http://www.yakamanation-nsn.gov/history.php>



## About the story

This story is available online through the Since Time Immemorial (STI) Curriculum in Washington State  
<http://www.indian-ed.org/resources/roger-fernandes-storytelling/>

All 29 tribes in Washington approved the Indian Ed resources curriculum within the STI curriculum



# In this booklet

**1**

**Listen to the story together.**

**2**

**You may choose to do any or all of the activities in this booklet. These activities may take about an hour.**

**Activity 1: Illuminate designs in nature**

**Activity 2: Animate the story with robotics**

**Activity 3: Share your knowledge**

**3**

**Help Section: Using the Hummingbird Kit**

# Listen to the story

Gather your family together  
Play the audio file on your computer desktop named  
**i-i-esh-girl-fernandes.mp3**



or listen online at  
[techtales.online/i-i-esh-girl/](https://techtales.online/i-i-esh-girl/)



# activity 1

## Illuminate Designs in Nature

### What designs show themselves to you?

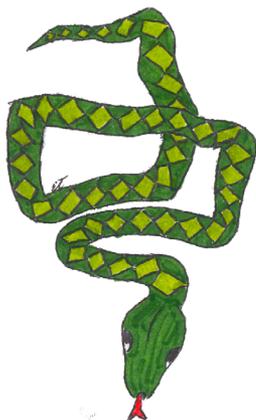
Go out on a walk outside with your family for about 10 minutes. This can be around the block, in the forest, or just outside your door.

### You'll need:

Camera  
Pens or pencils  
This booklet



### Take photos:



What patterns do you see in plants, water, sky, animals? Designs may be made by shapes of leaves, created by humans, or used for camouflage.

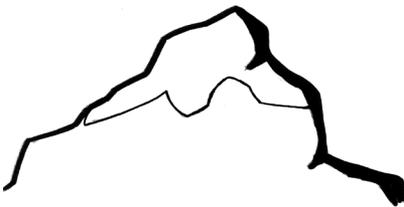
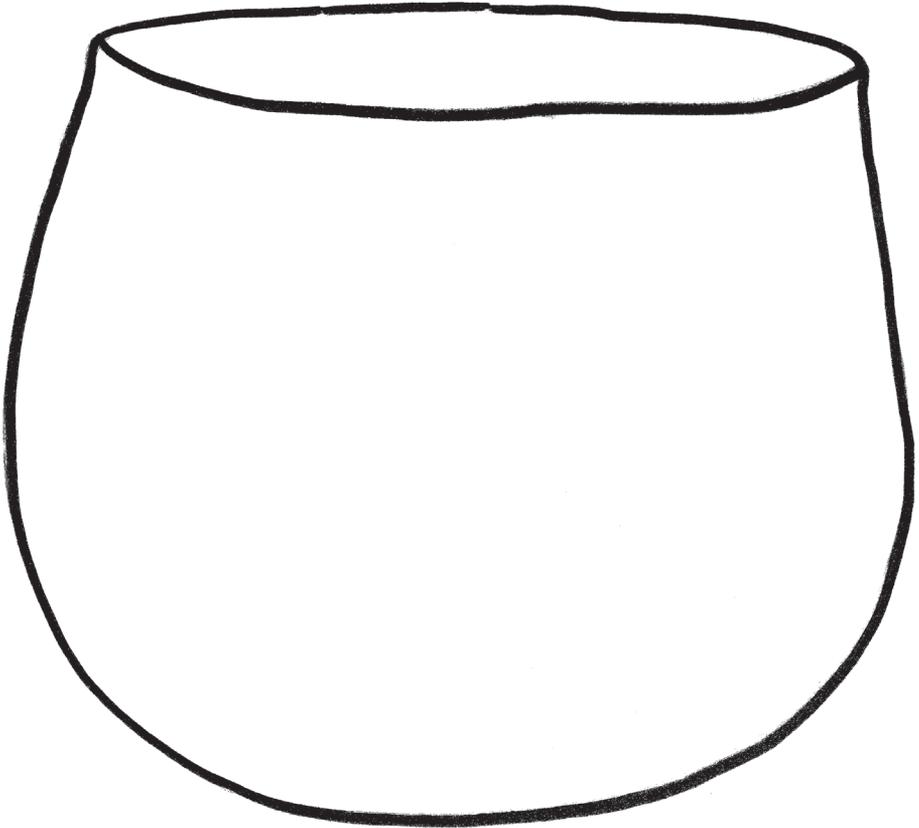
Look up high, look low, try different angles and perspectives, look at shadows and reflections.

The designs may be hard to see at first, but if you simplify them to their basic shapes, you may find a great pattern for a basket.



**Sketch your designs here:**

Draw the pattern you found on a basket:



## Use robotics to light it up:

Use LEDs to show this pattern.

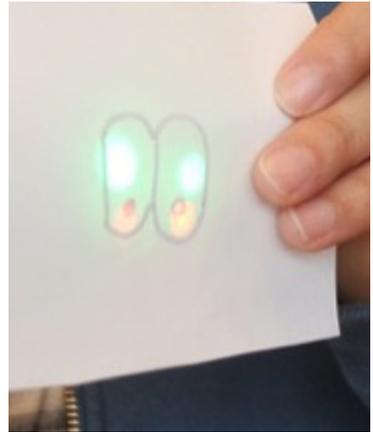
The little girl in the story did not see the designs right away until the mountain and the snake pointed them out to her.

How might you program LEDs to illuminate your design?

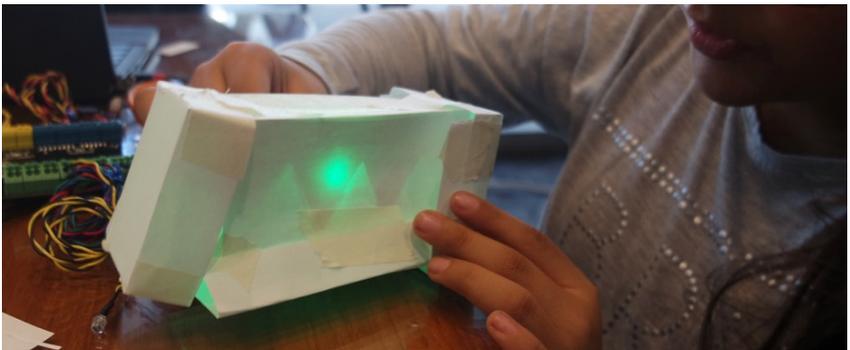


### You'll need:

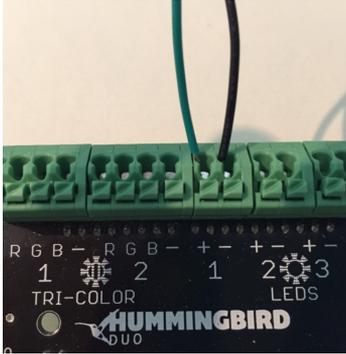
Hummingbird board  
USB cord  
Single and tricolor LEDs  
Laptop with Scratch and Birdbrain Robot Server  
Building materials: paper, sticks, plastic tubs, egg carton, tape, scissors, paper towel tubes, etc.



**Some ideas:** light up your design from behind, make patterns with the lights, use shadows, pick up natural pieces from outdoors. etc. How might you use lights to show motion, direction, color, or shapes?



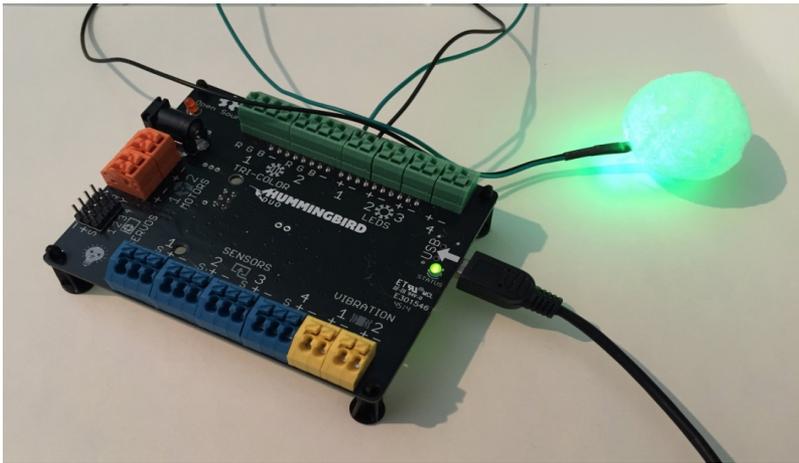
Connect your LEDs



Start **Birdbrain Robot Server**, open **Scratch**

HB LED 1 intensity 50

**Scratch:** find the **LED Block** and set the port number



**Scratch:** Add an **event** to control your LED

when space key pressed

HB LED 1 intensity 100

For more information, turn to the back of this booklet or check out

[https://www.hummingbirdkit.com/learning/introduction-hummingbird-scratch#single\\_leds](https://www.hummingbirdkit.com/learning/introduction-hummingbird-scratch#single_leds)



## Reflection questions to talk about with your family:

What have you learned from a plant?

Which plants are significant to your community?  
If you are not sure, how might you find out more?

Where do your stories come from?

How might you find out how to hear more stories  
from your background?



Salmonberries  
are important to  
the Chinook tribe,  
as we feed them to  
the first salmon we  
see in the river at  
First Salmon.

Ari

# activity 2

## Animate the Story

The little girl doubted that she could do what the Cedar tree asked her, and she cried. Her crying woke up the mountain, then the snake.

### Sketch your ideas on the next page.

Use words, arrows, pictures, whatever you want.

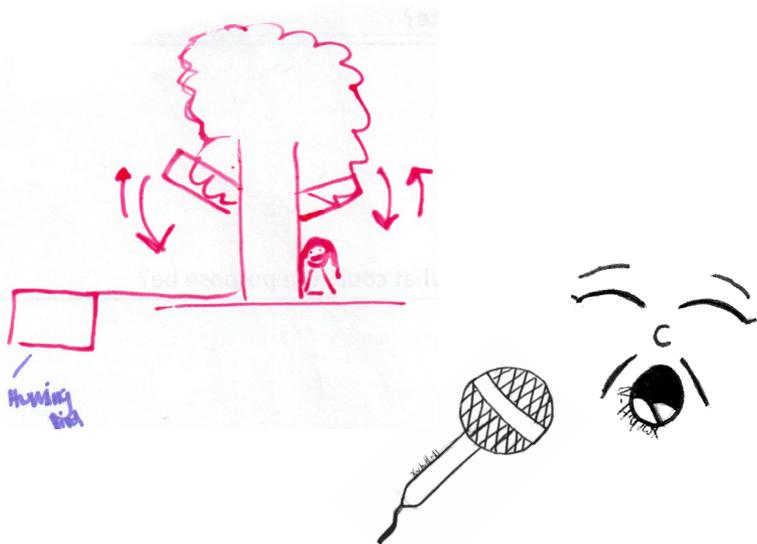
**You'll need:**  
Pens or pencils  
This booklet

What does a mountain or a cedar tree look like waking up?

What does a snake do when it wakes up?

What would their voices sound like?

How do they move?



**Sketch your ideas here:**

## Next, Choose one of these two challenges:

**1. Animate the girl waking up the mountain or the snake.** Build models of the mountain, snake, and/or little girl, and use motors and lights to bring them to life. You may choose any part of the story you want!

Some ideas: use the *vibration motor* to represent the snake's rattle; use the *Scratch Sounds* menu to record the sound of a girl crying, or the mountain talking; use a *motor* to move a mountain



### You'll need:

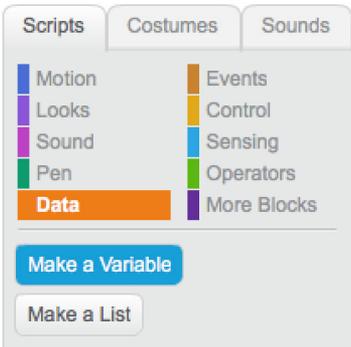
Hummingbird board  
USB cord  
Power cord  
LEDs, motors

Computer with Scratch  
and Birdbrain Robot Server  
Craft and building  
materials

## 2. Create an alert that shows you when a sound reaches a certain level.

The girl had to test her design over and over again by taking her basket to the river and seeing if it held water. How do you test to see if something you made is working? Programmers often include tests in their code to see if a condition is met or when a failure occurs.

*Some ideas: have a light stay red until the sound reaching a certain loudness. Make it turn green when the sound is loud enough to wake up a snake. Or, create an alert when there is no more light sensed between woven strands of a basket.*

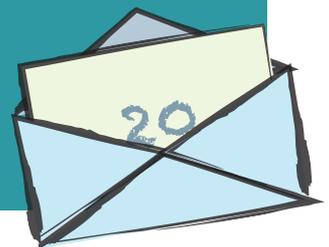


**Hint:** You might want to use **variables** to store the value of the sensor input

### What's a variable??

A variable is like an envelope with a name written on it. That envelope can hold something--in this case, a number.

*Example: If you wanted to tell Scratch to display the value of the rotary knob, you could write the name "turnValue" on the envelope, and inside would be how far the knob has been turned. Every time you ask for the envelope marked "turnValue", Scratch opens it up and uses the current number inside. This number can vary (the value is variable).*





## Using sensors



FINALLY, THERE ARE THE **SENSOR** BLOCKS. THESE GIVE YOU ("RETURN") INFORMATION ABOUT THE WORLD AROUND YOU.

**HB light sensor on port 1**  
RETURNS THE VALUE OF A LIGHT SENSOR. (0-100)

**HB distance sensor on port 1**  
RETURNS THE DISTANCE IN CENTIMETERS TO AN OBJECT.

**HB voltage on port 1**  
RETURNS THE RAW ANALOG VOLTAGE READING AT THE SENSOR PORT

**HB sound on port 1**  
RETURNS THE VALUE OF SOUND SENSOR. (0-100).

**HB rotary on port 1**  
RETURNS THE VALUE OF THE HUMMINGBIRD'S KNOB. (0-100)

**HB temperature on port 1**  
RETURNS THE TEMPERATURE VALUE IN CELSIUS (C) OR FAHRENHEIT (F).

FOR EACH SENSOR BLOCK, YOU WILL NEED TO GIVE THE PORT NUMBER (1-4)

RED+GREEN = YELLOW  
RED+BLUE = PURPLE  
GREEN + BLUE = TEAL  
RED+GREEN+BLUE =WHITE

NOW, WHAT WE WANT TO DO IS TO WRITE **STATEMENTS** THAT SCRATCH WILL UNDERSTAND. FOR EXAMPLE, WE COULD TRY TO TELL IT:

"WHEN SOMETHING GETS TOO CLOSE TO THE DISTANCE SENSOR, FLASH THE LIGHTS AND VIBRATE THE MOTOR."

BUT IN ORDER TO DO THAT, WE NEED MORE THAN JUST THE SENSOR BLOCKS. WE'LL ALSO NEED THE **EVENTS** AND **CONTROL** BLOCKS.

BOTH THE DARK YELLOW **EVENT** BLOCKS AND THE LIGHT YELLOW **CONTROL** BLOCKS ARE USED TO MAKE STATEMENTS.

when space key pressed      if      then  
   else

FOR THIS ACTIVITY, WE'LL MOSTLY JUST LOOK AT TWO BLOCKS:

"WHEN SPACE KEY PRESSED"

AND

"IF \_\_ THEN, ELSE"

TO USE THIS BLOCK, DRAG IT OUT TO THE SCRIPTS AREA AND SNAP IT TO AN ACTION.

when space key pressed  
HB LED 1 intensity 50

HERE'S AN EXAMPLE. WHEN I SNAP THESE TWO TOGETHER, PRESSING THE SPACE BAR WILL MAKE LED #1 TURN TO 50.

when space key pressed

H  
A  
S  
D  
P  
Q  
F  
S  
T  
U  
V  
W  
X  
Y  
Z  
0  
1  
2

THE "IF \_\_ THEN, ELSE" BLOCK IS A LITTLE MORE COMPLICATED. IT'S LIKE A LITTLE SENTENCE:

**IF** (SOME CONDITION IS MET), THEN DO THIS ACTION, OR **ELSE** DO THIS OTHER ACTION.

THE FIRST ACTION PART OF THE SENTENCE IS PRETTY SIMPLE. JUST SNAP AN ACTION BLOCK (LIKE ONE THAT CONTROLS A MOTOR OR AN LED) INTO THE MOUTH OF THE "IF \_\_" BLOCK.



BUT WHAT GOES IN THE FIRST PART OF THE "IF \_\_" BLOCK?

HB distance sensor on port 1

HB light sensor on port 1



THAT'S WHERE WE'LL PUT THE SENSING BLOCKS...AS WELL AS SOME GREEN BLOCKS CALLED OPERATORS.

WITH THE GREEN OPERATOR BLOCKS, WE'RE GOING TO LOOK AT TWO SYMBOLS YOU MIGHT REMEMBER FROM MATH CLASS:

< (LESS THAN)  
> (GREATER THAN)

9 < 10

9 IS LESS THAN 10

3 > 2

3 IS MORE THAN 2

IF YOU PUT IN SOMETHING FALSE...LIKE THAT 9 IS MORE THAN 10, IT WILL TELL YOU WHEN YOU CLICK ON IT!

15 < 2 false

9 < 10

WE CAN PUT OUR SENSORS IN THESE BLANKS! FOR EXAMPLE, THIS IS SAYING "THE LIGHT HITTING OUR SENSOR IS LESS THAN 50!"

HB light sensor on port 1 < 50

TIP: MAKE SURE THE NUMBER HERE MATCHES THE PORT YOU HAVE THE SENSOR PLUGGED INTO!

IS THAT TRUE OR FALSE? DEPENDS ON HOW BRIGHT THE ROOM IS!

WE CAN HAVE THE SENSOR CHECK THE LIGHT IN THE ROOM - TO DO THAT, WE'LL PUT OUR OPERATOR INSIDE THE "IF \_\_ THEN, ELSE" BLOCK DIAMOND.

if then  
HB LED 1 intensity 100  
else

DRAG THE GREEN BLOCK HERE

NOW YOU HAVE THIS STATEMENT:

**IF** THE LIGHT HITTING OUR SENSOR IS LESS THAN 50, TURN THE LED TO 100!



DOES IT WORK? IF NOTHING CHANGES, TRY TURNING OFF THE LIGHTS IN THE ROOM AND TRYING AGAIN!

BUT, WHAT IF YOU TURN THE LIGHTS BACK ON? HOW DO YOU GET THE LED TO TURN OFF WHEN IT'S NOT NEEDED?



THIS IS WHERE THE ELSE STATEMENT COMES IN.

WE WANT TO CREATE A STATEMENT THAT SAYS: IF THE LIGHT HITTING OUR SENSOR IS **LESS** THAN **50**, TURN THE LED TO **ZERO**.

**OTHERWISE**, TURN THE LED TO **ZERO**.

THE **ELSE** IS THE SECOND PART OF THIS STATEMENT. **ELSE** APPLIES WHEN THE FIRST **IF** CONDITION IS NOT MET.

ADDING THE **ELSE** ACTION IS EASY - IT'S JUST LIKE ADDING THE FIRST **IF** ACTION.

```
if HB light sensor on port 1 < 50 then
  HB LED 1 Intensity 100
else
  HB LED 1 Intensity 50
```

SNAP AN ACTION BLOCK INTO THE MOUTH OF THE "ELSE."

THIS TIME, WE'LL SET THE LED INTENSITY TO ZERO - COMPLETELY OFF.

```
if HB light sensor on port
  HB LED 1 Intensity 100
else
  HB LED 1 Intensity 0
```

AS IT STANDS, THAT STATEMENT WILL ONLY CHECK THE ROOM **ONCE**. TO HAVE IT CONSTANTLY CHECK, PUT EVERYTHING INSIDE A "FOREVER" BLOCK. THE "FOREVER" BLOCK CAN BE FOUND IN THE CONTROL MENU.

```
when space key pressed
  forever
    if HB light sensor on port 1 < 50 then
      HB LED 1 Intensity 100
    else
      HB LED 1 Intensity 0
```

LET'S TEST IT AGAIN! TRY THE FLIPPING LIGHTS ON AND OFF.

TIP: SNAP ON A "WHEN SPACE KEY PRESSED" AT THE TOP TO BE AN ON SWITCH!



THIS IS JUST ONE EXAMPLE OF THE TYPE OF THINGS YOU CAN DO WITH SCRATCH!

FOR MORE IDEAS, GO TO HUMMINGBIRDKIT.COM



EXPLORE EXAMPLE PROJECTS AND GET INSPIRED!

## For more info on using sensors:



<https://www.hummingbirdkit.com/teaching/using-sensors-hummingbird-scratch>

## For more info on using variables:

<https://www.hummingbirdkit.com/learning/introduction-hummingbird-scratch#light>



## Reflection questions to talk about with your family:

How did you feel when the people from the girl's village called her *i-i-esh*?

What do you think they should have said to her?

How did you feel when she had to take apart the basket and weave it again?

What have you had to try more than once to get it right?

What did you do in this activity that was out of your comfort zone?



# activity 3

## Share Your Knowledge

The girl learned a new skill from Grandma Cedar and taught it to her community. Now it is your turn to teach someone else.

### Some ideas:

**Use the camera or laptop webcam to take photos or video of yourself programming an LED or motor.**

Did you learn something that you want to share with the world? Upload your video to Tech Tales google drive or YouTube and tag it **#techtalebackpack**

(instructions on page 24)



### **Talk to someone who has not heard the story:**

What teachings about life did you learn from the story?  
What does the teaching mean to you?  
What teaching did you illustrate?  
How did you make that happen with the Hummingbird kit?

Record it, write it out, or draw a picture about it!



### **Project swap:**

Swap projects with another family member and continue improving on each other's designs.



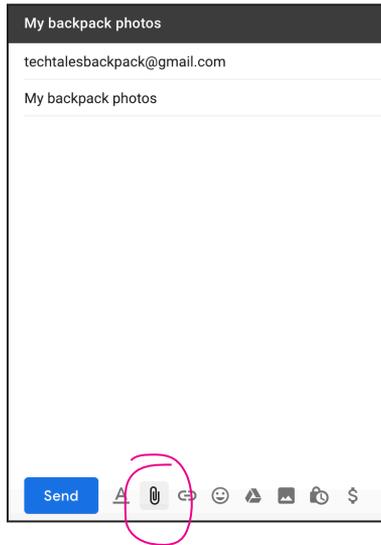
*For example, if you were building a character and your sister was programming the motions, switch places and add more features or actions while sharing your knowledge with each other.*

Take before and after photos and describe to each other what you chose to do.

# Share your work

Follow these steps to share your photos  
or videos online

E-mail your image as an attachment to  
**techtalesbackpack@gmail.com**



To view files you and others have uploaded, visit

<https://tinyurl.com/y8d79jgp>

**Be sure to check with an adult before  
sharing photos online!**

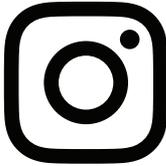
The Tech Tales team will add photos from this Google Drive to our website, [techtales.online](https://www.techtales.online)



Or share your images on your social media

<https://www.instagram.com/ngc.naahillahee/>

On Instagram, share your pictures or videos with [@ngc.naahillahee](https://www.instagram.com/ngc.naahillahee/)



You may also tag your posts with [#techtalesbackpacks](https://twitter.com/techtalesbackpack) on other platforms like Twitter or YouTube.





**Which  
challenge  
did you choose?**

**How did you do it?**

**What did each  
of you think about the  
challenge?**



## Reflection questions to talk about with your family:

Who in your life has taught you something valuable?

When have you used these new skills?

What have you taught to someone else?

What is something you practice to get better at?

How might you learn new skills  
or share your knowledge?

How do you think the girl felt when she taught others  
how to weave beautiful, useful baskets?



Hummingbird board



Power supply



USB Cord



Terminal Tool

Single-color LEDs



Tri-color LED

Gear Motor



Servo Motor

Vibration Motor



## What's in your kit?

To find out more, go to <http://www.hummingbirdkit.com/about/kit-contents>



Sound Sensor

Temperature Sensor



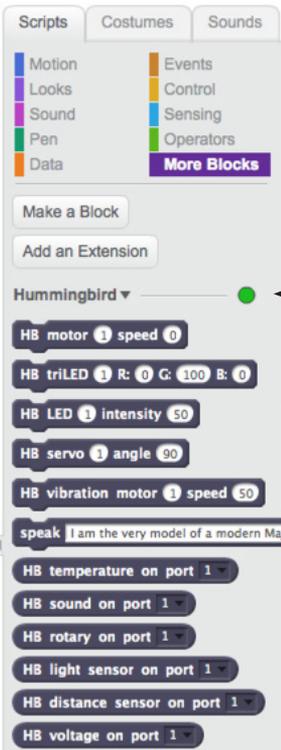
LightSensor



Distance Sensor



Rotary Knob



To program your components in **Scratch**, go to the **More Blocks** scripts menu

When the Hummingbird is connected, this circle turns **green**. If it is **red** or **yellow**, check your connection and make sure Birdbrain Robot server is running.





ONE WAY YOU CAN CONTROL YOUR HUMMINGBIRD IS WITH **SCRATCH 2.0!** SCRATCH IS A VISUAL PROGRAMMING LANGUAGE.

HERE'S HOW!

FIRST, CONNECT THE HUMMINGBIRD TO A COMPUTER AND SUPPLY POWER. MAKE SURE YOU HAVE BOTH THE USB CABLE AND THE POWER CABLE IN - THEY'RE BOTH NECESSARY.

ON THE COMPUTER, OPEN "BIRDBRAIN ROBOT SERVER".

THIS WINDOW WILL APPEAR, LETTING YOU KNOW IF YOUR HUMMINGBIRD (OR FINCH!) IS CONNECTED.

Open Snap!

Open Snap! locally (no cloud storage)

Open Scratch

CLICK "OPEN SCRATCH"

AFTER YOU'VE MADE YOUR CHOICE, YOUR COMPUTER SHOULD OPEN **SCRATCH 2.0**.

## Using the Hummingbird Robotics kit

To find out more, go to

<http://www.hummingbirdkit.com/learning/introduction-hummingbird-scratch>

THE BIG OPEN AREA ON THE RIGHT IS CALLED THE **SCRIPTS AREA**...ANY COMMANDS THAT YOU WANT YOUR ROBOT TO DO WILL WIND UP HERE.

TO THE LEFT ARE ALL THE **BLOCKS**. THESE ARE THE PIECES THAT YOU WILL DRAG OUT TO THE SCRIPTS AREA. EACH ONE HAS A SPECIFIC PURPOSE.

Go to the "More Blocks" category to check out the Hummingbird blocks. Happy robot coding!

ABOVE THE BLOCKS, THERE ARE DIFFERENT MENUS, OR CATEGORIES. ALL OF THE BLOCKS THAT ARE SPECIFIC TO HUMMINGBIRD WILL BE IN THE:

**"MORE BLOCKS" CATEGORY**

Go to the "More Blocks" category to check out the Hummingbird blocks. Happy robot coding!

IF YOU FORGET WHERE THE HUMMINGBIRD BLOCKS ARE, THERE'S A NOTE TO TELL YOU.

TO TEST ANY OF THESE BLOCKS OUT (FOR NOW), DRAG THEM INTO THE SCRIPTS AREA AND CLICK ON THEM. DRAG THEM BACK TO DELETE THEM.

ALL OF THE HUMMINGBIRD BLOCKS START WITH THE LETTERS **HB...** BUT THEY ALL DO SOMETHING DIFFERENT!

SOME BLOCKS CONTROL MOTION, LIKE **HB MOTOR...**

HB motor 1 speed 0

THE **FIRST** NUMBER SAYS WHICH MOTOR WE'RE TALKING ABOUT, #1 OR #2.

THE **SECOND** NUMBER SETS THE SPEED, FROM 0 (STOPPED) TO 100 (FULL), TO -100 (REVERSE FULL)

**HB SERVO...**

HB servo 1 angle 90

PORT NUMBER (1-4)

ANGLE (0-180)

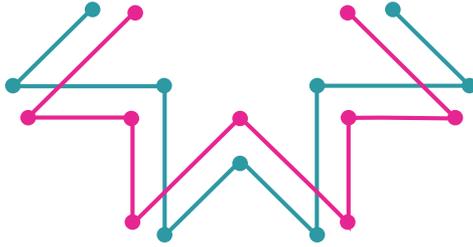
AND **HB VIBRATION MOTOR!**

HB vibration motor 1 speed 50

PORT NUMBER (1-2)

SPEED OF MOTOR (INTENSITY OF VIBRATION) (0-100)





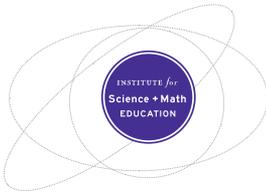
Tech Tales Family Robotics Workshops are a part of the Backpacks for Science Learning research project, a collaboration between UW Bothell OpenSTEM Research, the UW Seattle Institute for Science + Math Education, Pacific Science Center, Highline Public Schools Native Education Program, and Seattle Public Libraries, and funded by the National Science Foundation.



Na'ah Illahee Fund



OpenSTEM  
RESEARCH



The Seattle Public Library



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