

## Collaborative Challenge

# Puff Mobiles

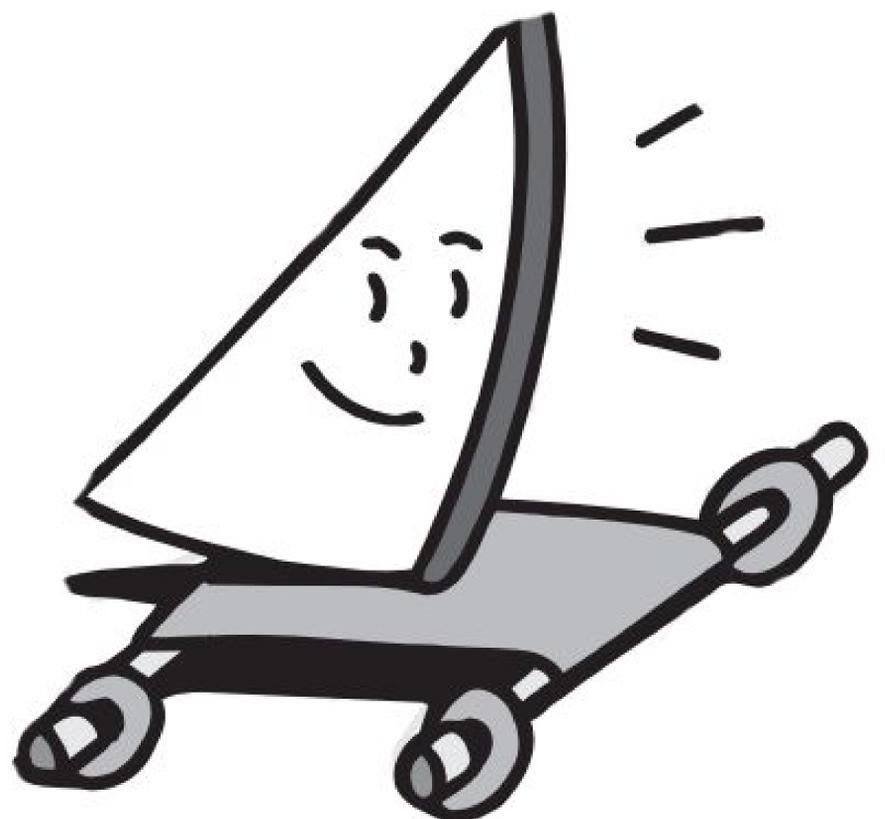
**YOUR CHALLENGE:** Using these materials, design and build a car that moves only by blowing on it:

- 3 non-bendable plastic drinking straws
- 4 Lifesavers™
- 1 piece of paper
- 2 paper clips
- tape
- scissors



### CAN YOU:

- Measure how far your car travels with one puff?
- Determine how many puffs it takes for your car to travel 6 feet?
- Redesign your car so that it will travel the same distance with fewer puffs?



Activity adapted from:

<http://www-tc.pbskids.org/zoom/printables/activities/pdfs/puffmobile.pdf>

# Stop Motion Hybrid Animals

**WHAT:** Stop motion animation is where you take many photos of objects or characters and string them together into a movie. Each time you take a picture, you'll move the character or object just a tiny amount. The onion skin feature helps you line up your shots to create a smooth animation. The voice recording feature even lets you narrate the story once you're done filming.

**YOUR CHALLENGE:** Create a stop motion animation video of an originally designed hybrid animal.

## CAN YOU:

- Name your animal, and describe its unique traits and characteristics?
- Show your animal moving through its natural habitat?
- Add a voice narration or sound effects?



# Draw Bots

**WHAT:** Draw Bots are drawing robots made out of a DC hobby motor, battery pack and art supplies. The robot is brought to life by completing a simple circuit between the battery and the motor.

## ELEMENTARY CHALLENGE:

Use the materials provided to design your own Draw Bot.

### CAN YOUR BOT DRAW:

- Dotted lines?
- Straight lines?
- In circles?



## MIDDLE/HIGH SCHOOL CHALLENGE:

Use the materials provided to design and redesign your own Draw Bot and chart the impact of the different variables.

### UNDER WHAT CONDITIONS CAN YOUR BOT DRAW:

- Dotted lines?
- Straight lines?
- In circles?



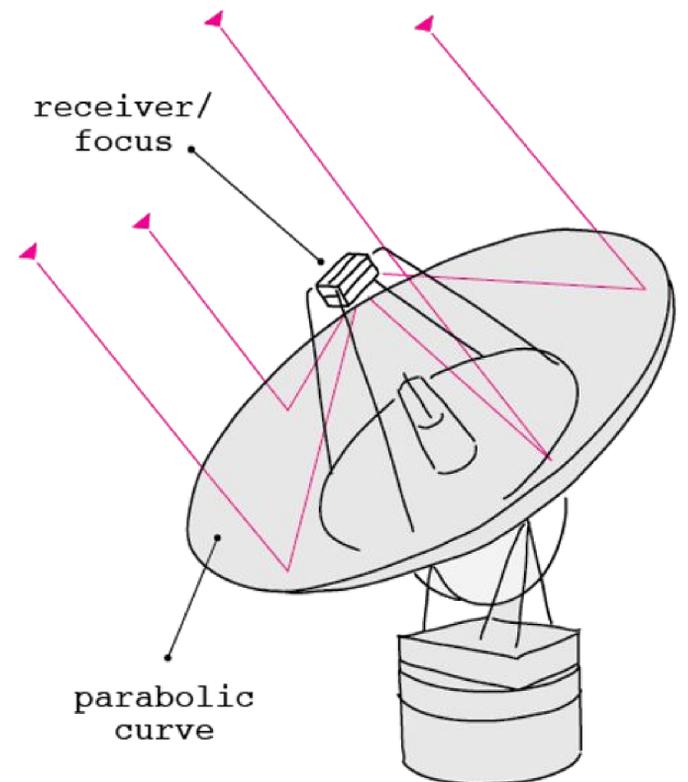
# littleBits



# Satellite Dish

## WHAT:

Satellites come in many shapes and sizes. But most have at least two parts in common - an antenna (also called a receiver or a focus) and a power source. The antenna sends and receives information, often to and from Earth. The power source can be a solar panel or battery.



**YOUR CHALLENGE:** Design a satellite that uses *reflected light* to model how radio waves would transmit data long distances.

## CAN YOU:

- Brainstorm how you might design your satellite to capture as much **reflected light** as possible?
- Test satellite with a flashlight.
- Record your distance and corresponding light sensor data.
- Redesign in order to obtain a higher sensor reading?

### Materials:

- Plastic cups
- Paper bowls or plates
- Tin foil
- Tape (craft for littleBits/duct tape for bowl/cup)
- Wide popsicle sticks
- Ping pong ball (optional)
- Rubber bands (optional if using craft tape)

### littleBits:

- Power bit & power cord
- Wires
- Light sensor & light sensor screw driver
- Number bit
- 9 volt battery

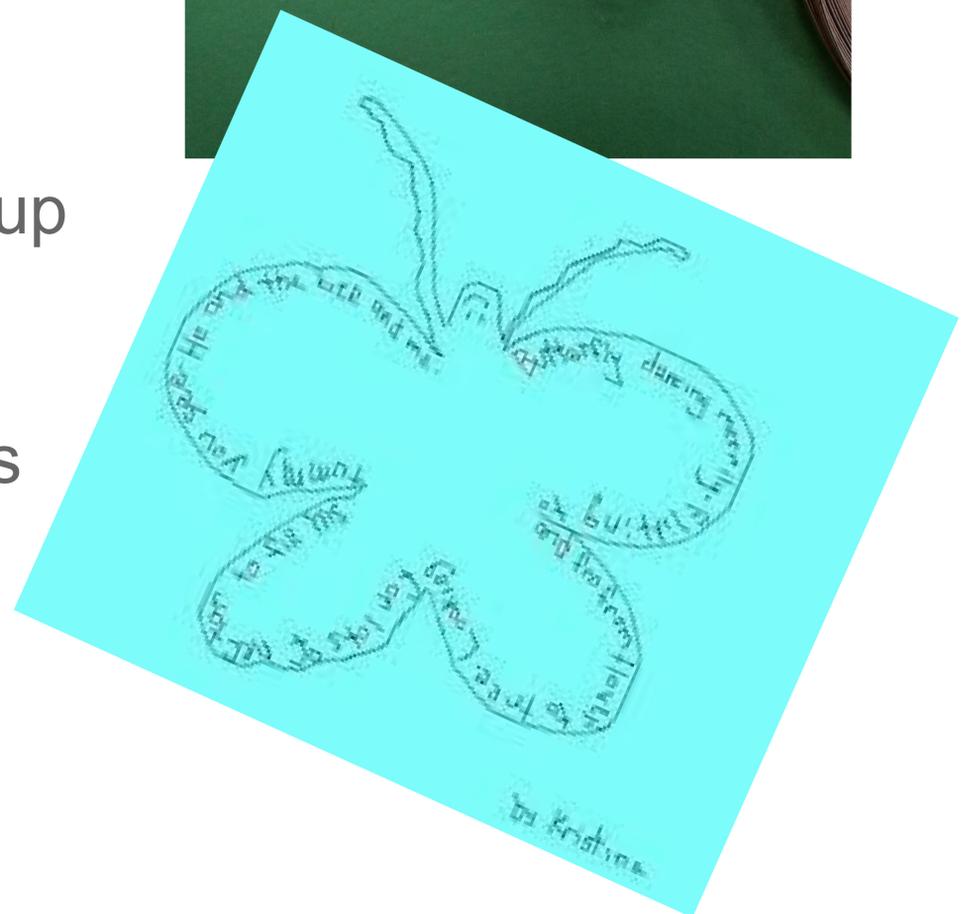
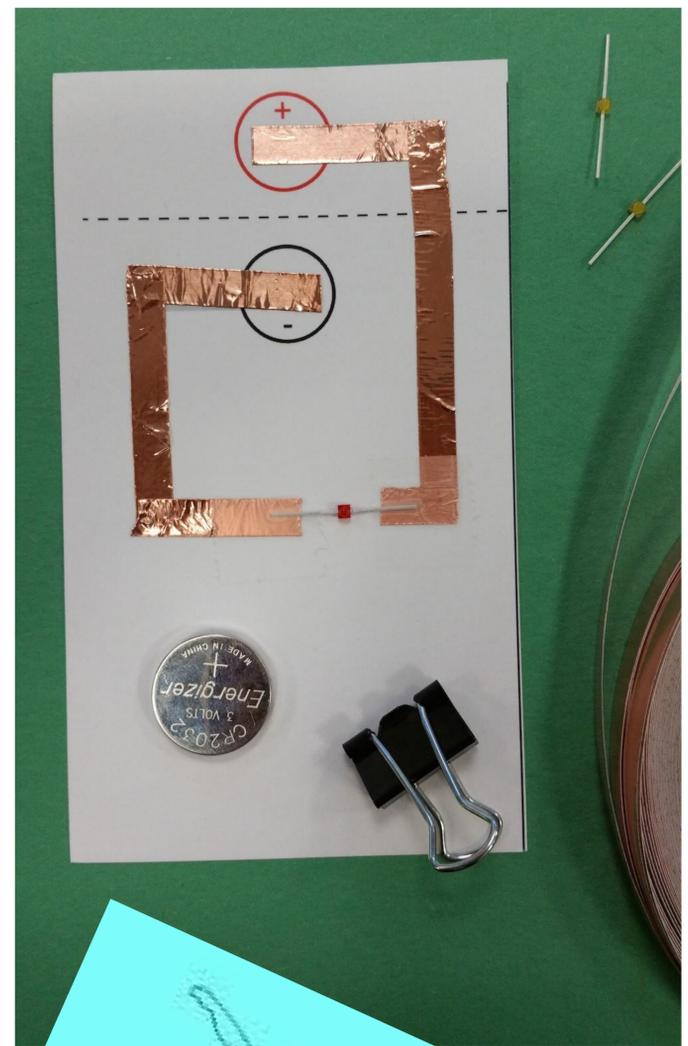
# Concrete Poems & Paper Circuits

**WHAT:** Concrete Poems are written to take the shape of poem's topic. And paper circuits are self-designed simple or complex circuits made of cardstock, copper tape, a 3V battery, and LEDs.

**YOUR CHALLENGE:** Create a simple circuit to enhance a concrete poem.

**CAN YOU:**

- Think of a simple poem?
- Create a simple circuit to light up your poem?
- Design a circuit that will bring your poem to life with the LEDs



# Scratch Jr.

**WHAT:** Scratch Jr. uses color-coded “blocks” that can be dragged down into the programming area to instruct a character to do something (move, talk, jump, etc). These command blocks can be snapped together to create more complex instructions

**Note:** you need to begin with one of the **yellow blocks** (like the green flag). Click on the green flag at the top of the screen to make your program go!



**YOUR CHALLENGE:** Create an interactive additional math story problem.

## CAN YOU ADD:

- An action that uses a repeat or wait block?
- A character that has your face? (hint: camera feature)
- A character that talks: with speech bubbles or sound?

# DIY Instrument with MaKey MaKey

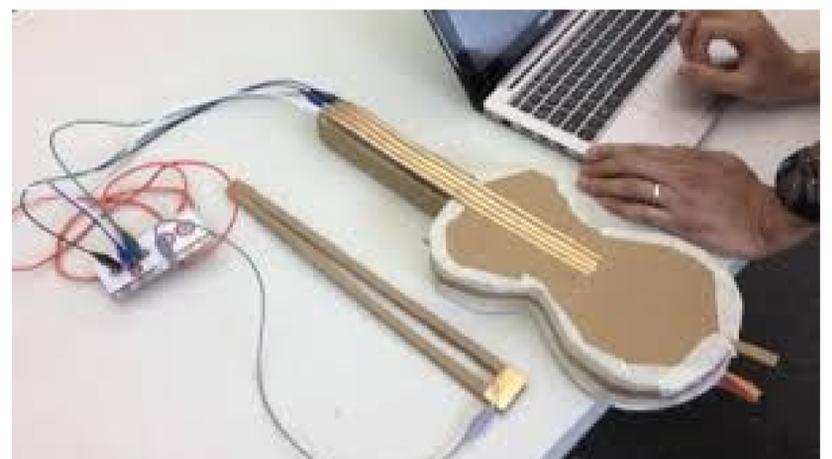
**WHAT:** MaKey MaKey works by creating simple circuits connected to an input (space key, up arrow key). Control the computer by turning conductive objects like fruit, tin foil, and water into a touch pad, mouse or keyboard.

**YOUR CHALLENGE:** Use conductive materials to design your own instruments and create an original piece of music.  
(<http://makeymakey.com/piano/>)



## CAN YOU:

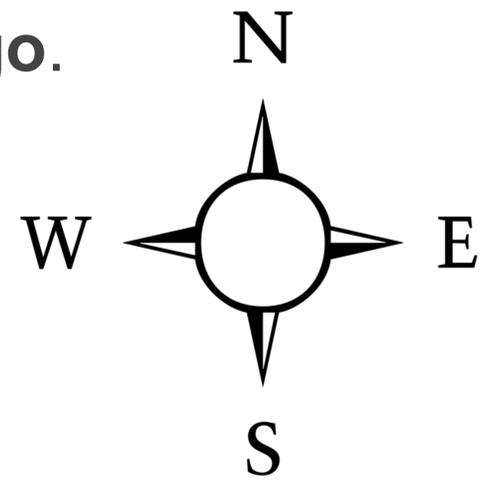
- Make yourself into an instrument?
- Create a song?
- Make a friend part of your instrument?
- Make an instrument using all of your friends?



## INDEPENDENT ACTIVITY

# Bee-Bot City

**WHAT:** The Bee Bot robot is programmed by pressing the desired buttons and then pressing **go**.



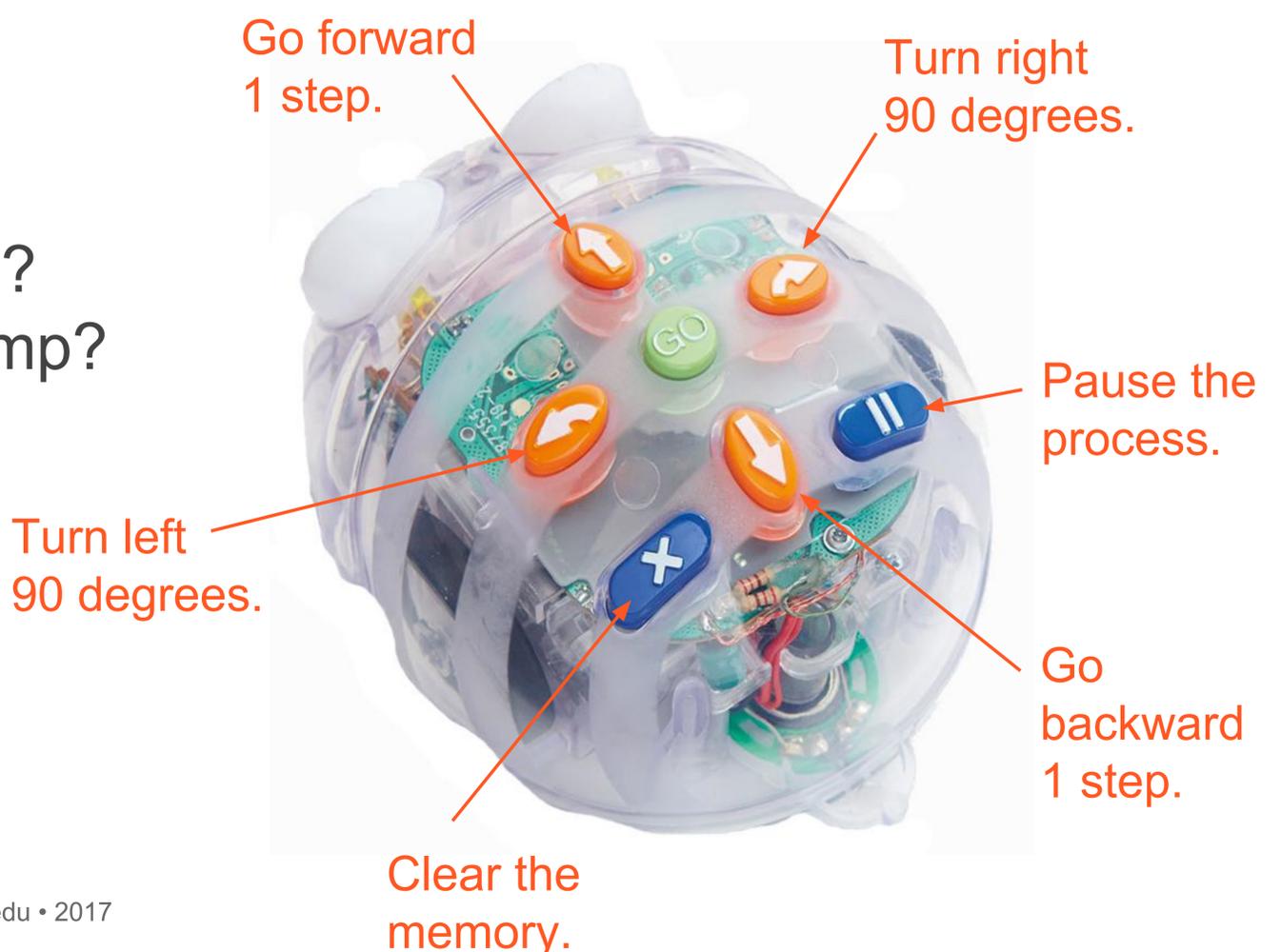
**Note:** Be sure to press **clear** between each program! You can press more than one button (multiple instructions) before pressing go.

**YOUR CHALLENGE:** Help us build our Robot City!

1. Using recyclables: create a streetscape/neighborhood.
2. Use post-its or cardstock to label the environmental print, street signs, storefronts, neighborhood helpers, cardinal directions.
3. Can you program the Bee-Bot to move around the city?

### CAN YOUR BOT:

- Turn at street corners?
- Repeat a move?
- Go up a low ramp?
- Turn at a 45 degree angle?

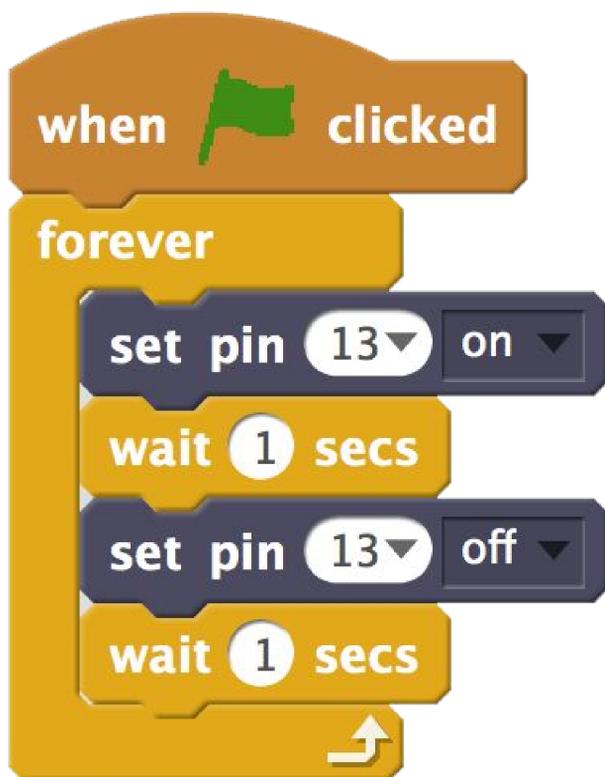


## INDEPENDENT ACTIVITY

# LED Clouds

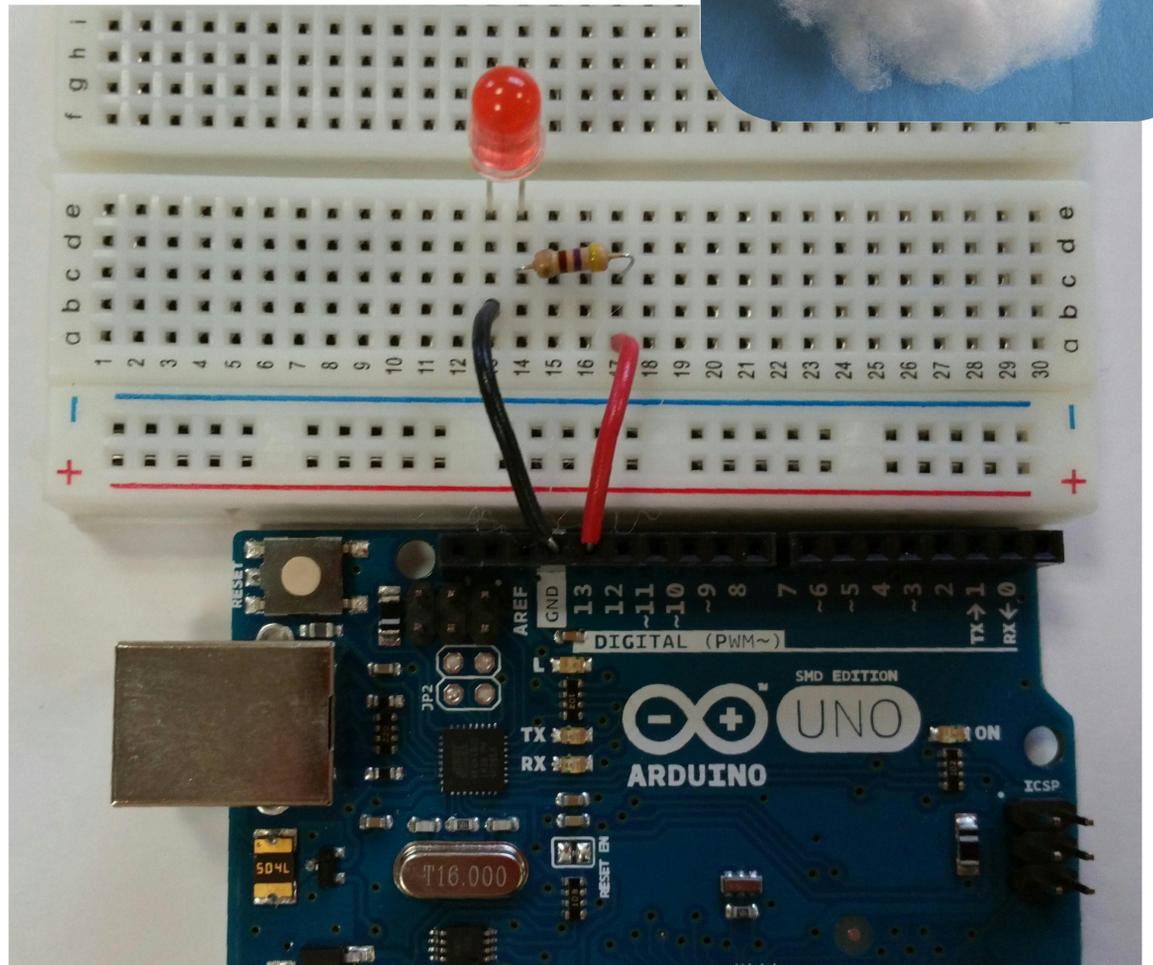
### CHALLENGE:

Make an LED cloud complete with flashing lights and sound effects.



### CAN YOU:

- Make your cloud light up?
- Record a sound effect for thunder?
- Use multiple LEDs to give your cloud a unique lightning effect?



ScratchX is the experimental extension system for the Scratch programming language developed by the Lifelong Kindergarten Group at the MIT Media Lab. The Scratch Arduino 101 extension lets you interact with the physical world using an Arduino/Genuino 101 board. The 101 features a built in tilt sensor and wireless Bluetooth connectivity. For all the details/specs, check out ScratchX: <http://scratchx.org/#extensions>

## INDEPENDENT ACTIVITY

# Green Screen

**WHAT:** Using the Green Screen app DoInk, you can transport yourself anywhere you want to be!



### YOUR CHALLENGE:

Picture yourself in Thoreau's cabin at Walden Pond, or peaking into the windows at Paul Revere's house, or looking up at Hogwarts as you dream about the adventures to come!

### CAN YOU IMAGINE YOURSELF:

- Traveling through time!
- Inside your favorite book!
- Standing next to your favorite author!

### WHERE TO START:

1. Launch Photos and browse the images in the ISTE 2017 album or save a background of your choice into the camera roll.
2. Launch Green Screen by DoInk
3. Tap the "+" in the bottom row then tap on the "Image" icon and select your desired background image, then select "Use"
4. Now select the middle "+" then select the "Camera" icon *and get ready in front of the green screen!*
5. Have a friend take your picture by tapping the round circle by the play button and select Done
6. To share, tap "Show Export Options" - then Select "Twitter"
7. Type in your message, add **#ISTE2017** (add **@LesleySTEAM** if tweeting from your own handle.)