NISE Net Online Workshop

Making Waves with Radio - New Ways to Engage Audiences with the Basics of Modern Communication & Navigation

Tuesday, April 4, 2023

NISE NATIONAL INFORMAL STEM EDUCATION NETWORK

Today's Presenters:

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

Sherry Hsi, Ph.D., BSCS Science Learning

Ali Jackson, Sciencenter

Steve Scholle, Museum of Life and Science

David Knudsen, Museum of Life and Science

NISE NETWORK ONLINE WORKSHOPS

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 **5 Big Ideas about Radio**

📻Share **new hands-on activities** and apps for facilitating topics about radio communications, wireless technologies, and the future of radio.

📻Listen to feedback from museum educators that have used these activities with their audiences.

MAKING WAVES with radio

BSCS Science Learning
Colorado Springs, CO

Children's Creativity Museum
San Francisco, CA

Sciencenter
Ithaca, NY

Museum of Life and Science
Durham, NC

Emily Maletz Graphic Design
Portland, OR

Swift Creek Media
Raleigh, NC

Yellow Cow Consulting
San Francisco, CA

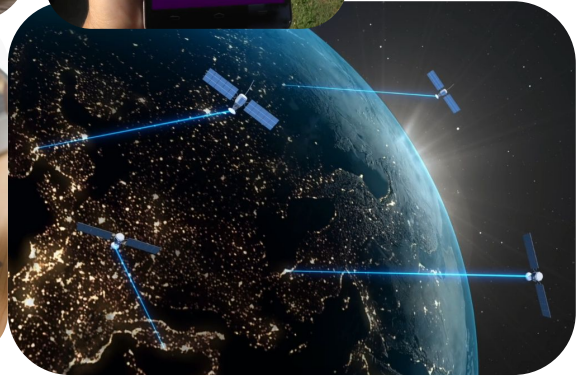
BSCS SCIENCE LEARNING

NISE NATIONAL INFORMAL STEM EDUCATION NETWORK

NSF

Now let's try this : What is radio?

What is radio?



MAKING WAVES
with radio

What is radio?

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.

Content Training Video:
https://vimeo.com/776685410
https://vimeo.com/776686149 (En Español)

Project resources on nisenet.org:
https://www.nisenet.org/radio

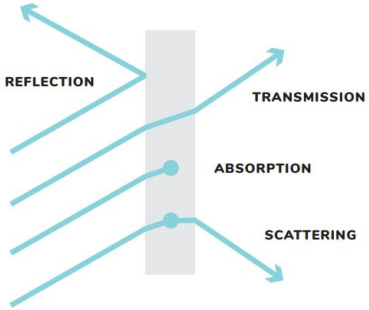
MAKING WAVES
with radio

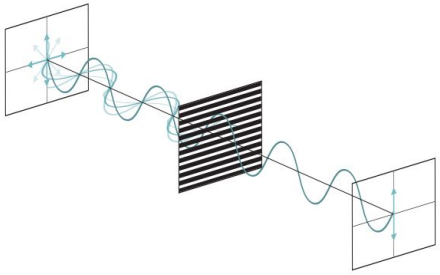
1. Electromagnetic radiation is around us at all times.

Artist: Nickolay Lamm
https://nickolaylamm.com/art-for-clients/what-if-you-could-see-wifi/

MAKING WAVES
with radio

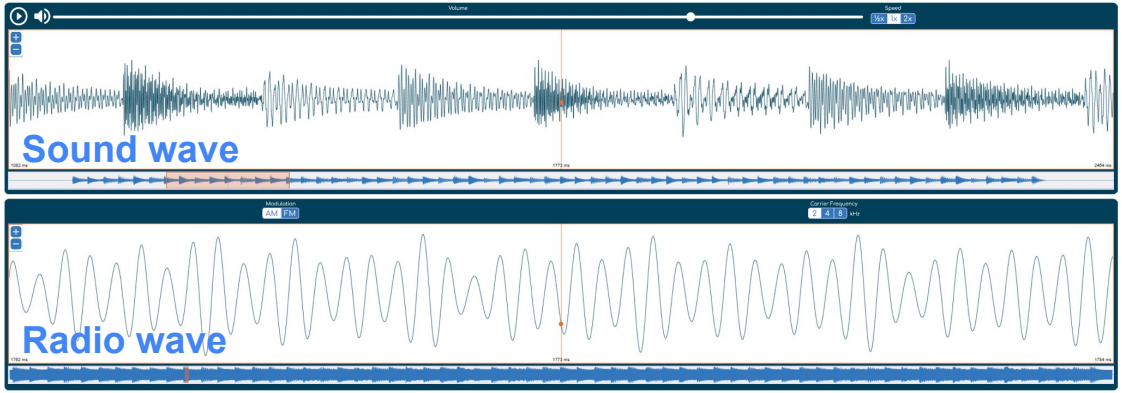
2. Radio waves transfer energy that can be reflected, absorbed, or passed through materials.

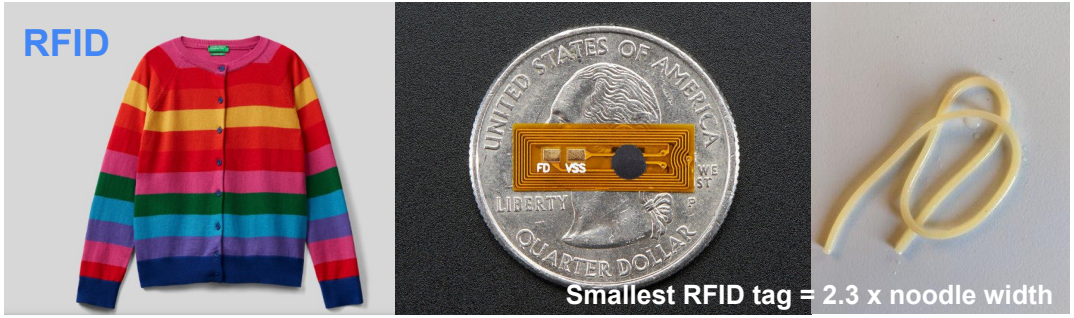


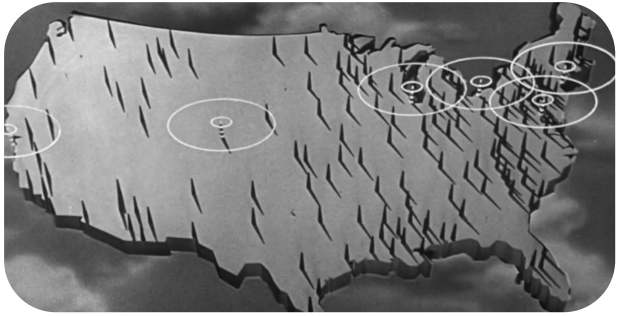


MAKING WAVES with radio

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







MAKING WAVES with radio

4. Making radio technology equitable requires all of our voices.

Ars Electronica winner 2022: “Bi0film.net: Resist like bacteria”

Designers: Jung Hsu/Taiwan, Natalia Rivera/Columbia

Parabolic antenna, repeater, and router for distributed civil resistance, alternative communication during pandemic protests.

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

Domino's upgrades store network ahead of more online orders and drone-delivered pizzas

ZDNet· March 27, 2022

HEALTHCARE

Drone Flies Lungs Between Hospitals For Transplant Patient

Forbes, Oct 14, 2021

New Making Waves Digital Kit

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

MAKING WAVES with radio

Activity Development Process

Developed

Core Partner Testing

Translated

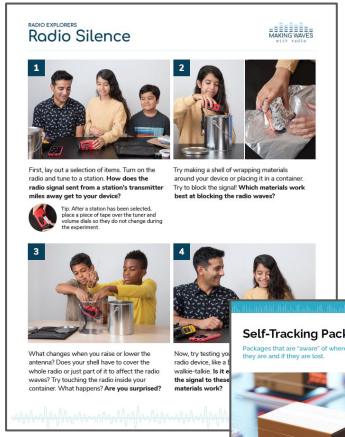
Extension Partner Testing

REVISIONS

Training video shoot

Activity photo shoot

Design and final layout



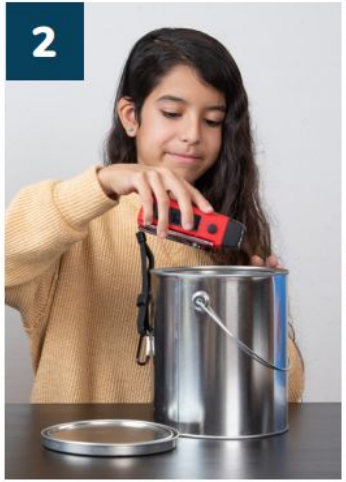
MAKING WAVES with radio

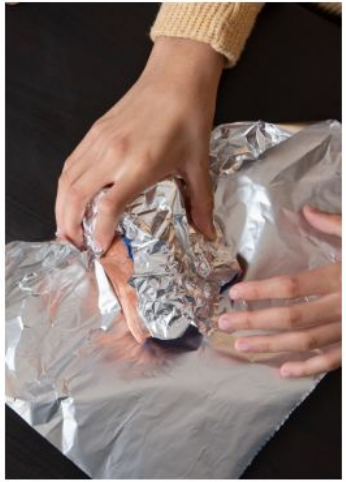
RADIO EXPLORERS

Radio Silence

1

2





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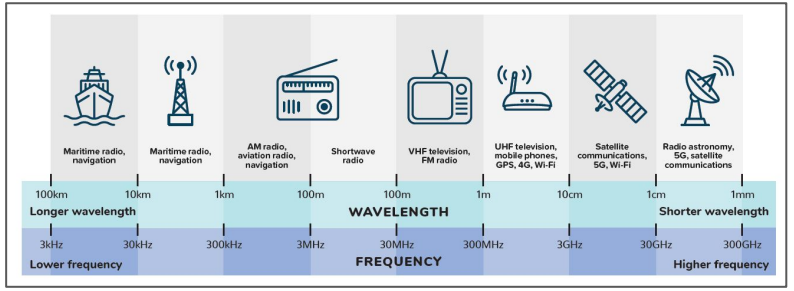
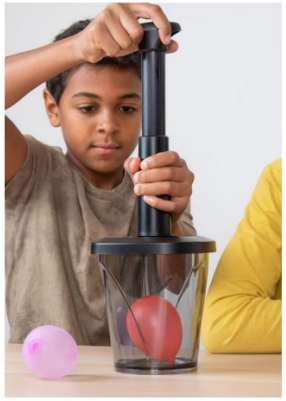


MAKING WAVES with radio

RADIO EXPLORERS

Messages from Space



MAKING WAVES with radio

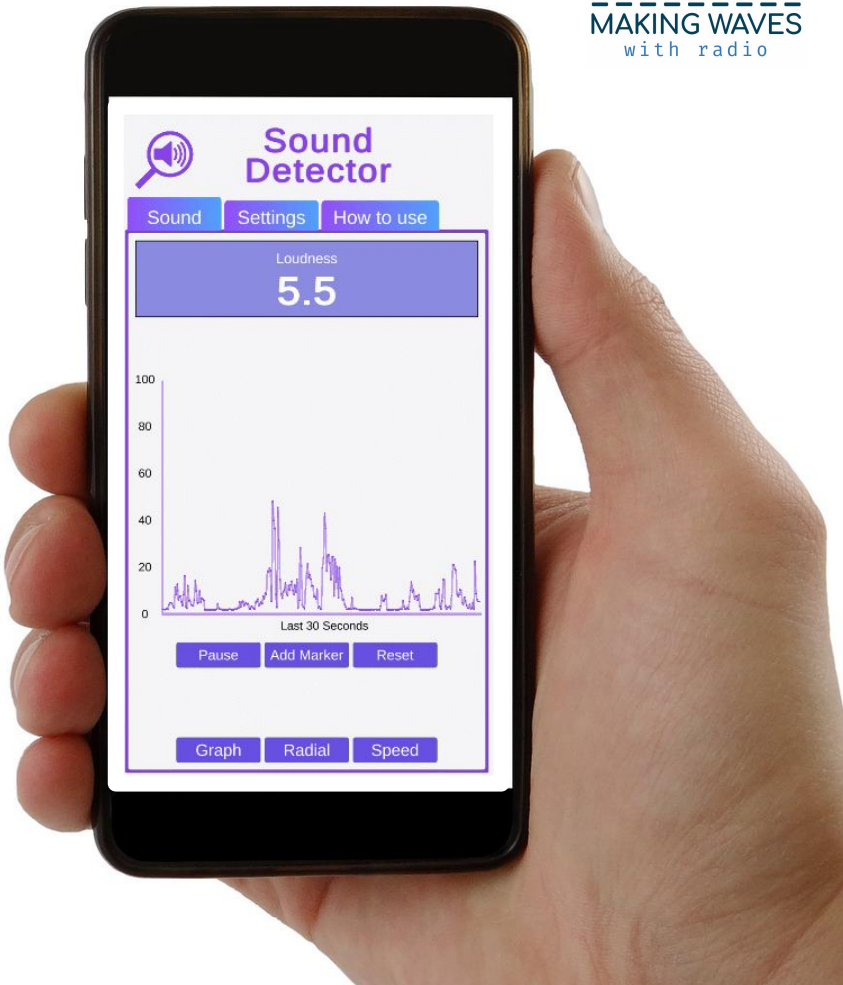
Sound Detector app

- Minimal, sleek, kid-friendly
- Multiple Visualizations
- Historic Data Graph
- Spanish Translation
- Accessible Contrast Modes
- QR Code sign available

GET IT ON Google Play

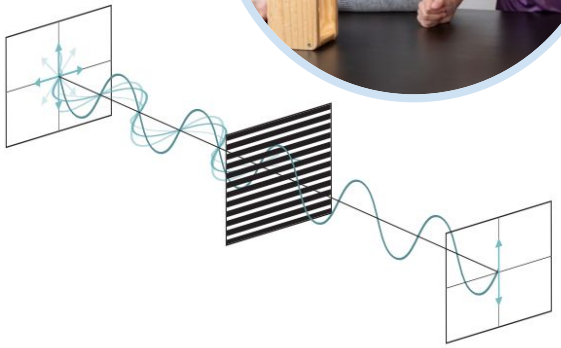
DISPONIBLE EN Google Play

bit.ly/sounddetectorapp



RADIO EXPLORERS

Wi-Fi Detective



MAKING WAVES
with radio

Wi-Fi Detector app

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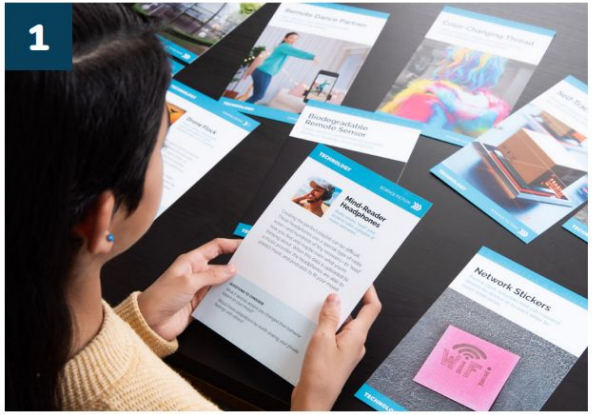
MAKING WAVES with radio

MAKING WAVES with radio

RADIO FUTURES

You Decide



Radio Wave Shield

Block the radio waves that carry data in and out of your home or business.

TECHNOLOGY SCIENCE FICTION

Drone Flock

These camera drones talk with each other to track whatever they are recording.

TECHNOLOGY COMING SOON

Artist

NAME: Alex (she/her)
AGE: 9
HOUSEHOLD INCOME: $$$$
TECHNOLOGY: iPad, Chromebook
Young artist just starting out

PEOPLE

Medical Technology Engineer

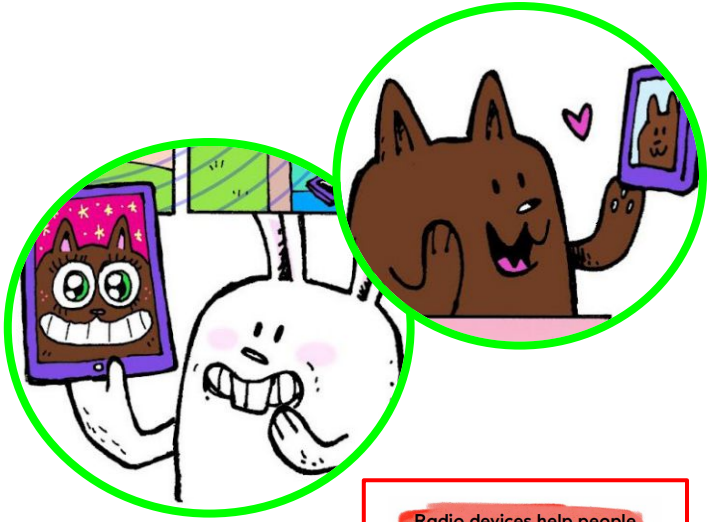
NAME: Maira (she/her)
AGE: 29
HOUSEHOLD INCOME: $$$
TECHNOLOGY: radio, laptop, desktop computer, cell phone
Entrepreneurial, wants to start her own company

PEOPLE

MAKING WAVES with radio

RADIO FUTURES

I Spy Radio



Radio devices help people talk together.

Find some in Wavetown!

CHILD: Radio devices can help people talk with each other. Find some examples.

ADULT: Point out to your young partner one device you used recently.

BOTH: Decide your favorite way to talk to each other when separated. What device do you prefer and why?

MAKING WAVES with radio

Feedback from Museum Educators

What did we hear from visitors while testing & developing the activities?

MAKING WAVES with radio

Sciencenter - Ithaca, NY

Using **I Spy Radio** with younger learners.

MAKING WAVES
with radio

Museum of Life and Science - Durham, NC

Using **Radio Silence, You Decide, and Wi-Fi Detective**

on the floor and with Spanish-speakers.

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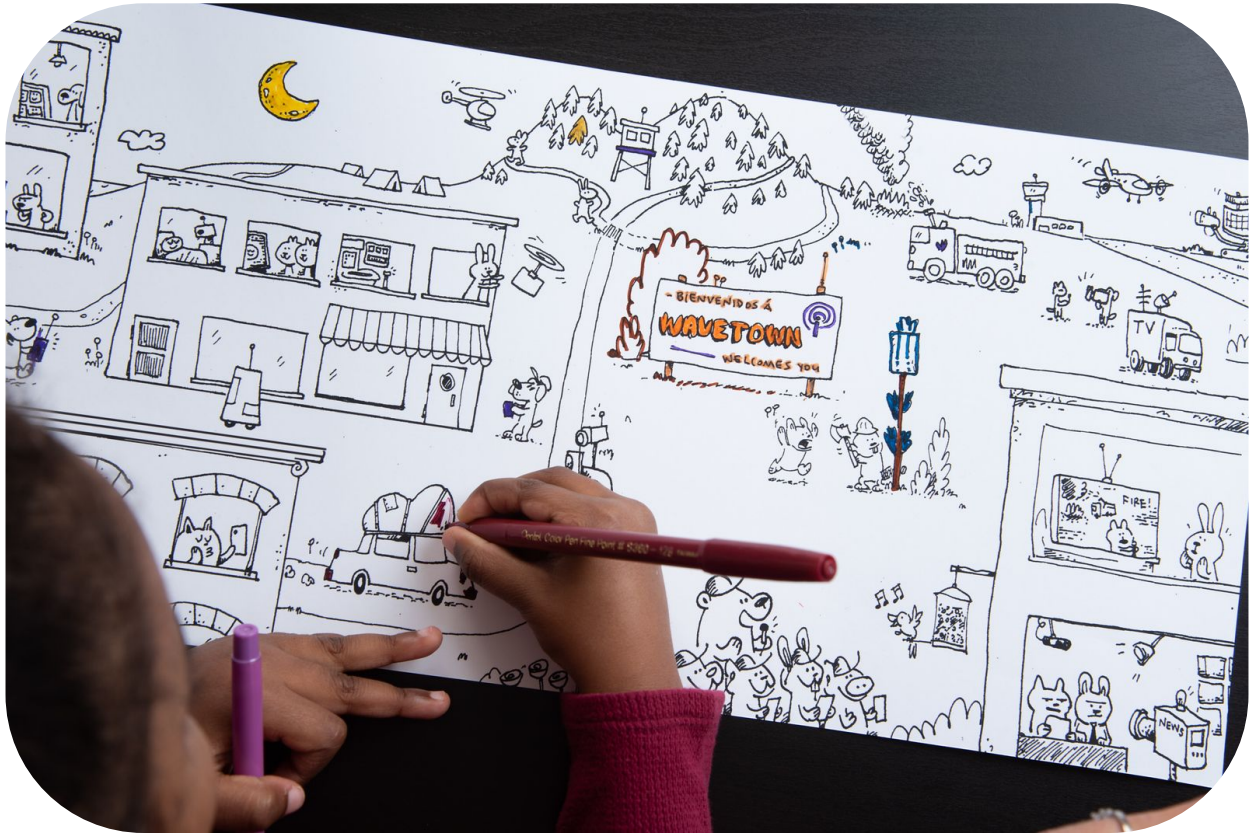
with radio

Q&A



Coming soon - Content Themes

Physics of Radio

- What are radio waves
- How waves work
  EM spectrum, wavelengths, & frequencies
- Radio waves in space & through space
- Blocking radio waves & interference

Radio Communications Technology

- How radio signals carry information - modulation, analog/digital conversion
- Transmitters & receivers
- Data encryption & security, encoding & decoding
- Signals: amplification, regeneration, jamming, & frequency hopping, 5G and beyond
- Antennas & MIMO - resonance, bandwidth, modern antennas & antenna arrays
- Sensor networks & IoT

Radio in Society

- Radio devices at home and around town (how communities and people use radio)
- Spectrum allocation & crowding
- Rights, Ownership, & Piracy (Industry cooperation services, pirate radio)
- Myths, Health, & Well being (radiophobia)
- Shaping radio futures and our roles

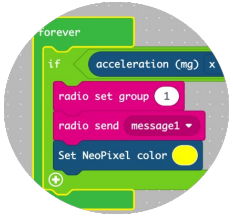
MAKING WAVES with radio

Radio Makers
Coding camp

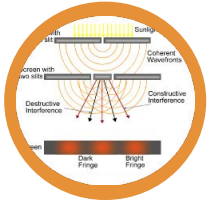
Radio Explorers
IoT radio camp

Radio Makers
Smart Cities

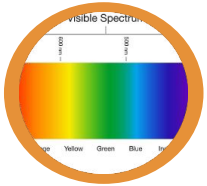
Radio Makers
My:Talkies



Radio Explorers
Broadcasting



Radio Explorers
EM waves



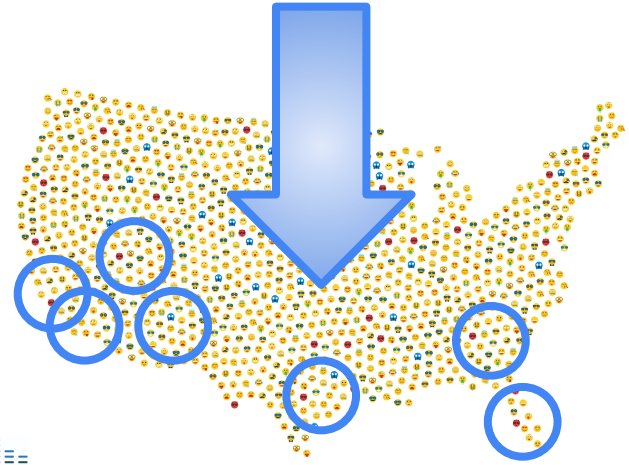
Radio Explorers
Frequency Hopping

Radio Explorer
Signal searcher

Radio Makers
Light Radio

MAKING WAVES
with radio

Coming soon - 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**

Resources & Opportunities

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

NISE NETWORK
NEWSLETTER

Read our monthly newsletter
nisenet.org/newsletter

Follow NISE Net on social networking
nisenet.org/social

2023 Online Workshops

Bubbling Up later this Year… 😸

Take a Voyage through the Solar System with the NISE Network!

Tuesday, May 9, 2023
2pm-3pm Eastern / 11am-12pm Pacific

Topics from Sustainable Futures Fellows - Coming this Summer!

NISE NETWORK
ONLINE WORKSHOPS

Learn more at nisenet.org/events

Thank You

This material is based upon work supported by the National Science Foundation under Award Number 2053160. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the view of the National Science Foundation.