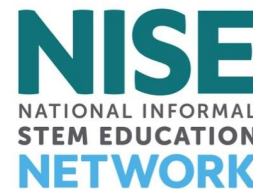


NISE Net Online Workshop

Online Workshop: Making Waves with Radio - Resource Roundup for Educators Working with Hispanic Audiences

August 20, 2024



Today's Presenters:

Darrell Porcello, Ph.D., Children's Creativity Museum & Lawrence Hall of Science, UC Berkeley

Sherry Hsi, Ph.D., BSCS Science Learning in Colorado Springs, CO

Lisbeth Tengono Hickey, El Centro Hispano in Durham, NC

Yasmin Santiago, Science & Visitor Center Arecibo C3 – USC in Puerto Rico

Steve Scholle, Museum of Life and Science in Durham, NC

David Knudsen, Museum of Life and Science in Durham, NC




Welcome! As we wait to get started with today's discussion, please:


Introduce yourself! Type your name, institution, and location into the [Chat Box](#)

Questions? Feel free to type your questions into the [Chat Box](#) at any time throughout the webinar or use the raise your hand function in the participants list and we'll unmute your microphone.

Today's discussion will be recorded and shared on nisenet.org at: nisenet.org/events/online-workshop

Today's Workshop Objectives

 Introduce **Radioeverywhere.org** and a new set of camp & craft along with other radio resources

 Hear how educators are using these radio resources in **hispanic communities**

 Share a new interactive adventure story app for mobile devices called **Whispers in the Wind**



BSCS Science Learning

Colorado Springs, CO

Children's Creativity Museum

San Francisco, CA

Sciencenter

Ithaca, NY

Museum of Life and Science

Durham, NC

Community Partners

El Centro Hispano

Durham, NC

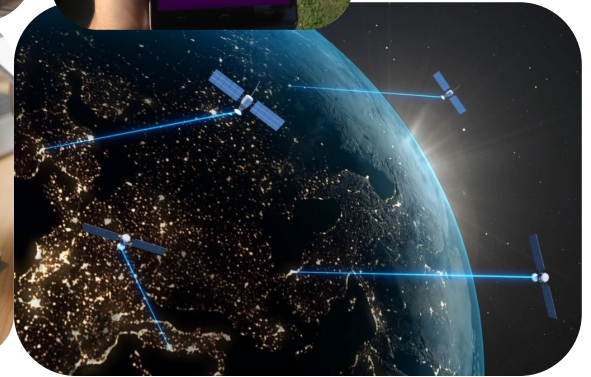
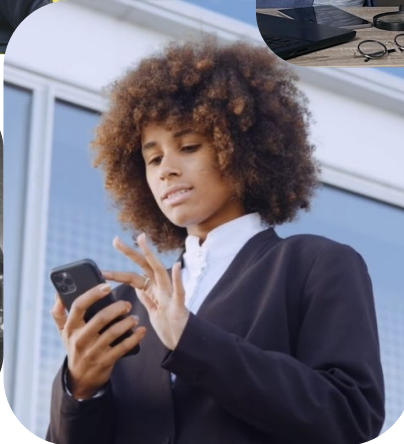
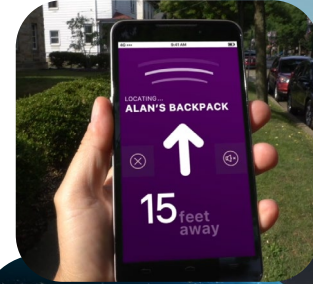
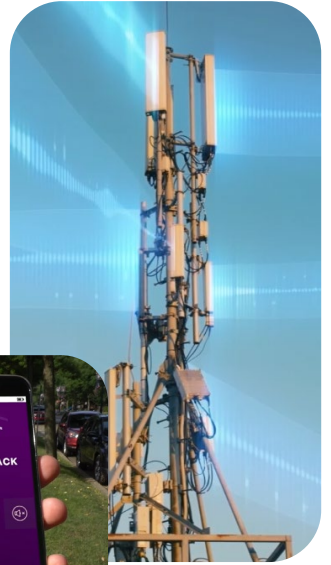
Science & Visitor Center

Arecibo Observatory

Arecibo, Puerto Rico



What is radio?





Project Themes

Physics of Radio

Radio Communication
Technology

Radio in Society

5 Big Ideas in Radio Frequency Communications

SCIENCE

1

Electromagnetic radiation is all around at all times.

2

Radio waves transfer energy that can be reflected, absorbed, or passed through materials.

3

Engineers create technologies to securely encode and decode information carried by radio waves.

4

Making radio technology equitable requires all of our voices.

5

Radio innovations may create surprising ways to communicate in the future.

TECHNOLOGY

SOCIETY

Physics of Radio

Radio Communications Technology

Radio in Society



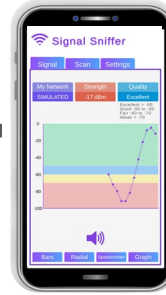
Radio Explorers
Messages
from Space



Sound Detc.



Radio Explorers
Wi-Fi
Detective



Wi-Fi Detc.



Radio Futures
You Decide



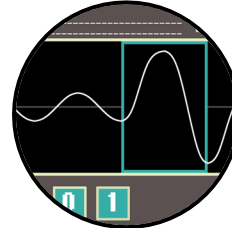
Radio Futures
I Spy Radio



Radio Explorers
Radio Silence



Web Interactive
Parity Blitz



Web Interactive
Operation
Modulation



Mobile App
Whispers
in the Wind

Physics of Radio

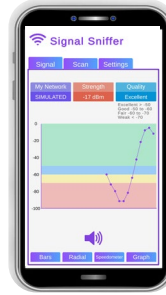
Radio Communications Technology

Radio in Society



Radio Explorers
Messages from Space

Sound Detc.



Radio Explorers
Wi-Fi Detective

Wi-Fi Detc.



Radio Futures
You Decide



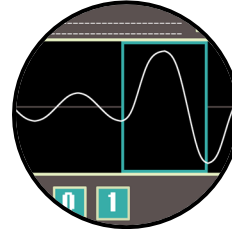
Radio Futures
I Spy Radio



Radio Explorers
Radio Silence



Web Interactive
Parity Blitz



Web Interactive
Operation Modulation



Mobile App
Whispers in the Wind

Making Waves Activities

nisenet.org/radio

Radio Explorers



Radio Silence



Messages from Space



Wi-Fi Detective

Radio Futures



You Decide



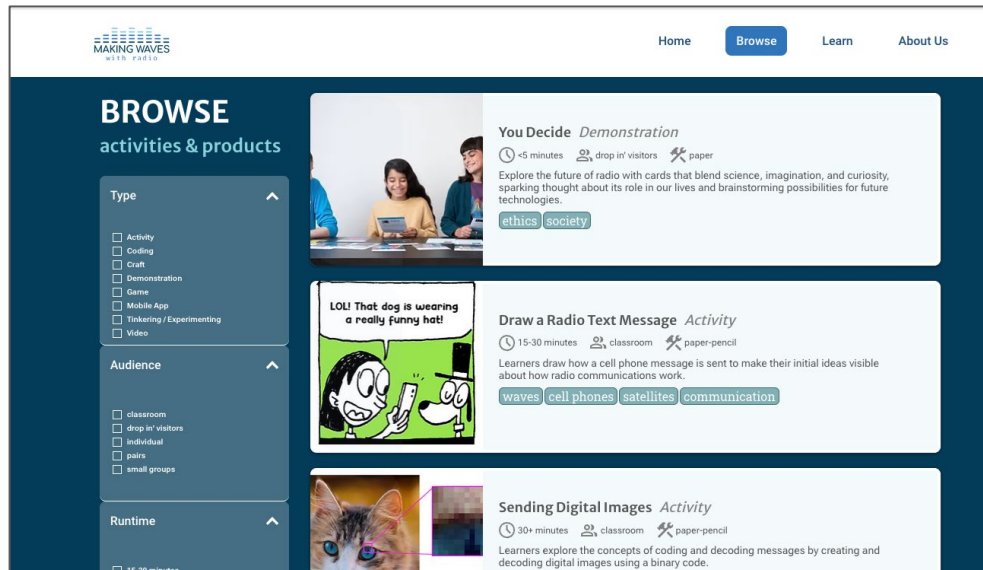
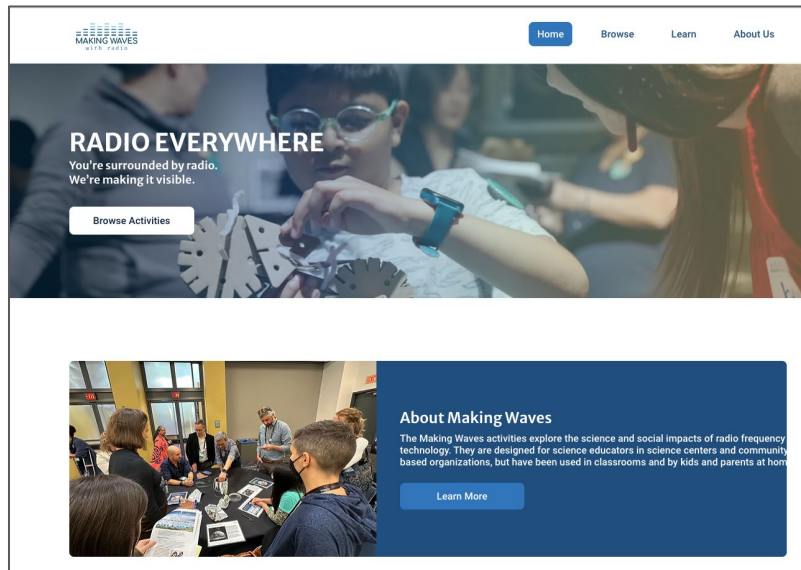
I Spy Radio

- +Spanish versions
- +mobile apps
- +activity training videos
- +content training video

NISE
NATIONAL INFORMAL
STEM EDUCATION
NETWORK

Introducing Radioeverywhere.org

- New comprehensive website for the project **coming soon**
- Browse features along with thematic categorization



Introducing Radioeverywhere.org

BROWSE

activities & products

Type

☒ Activity

☐ Coding

☐ Craft

☐ Demonstration

☐ Game

☐ Mobile App

☐ Tinkering / Experimenting

☐ Video

Audience

☐ classroom

☐ drop in' visitors

☐ individual

☐ pairs

☐ small groups

Runtime

☐ 15-30 minutes

☐ 30+ minutes

☐ 5-15 minutes

☐ <5 minutes

Required Materials

☐ computer

☐ craft supplies

☐ microbit

☐ mobile phone

☐ mutple parts

☐ paper

☐ paper-pencil

☐ special tech

☐ tablet

Content Areas

amplitude binary

binary code bluetooth

broadcast cell phones

channels communication

decoding electromagnetism

encoding error detection

ethics frequency history

input device interference

key shift messages

modulation output device

parity bit pixels

potentiometers

radio operator

real-world examples

receivers satellites

signal strength signals

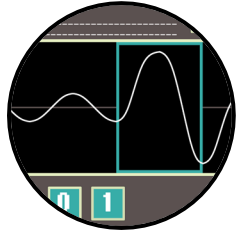
society sound space

transmission wavelength

waves wifi

Introducing Radioeverywhere.org


- New web interactives to showcase digital radio



Web Interactive
Operation
Modulation


Digital modulation is a method used to transform digital bits of information (0s and 1s) into radio waves that can be transmitted over long distances. A radio wave, called a **carrier signal**, is changed, or **modulated**, in response to the digital bits being transmitted. The **amplitude** or the **frequency** of the carrier signal can be changed to represent the specific 0s or 1s of the digital bits.

amplitude key shifting



0 = low amplitude
1 = high amplitude

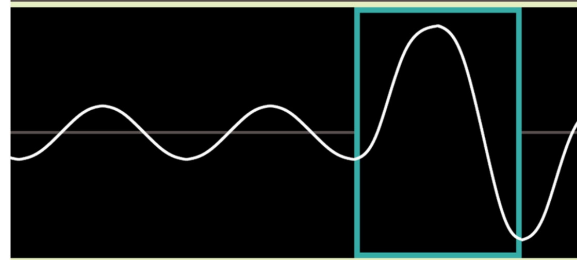
frequency key shifting



0 = low frequency
1 = high frequency

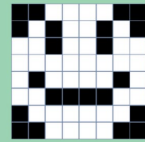
Next

010010101_____ Quit



0 1


NIVEL 1



¡Una onda de radio que tiene la información digital de un smile emoji viene en camino!

¡Ahora TÚ eres la computadora y debes decodificar correctamente la onda portadora modulada digitalmente!

Quando entre la onda de radio que usa la modulación por desplazamiento de amplitud, decide si la forma de la onda muestra un 0 o un 1 basándote en su amplitud. Los cuadros blancos se representan como un 1. Los cuadros negros se representan como un 0. ¡Al final, comparemos tu imagen decodificada con la que se envió!



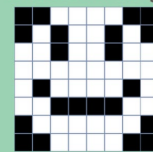
0 1

Jugar


LEVEL COMPLETE!

How did you do?

Transmitted image



Your decoded image

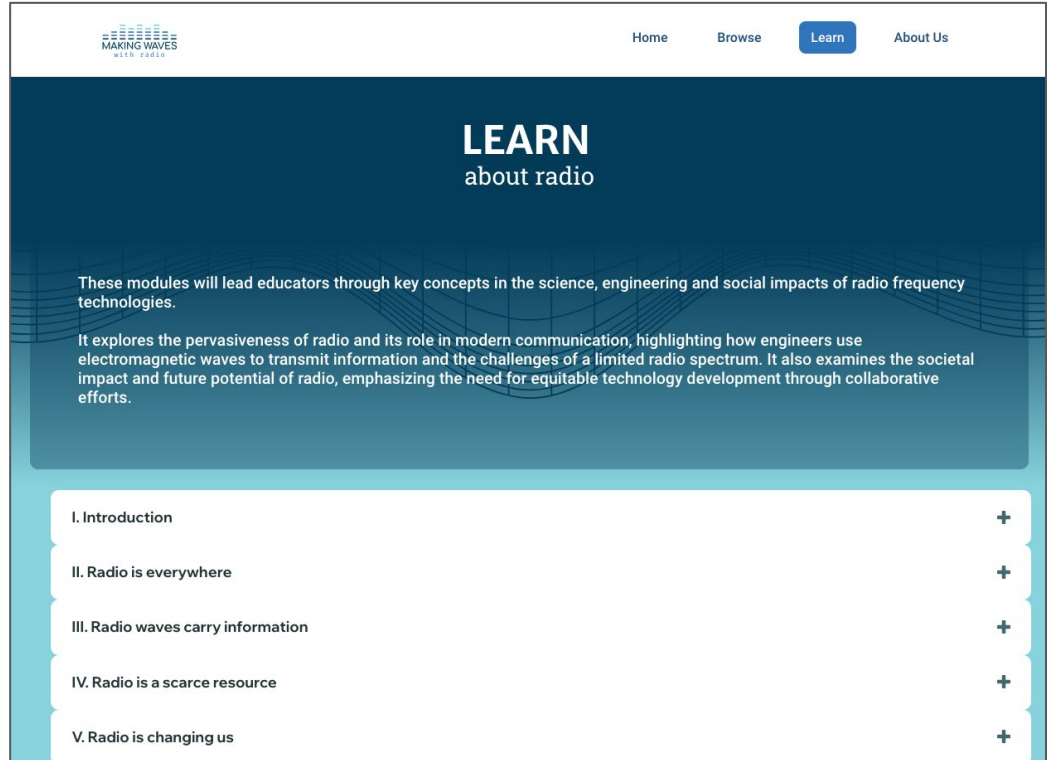


73% accurate!

Next Level

Introducing Radioeverywhere.org

- **New step-by-step professional learning module**
- Grasp the principles and applications of radio, from cell phones to wireless internet, and its historical to current significance.
- Examine how radio shapes communication, healthcare, and environmental challenges, highlighting its role in society.
- Engage with the use of radio in society, focusing on equitable access and the collective shaping of its future.



Radio Crafters Camp

Day 1 - What are radio waves and how can they be used for communication?

Day 2 - How do radios send different types of information over long distances?

Day 3 - How we can program radio devices to transmit and receive different types of information using radio signals?

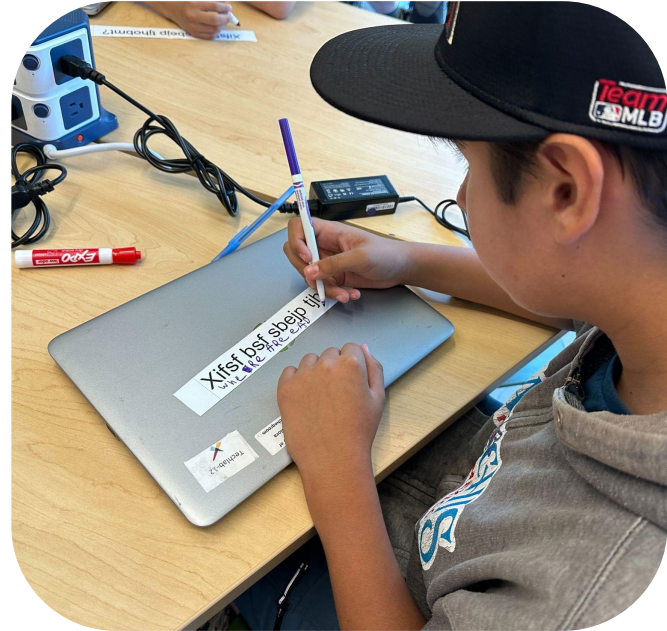
Day 4 + 5 - Let's design and create a future solution to a radio communication problem that we care about.

Radio waves are everywhere!
Learn about the science
behind wireless
communications.
Play games, design crafts,
and build a project with
micro:bit coding and
cardboard.

Radio Crafters Camp

Decode a
message

Bmm bspvoe vt, bmxbzt



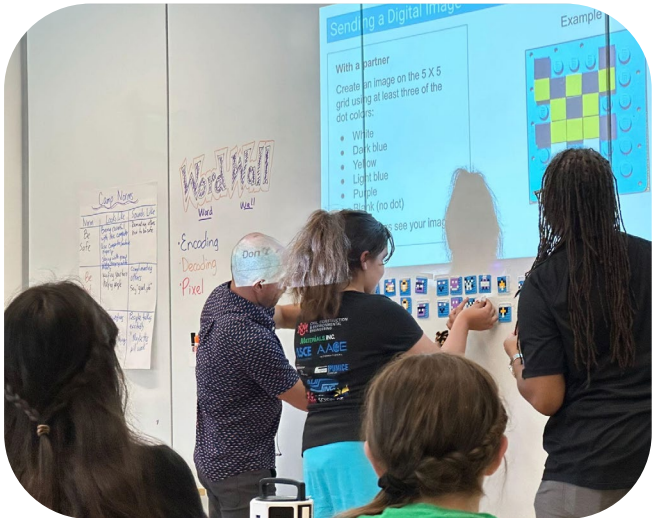
Radio Crafters Camp

Make a
lighthouse

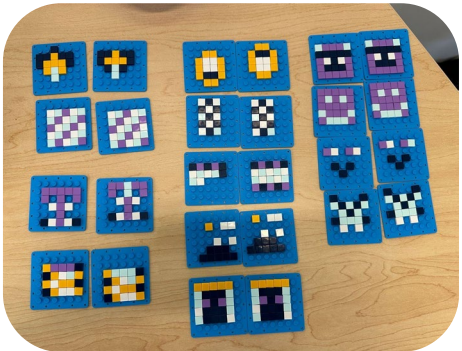
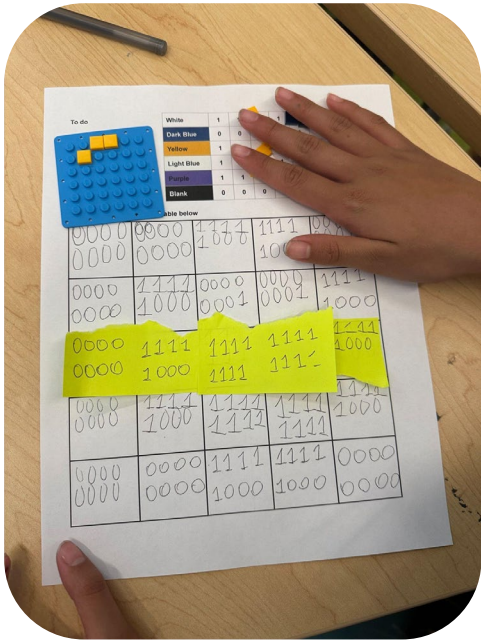


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B - ● ● ●	K - ● -	T -
C - ● - ●	L ● - ● ●	U ● ● -
D - ● ●	M - -	V ● ● ● -
E ●	N - ●	W ● - -
F ● ● - ●	O - - -	X - ● ● -
G - - ●	P ● - - ●	Y - ● - -
H ● ● ● ●	Q - - ● -	Z - - ● ●
I ● ●	R ● - ●	

Radio Crafters Camp



Sending digital images

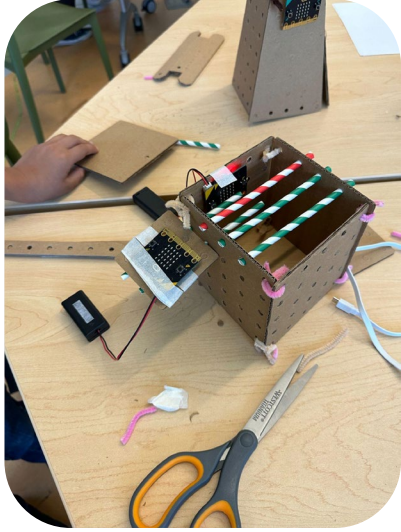


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Red:	1	1	1	0	0	0	0	0	
Blue:	0	0	0	0	0	0	1	1	
Green:	0	0	0	1	0	0	0	0	
Yellow:	1	1	1	1	1	1	0	0	
Black:	0	0	0	0	0	0	0	0	
White:	1	1	1	1	1	1	1	1	
Orange:	1	1	1	1	0	1	0	0	
Purple:	1	0	1	0	0	1	1	1	
Brown:	0	1	1	0	1	0	0	0	

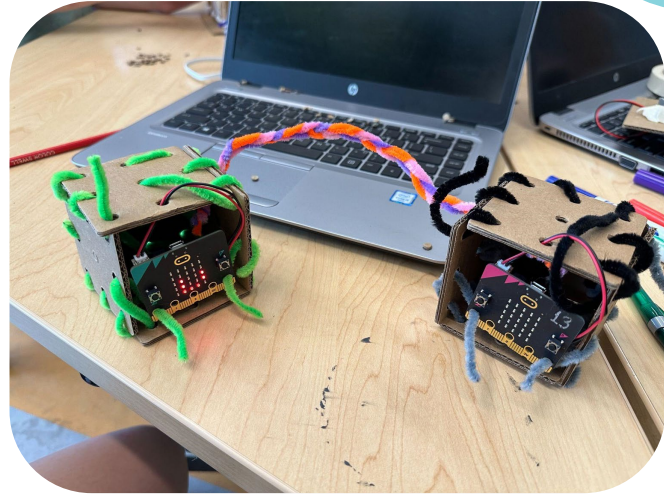
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Radio Crafters Camp

Student
design
projects



"El Problema en el que voy a trabajar es la casa que se cubre de arena"



"Hacer un sistema de micro:bit que mande un mensaje con un sonido que alerte a las personas minutos antes de que llegue la tormenta."

SparkleTech Camp

Day 1 - Basic circuits (LEDs, copper tape and batteries)

Day 2 - Lights (switch, resistor, diode)

Day 3 - Party lights and Fairy jars (NeoPixels + microbits)

Day 4 - Project planning, designing, plussing

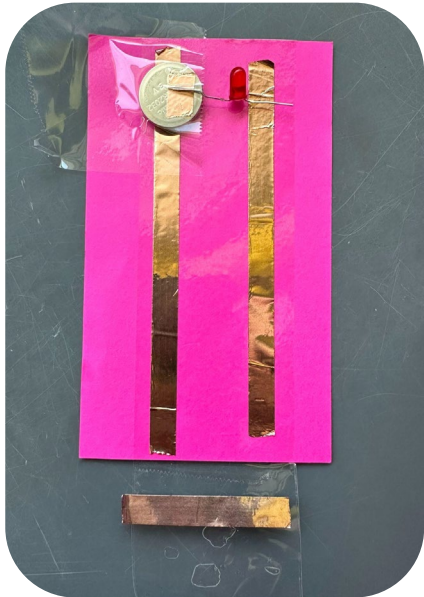
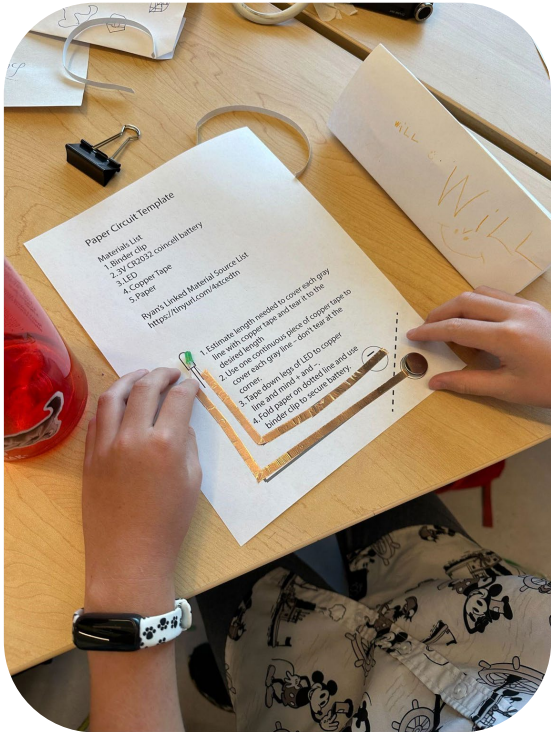
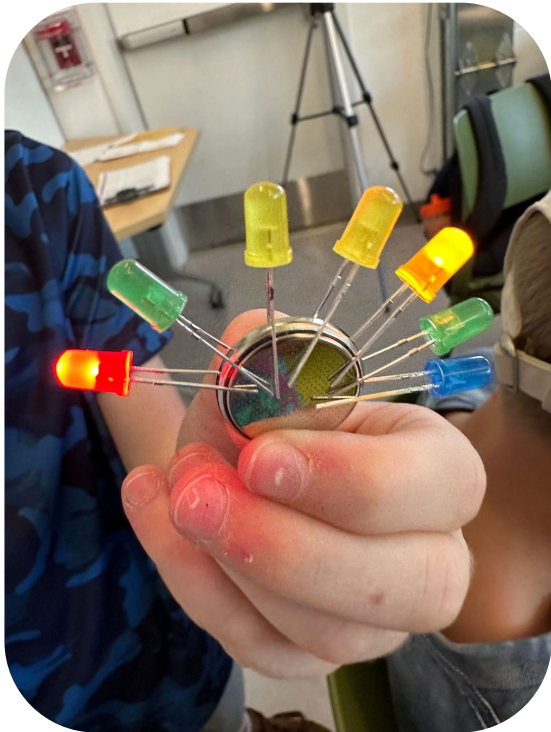
Day 5 - Project studio time + Gallery walk

Introduction to
electronics and
microelectronics
through making and
coding.
What lights you up?

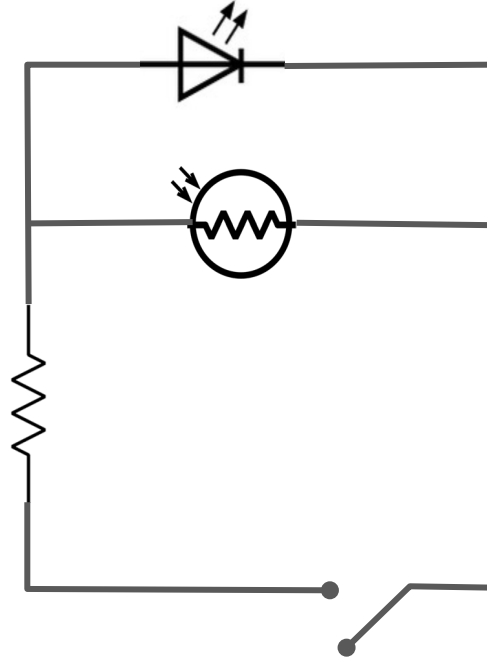
Alt text

SparkleTech Camp

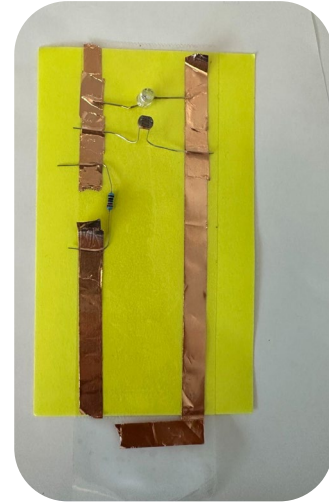
Building
basic
circuits



SparkleTech Camp

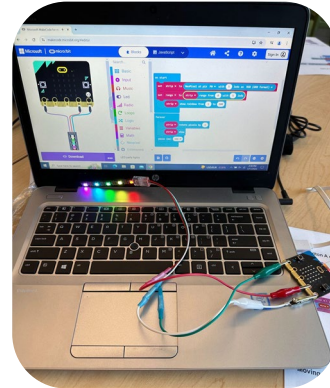
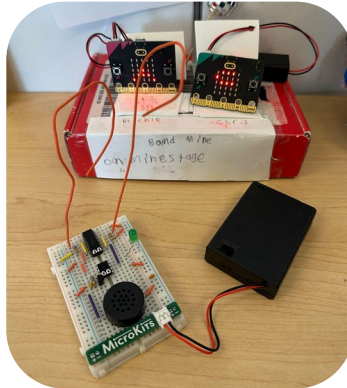
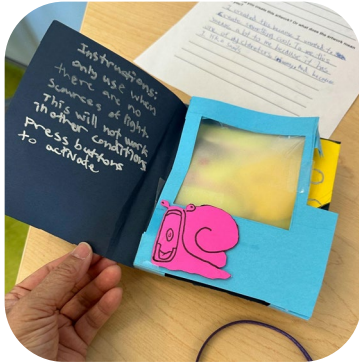
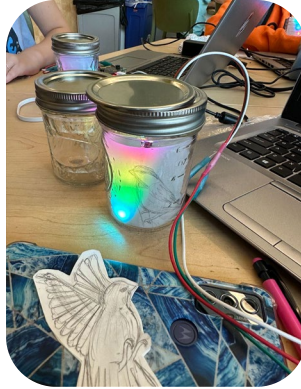


Circuit
Construction
Kit



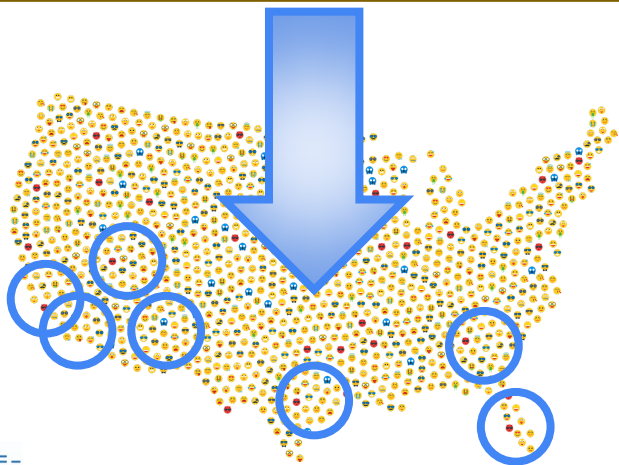
SparkleTech Camp

Make
your own
project!



Community of Practice

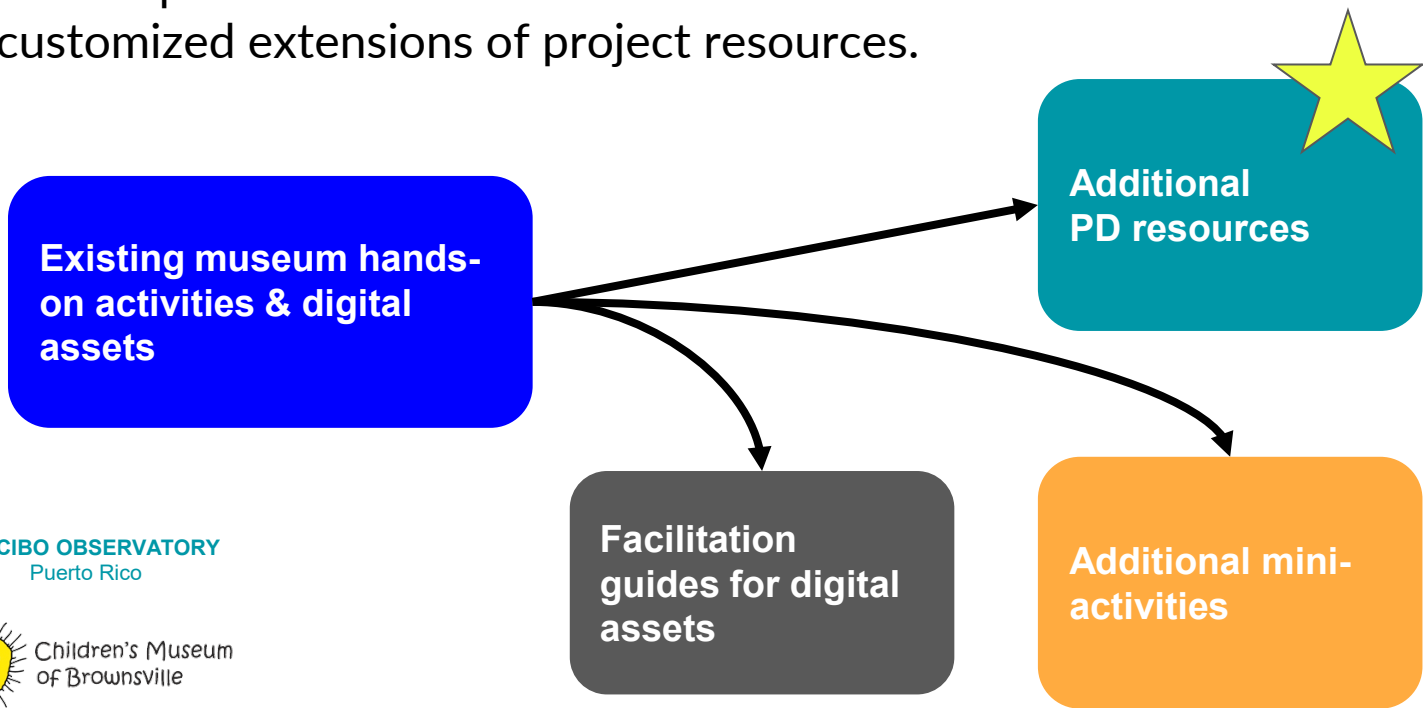
- Project team will assemble **10 physical kits** including museum activities and selection of camp curriculum
- All required materials will be included plus at least **one android phone**
- Museums will be invited to apply for materials and be paid to be part of a small **community of practice** to use and provide feedback on the materials
- Partner museums will attend a handful of zoom calls for peer discussion and critique



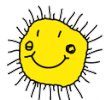
Making Waves with Radio

Museum Community of Practice 2023

Museum partners experienced radio with their audiences to co-create customized extensions of project resources.



ARECIBO OBSERVATORY
Puerto Rico





MUSEUM
of LIFE +
SCIENCE

El Futuro



Activity Adaptation Development Process

Community of Practice members formed teams with activity developers and brainstormed ways that the existing could feature new materials, facilitation tools, and resources.

Examples of adaptations include:

- New materials or interference patterns for Wi-Fi Detective.
- Info sheet for facilitators for Messages from Space.

Adaptaciones: Radio Silence (Spanish version)

Se comienza la actividad con un poco de teoría, explicando de forma sencilla, lo que es una onda electromagnética. Se dice lo siguiente: Es una energía que se desplaza de un punto a otro sin necesidad de ser "cargada o llevada" por algún medio, a diferencia de las ondas de sonido, que necesitan de un medio para transportarse. Se utilizó un "slinky" para que visualizaran la explicación que daría. Las ondas electromagnéticas tienen diferente largo, energía y frecuencia, o sea, que algunas pueden estar más estradas (ondas de radio), mientras que otras suelen estar menos estradas y las podemos visualizar como muchas montañas juntas (rayos gamma y rayos x). La longitud de una onda sería la medida en metros, de una cresta a la siguiente cresta, que lo podemos visualizar, desde el tope de una montaña al tope de la siguiente montaña. Siguiendo el ejemplo de las montañas, si nosotros necesitamos movernos de un lugar a otro caminando, si el camino tiene muchas cuevas o montañas seguidas, necesitaremos más energía para lograrlo. Por el contrario, si el camino para llegar tiene pocas cuevas o montañas seguidas, necesitaremos menos energía para llegar a nuestro destino. Así mismo, si las ondas están más juntas y más separadas. Para describir cuántas cuevas hay en un término de tiempo, utilizamos el término frecuencia. Por consiguiente, a menor energía, menor frecuencia. En cuanto a la longitud de onda, menor largo de onda (están más juntas) y a menor frecuencia, menor largo de onda (están más estradas). Durante toda la explicación, extraí y controlé el "slinky" para que visualizarlo y entender los conceptos más fácilmente. Se les dieron ejemplos de ondas de radio (la radio, la bocina bluetooth, el teléfono celular, etc.). Luego se presentaron los materiales a ser utilizados durante la actividad.

Materiales añadidos a los provistos en la actividad:

- Slinky
- Zafación metálica (con diseño perforado de 2mm en las paredes)
- Zafación metálica (con perforaciones de 2 pulgadas)

Procedimiento:

1. Encender el radio portátil y sintonizarlo en una emisora de AM y se le pide que tratan de bloquear la señal, colocándolo dentro de los envases plásticos y luego en el de metal. Deben comentar sobre sus observaciones.
2. Se envuelve el radio primero con la envoltura plástica y se verifica si se puede escuchar la señal. Luego se repite el mismo proceso pero con la envoltura de aluminio. Se repite lo mismo, pero cambiando la envoltura (papel y aluminio). No olvidar las observaciones.
3. Se repiten los pasos 1 y 2 con la bocina bluetooth. Se discuten las observaciones con las obtenidas con el radio portátil.
4. Luego, se pide que establezcan hipótesis sobre qué creen que pasaría si se usan envases para cosas grandes.

Here's where we left off... What did you try?

Increasing Social/Cultural Relevance	Communicating Complex Ideas	Material Ideas: New Uses, Additions, etc.
<ul style="list-style-type: none">● We had kids who were not interested in the activity until we added the "slinky" and the "radio" to it.● We had kids who were not interested in the activity until we added the "slinky" and the "radio" to it.● We had kids who were not interested in the activity until we added the "slinky" and the "radio" to it.	<ul style="list-style-type: none">● We had kids who were not interested in the activity until we added the "slinky" and the "radio" to it.● We had kids who were not interested in the activity until we added the "slinky" and the "radio" to it.● We had kids who were not interested in the activity until we added the "slinky" and the "radio" to it.	<ul style="list-style-type: none">● We had kids who were not interested in the activity until we added the "slinky" and the "radio" to it.● We had kids who were not interested in the activity until we added the "slinky" and the "radio" to it.● We had kids who were not interested in the activity until we added the "slinky" and the "radio" to it.

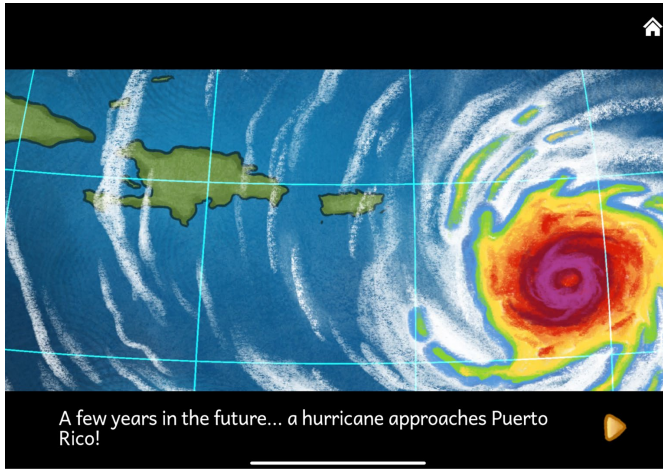
Interactive Story App

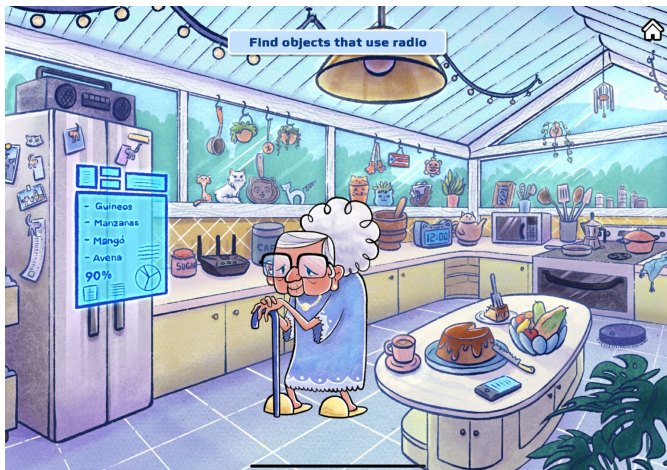
- Phones & tablets, Apple & Android
- Awareness of Radio in your everyday life
- Reflected overall learning objects of the projects

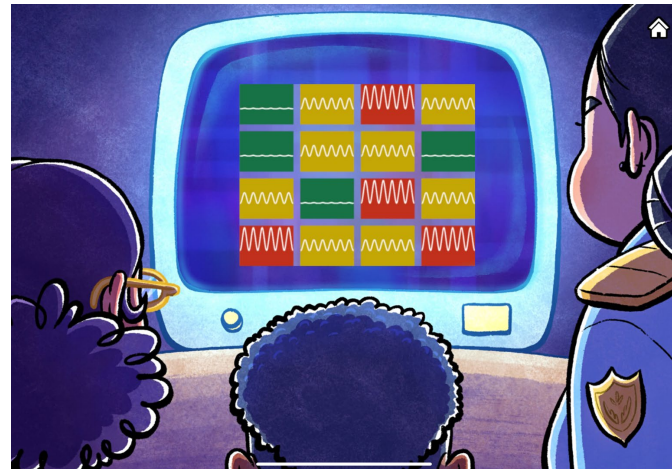
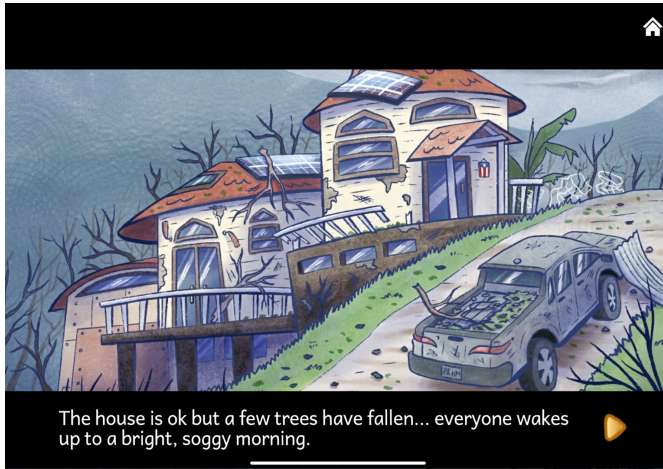


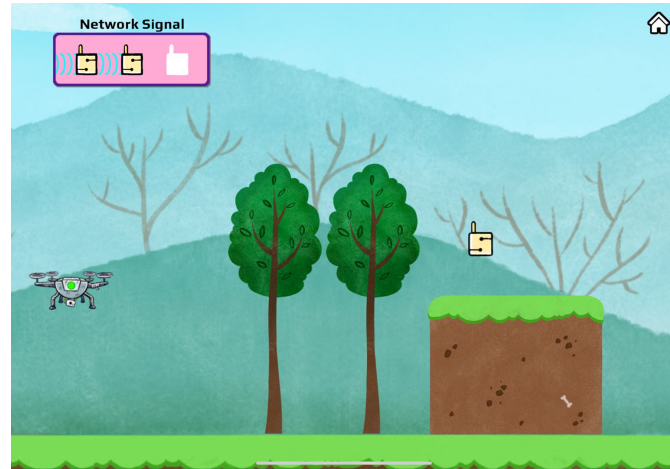
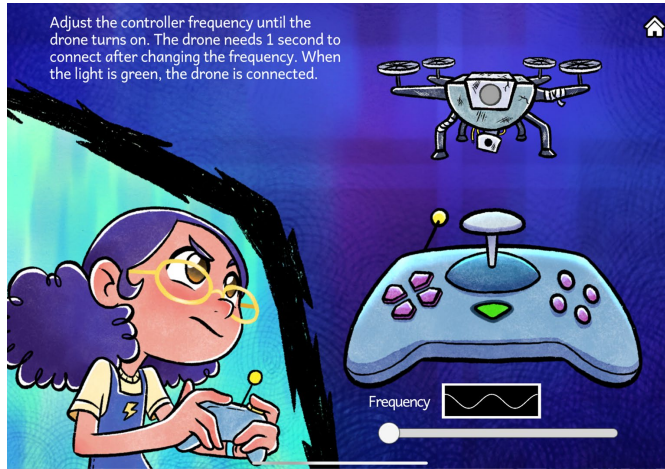
English + Español











Resources & Opportunities



Learn more and access the NISE Network's online digital resources:
nisenet.org/browse-topic



Read our monthly newsletter
nisenet.org/newsletter



Past Recordings of Online Workshops
nisenet.org/online-workshop-recordings-list

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Next Online Workshop...

**Engaging Hispanic/Latinx Communities -
Forming Community Partnerships & the Co-
creation Process (Part 1)**

September 10, 2024

2pm-3pm Eastern / 11am-12pm Pacific

**Engaging Hispanic/Latinx Communities -
Resources for Public Engagement (Part 2)**

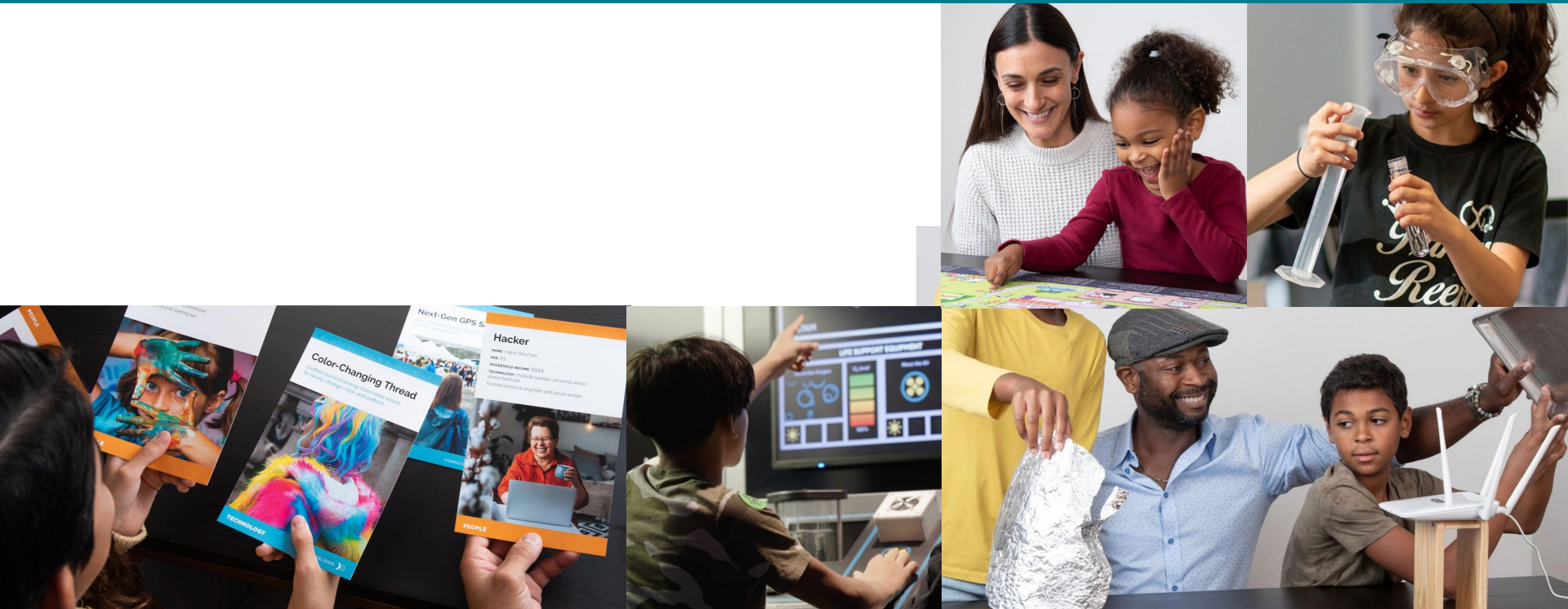
October 8, 2024

2pm-3pm Eastern / 11am-12pm Pacific

nisenet.org/events



Thank You



Q&A

**Use the raise hand
feature or type your
question into the chat**

