

# Nature Bots

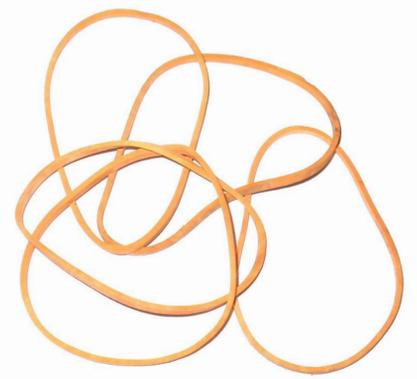
**WHAT:** Nature Bots are moving/spinning robots made out of a DC hobby motor, battery pack and natural materials. The robot is brought to life by completing a simple circuit between the battery and the motor.

## YOUR CHALLENGE:

Use the materials provided to design a roving robot.

## CAN YOU:

- Predict how your robot will move based on your design?
- Consider design variables: weight, friction, balance?
- Integrate a variety of natural materials into your design?
- Redesign for a different movement: spinning, straight, bouncing, etc?
- For the final bot:
  - What types of plant materials did you use?
  - Identify unique characteristics of each material: shape of leaves, type of flower, color, seed type, texture, fruit type, size, and bark.



Rubber bands



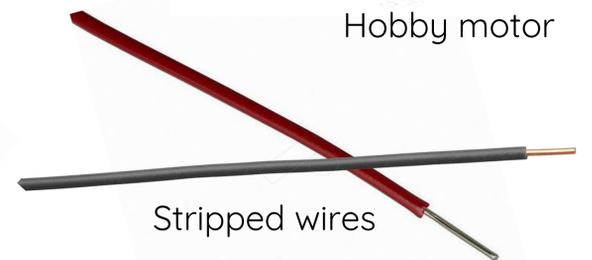
Glue gun



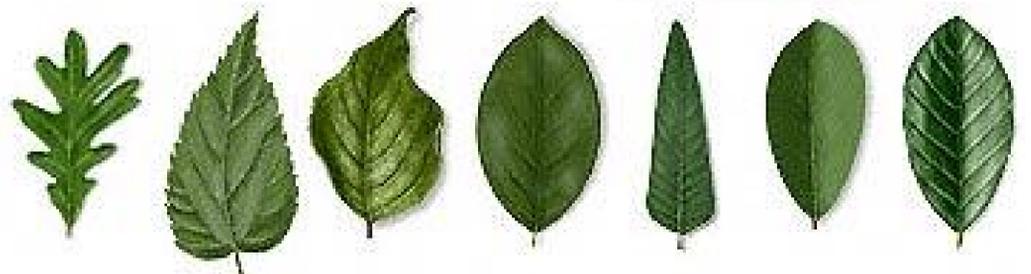
Hobby motor



Needle nose pliers



Stripped wires



Variety of natural materials



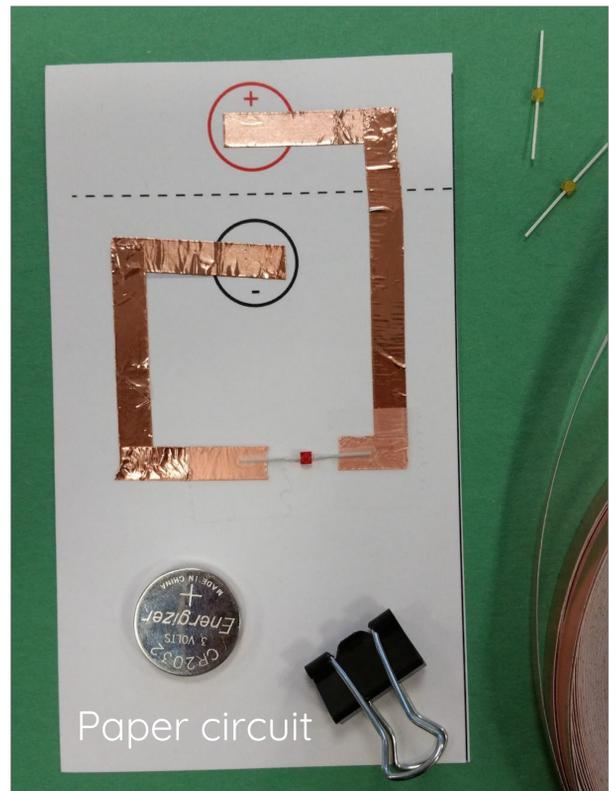
# Light It Up!

**WHAT:** Electronic wearables use LEDs (light emitting diodes) plus conductive tape and 3 volt batteries to create an illuminated product or design.

**YOUR CHALLENGE:** Design a duct tape bookmark or bracelet that incorporates elements of light.

## CONSIDER:

- Are you using **one** or **two** LEDs? Will your design use a series circuit or parallel circuit?
- Can you integrate a “switch” that helps easily turn your design on/off to save battery power?
- How might your design present a fashion concept or solve a real world problem?



# Energy Tips



**LED:** Light Emitting Diode, have negative and positive leads (legs)

**Node:** the electrical junction between two or more components.

**Voltage:** The measurement of the electrical potential produced by the battery, or the utility grid connected to the wall outlet. It is the amount of potential energy between two points on a circuit.

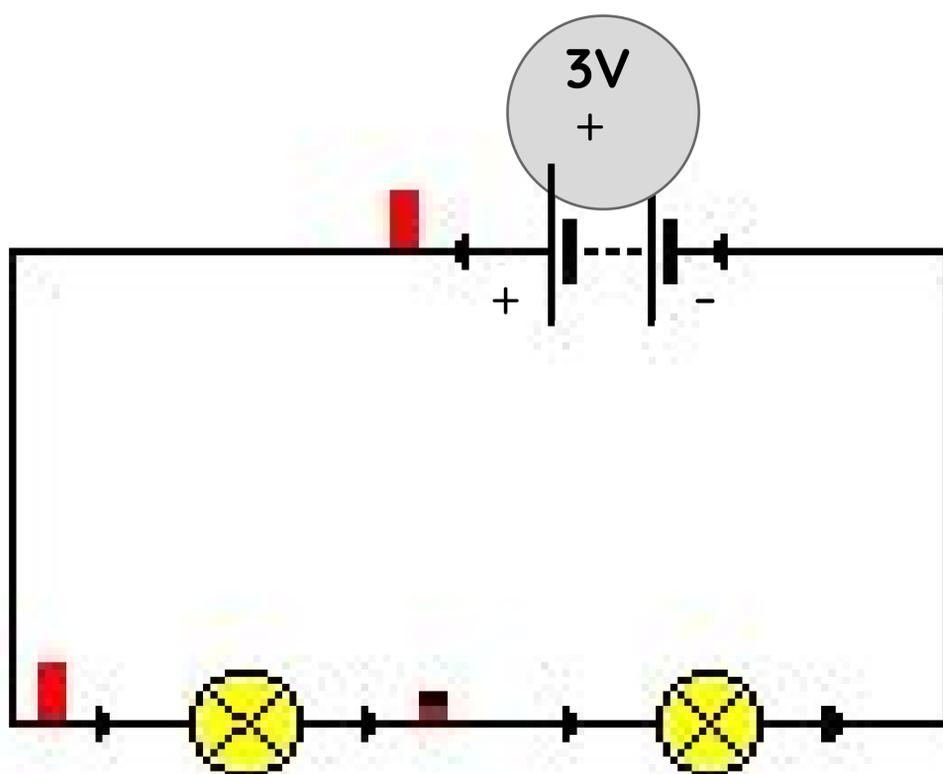
**Current:** is the rate at which charge is flowing. Current flows from a high voltage to a lower voltage in a circuit. Some amount of current will flow through every path it can take to get to the point of lowest voltage (usually called **ground**).

**Voltage drop:** Each LED reduces the amount of current running through a circuit.

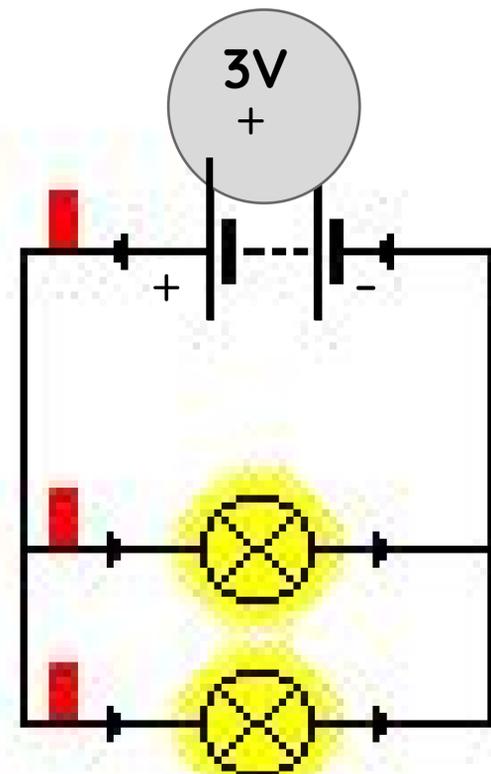
**Series circuits:** share a common node and the same current flows through them.

**Parallel circuits:** components all have the same voltage drop across them. They ensure all components in the circuit have the same voltage as the source (all bulbs in a string of lights with a parallel circuit will have the same brightness.)

Vocabulary source: <https://learn.sparkfun.com/tutorials/what-is-a-circuit>



Series Circuit



Parallel Circuit

[https://upload.wikimedia.org/wikipedia/commons/1/11/Series\\_and\\_parallel\\_circuits.png](https://upload.wikimedia.org/wikipedia/commons/1/11/Series_and_parallel_circuits.png)

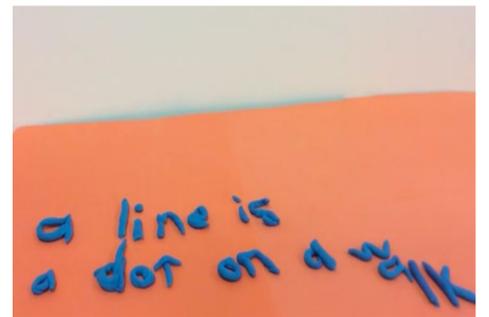
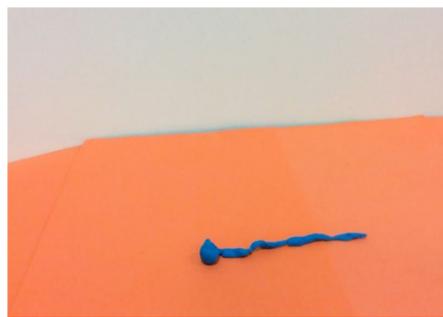
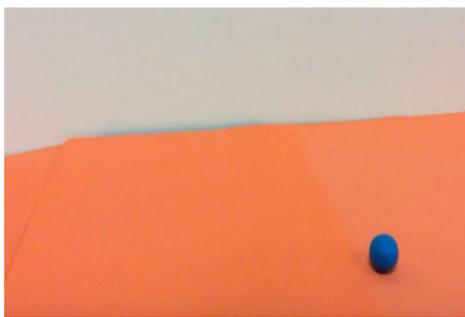
# Poetry in Action

**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:** Bring a poem of your choice to life through stop motion.

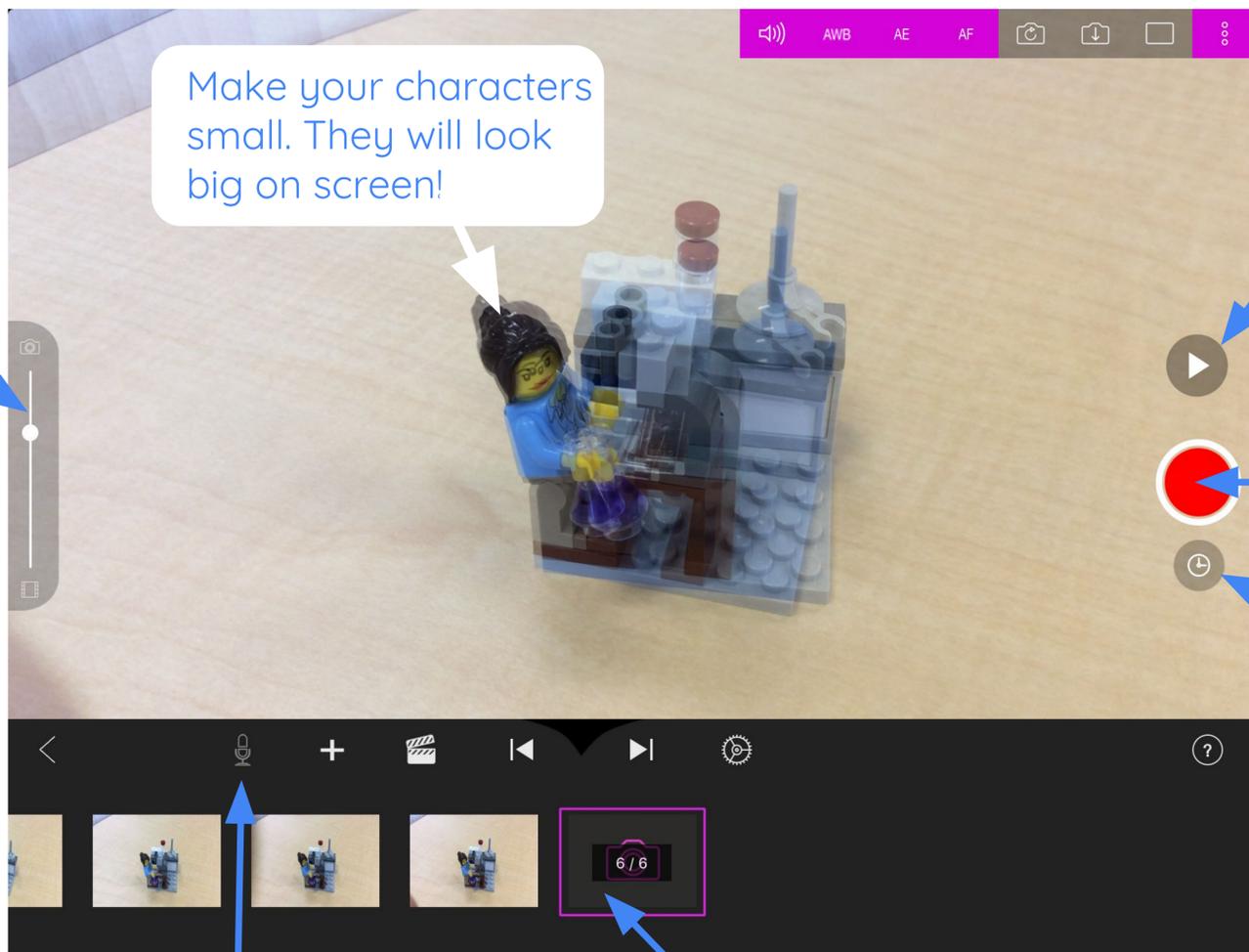
## CAN YOU:

- Take advantage of the text structure?
- Bring new meaning to the author's use of language and word choice?
- Take at least 50 - 100 photos to help make the animation flow organically?
- Add a voice narration and sound effects with attention to rate and expression of your reading?



# Stop Motion Studio Tips

Onion skin feature allows you to view hint of previous frame.



Playback

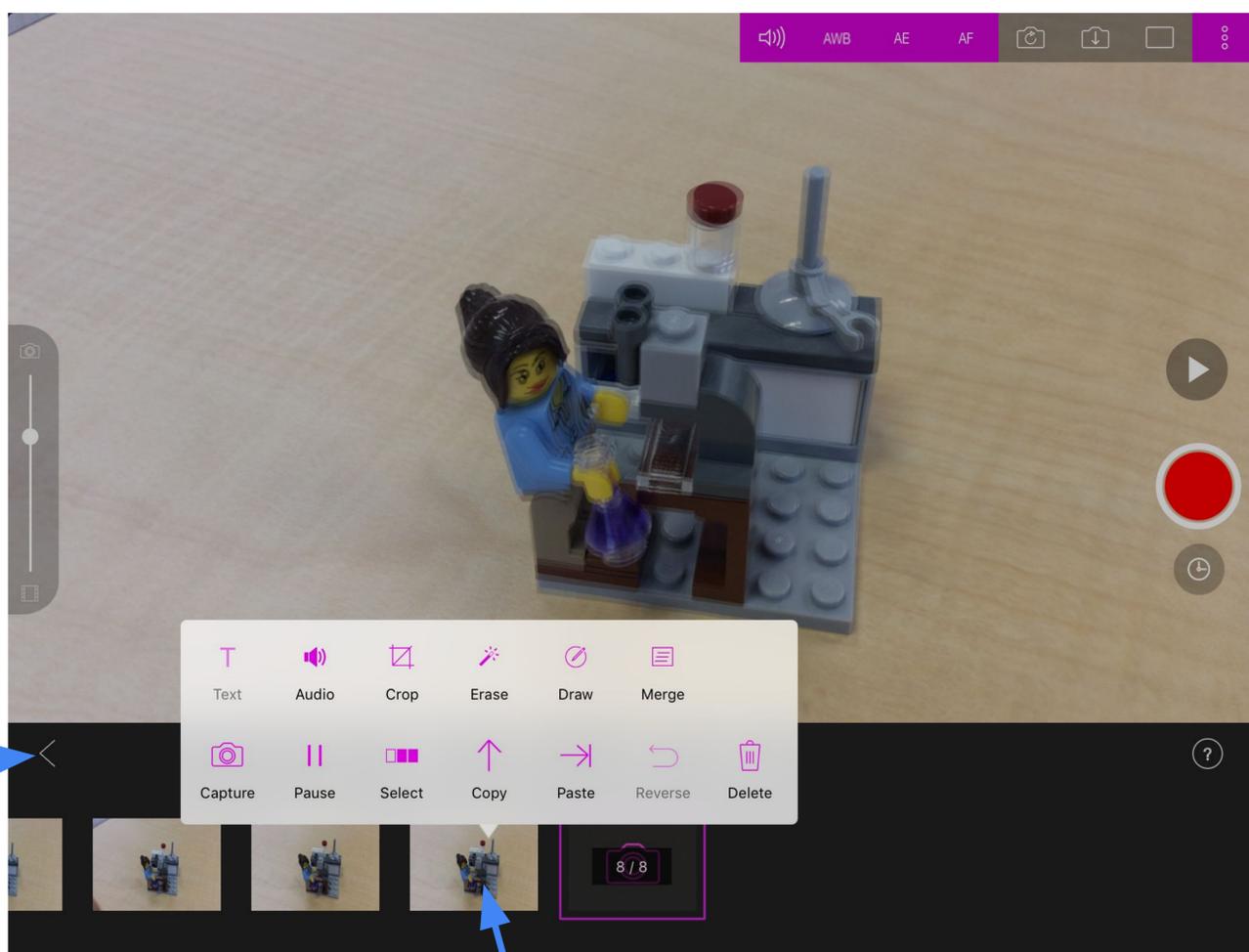
Camera button

Adjust frames per second

Record audio

Timeline

Go back to projects start page to export your video.

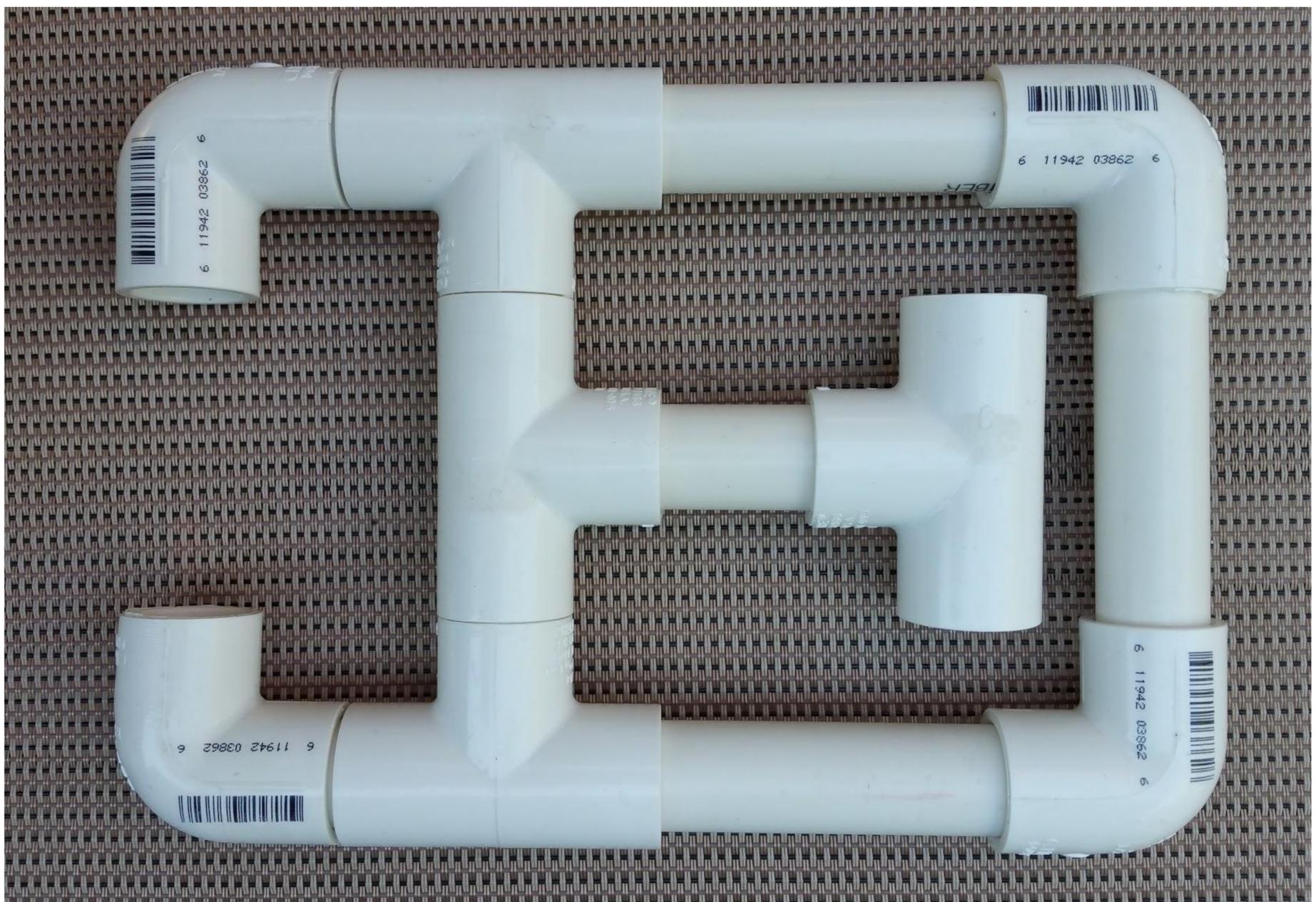
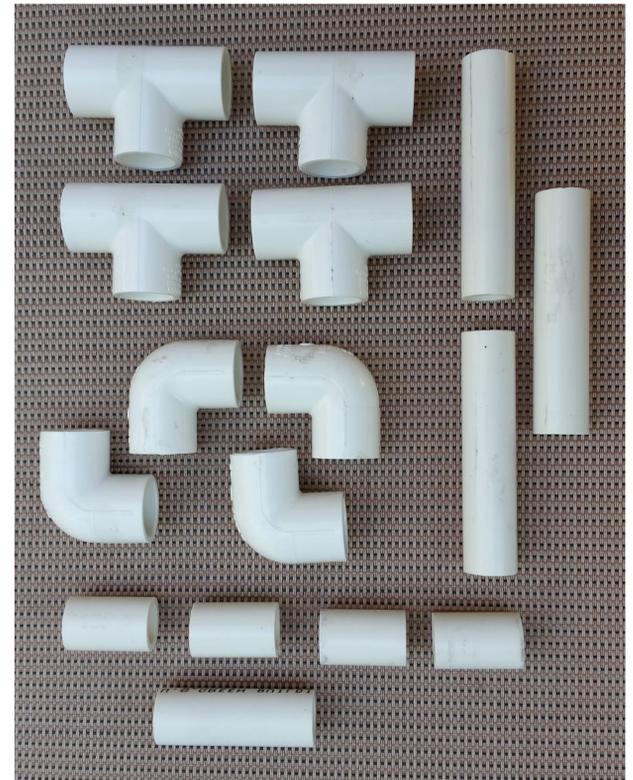


Holding your finger down on a frame reveals a variety of tools, including delete one frame.

# DIY iPad Stand<sup>1</sup>

## → PVC Parts List (16 Pieces)

- ◆ Four ½” Tees
- ◆ Four ½” 90° Elbows
- ◆ Three ½” tubes - 3 ¾” long
- ◆ Four ½” tubes - 1 ⅜” long
- ◆ One ½” tube - 2 ½” long



<sup>1</sup> Many thanks to our colleague Rosey McQuillan for sharing this DIY iPad Stand. Follow Rosey and her good work on Twitter @romquill

## Independent Activity

# MaKey MaKey Mashup

**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. With Scratch, you can program interactive stories, games, animations, and music — and share your creations with others.

### YOUR CHALLENGE:

Use conductive materials (and your voice!) to create an original piece of music.

### CAN YOU:

- Record your own sound?
- Use the repeat or forever blocks to create loops?
- Customize the background and create your own sprite?
- Design a keyboard that plays notes?



## Independent Activity

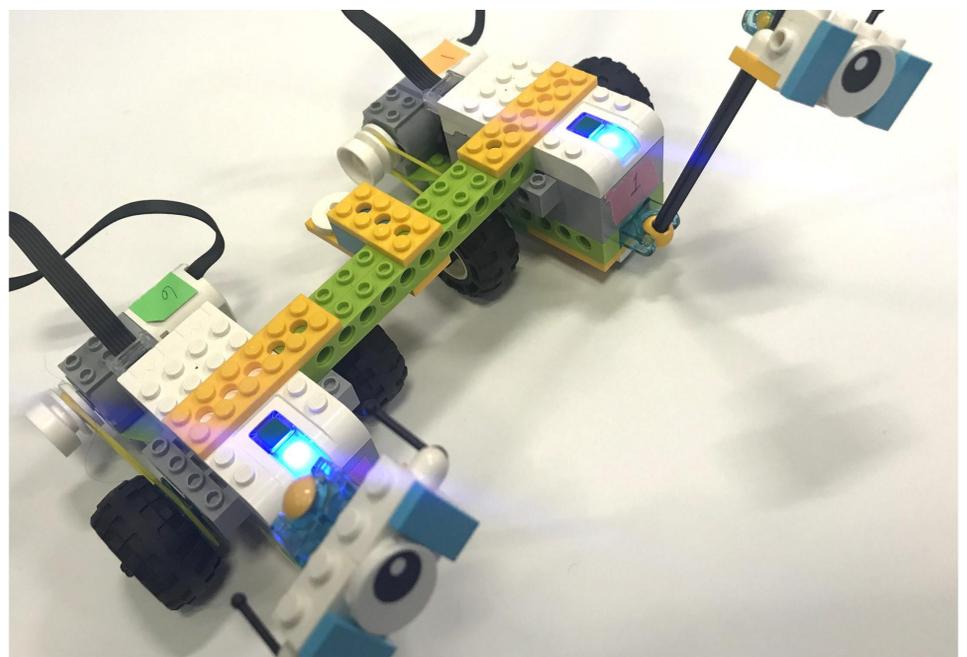
# WeDo Mars Rover

**WHAT:** The Lego WeDo is a robotics kit that contains a motor, sensors, and a variety of Lego parts that can construct robots and kinetic sculptures. Program your WeDo creation using the tablet software.

**YOUR CHALLENGE:** Collect rock and soil samples from the Martian crust using your Mars Rover Robot.

### CAN YOU:

- Design a track in the shape of a quadrilateral. Use painters tape to mark the corners of your track so you can reposition if needed.
- Program your rover to travel to each point of your track to simulate picking up samples.



<https://upload.wikimedia.org/wikipedia/commons/e/e5/Pathfinder01.jpg>

### EXTRA CREDIT:

- You were just notified that you missed a sample. Can you program the rover to go backwards to retrieve it?
- Can you edit your code to use fewer blocks?
- Add a victory sound at the end?

## Independent Activity

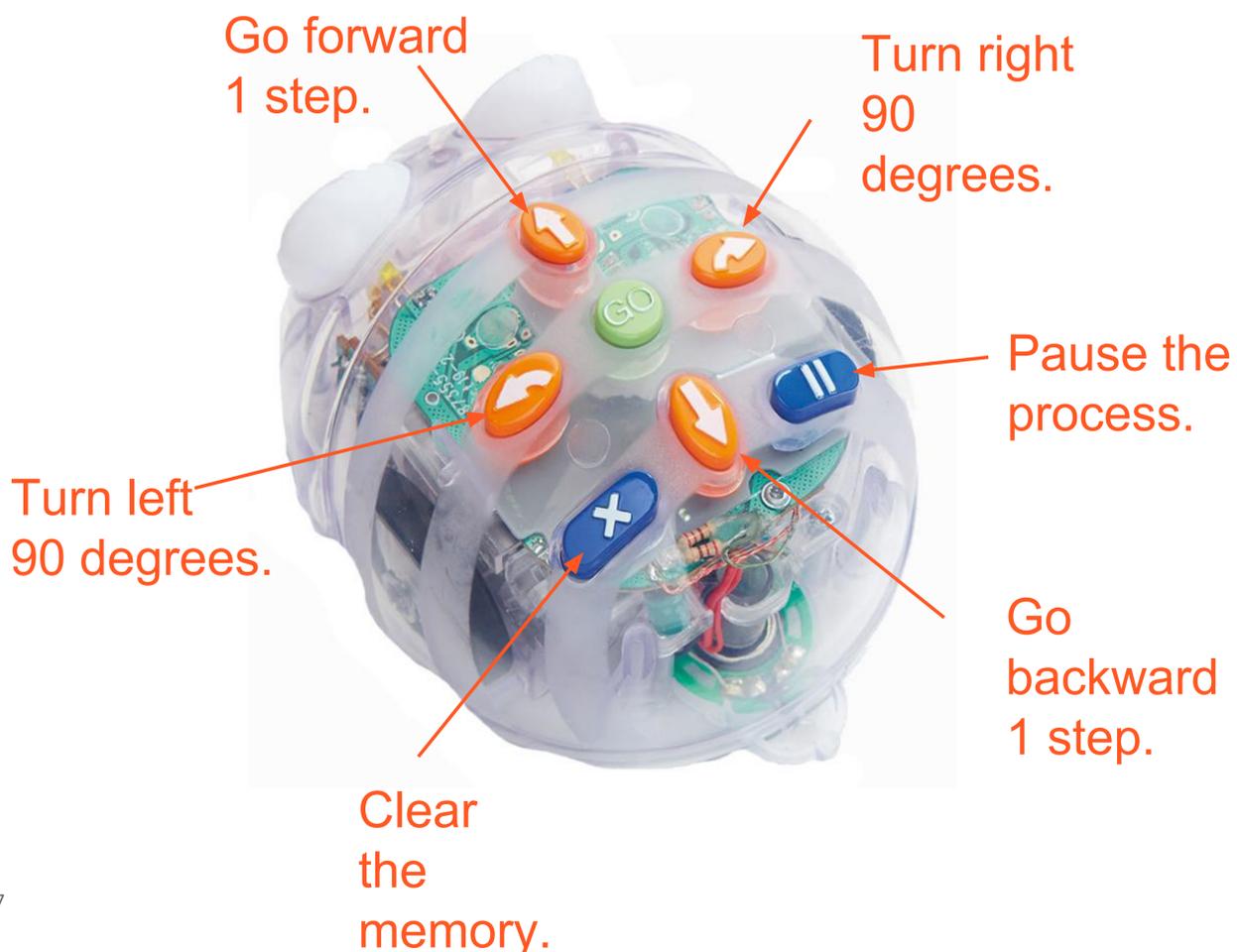
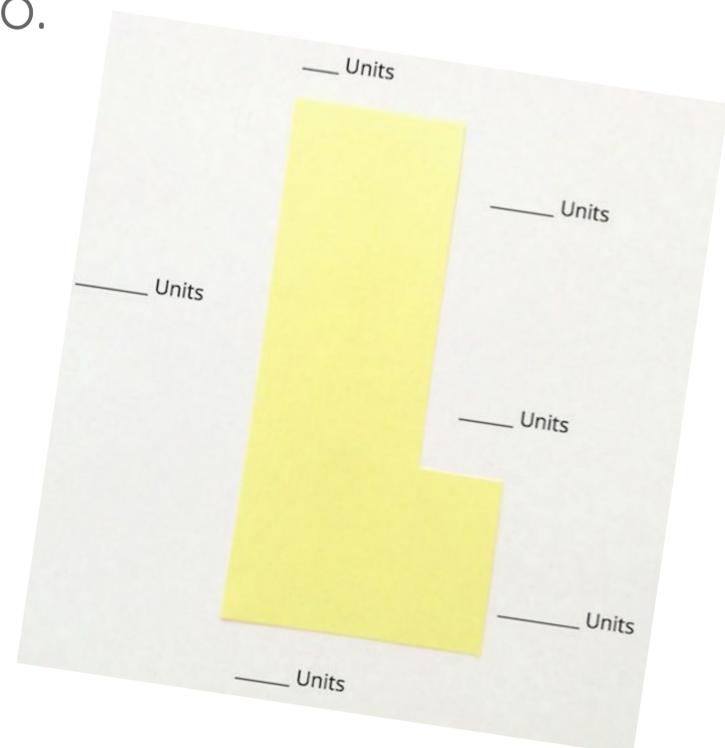
# Bee Units

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

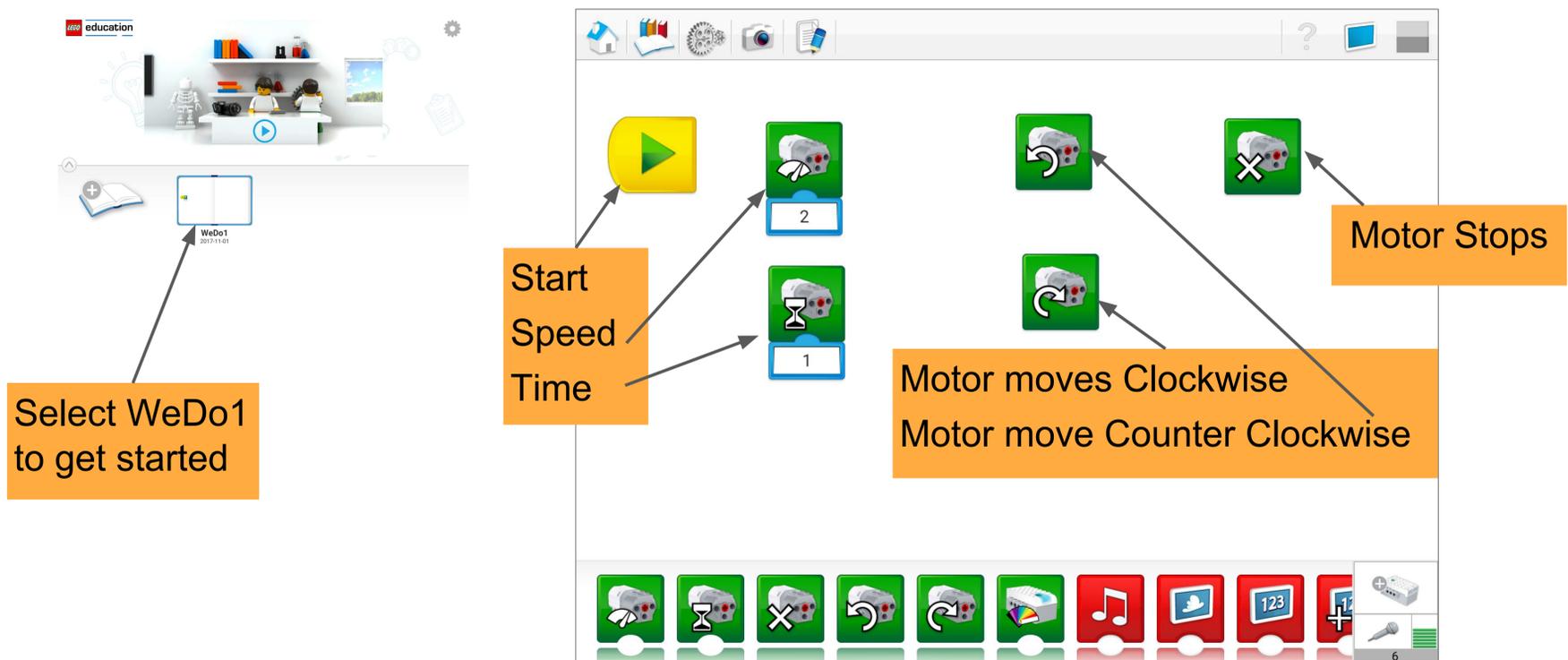
**Note:** Be sure to press **clear** between each program! You can press more than one button (multiple instructions) before pressing go.

### CAN YOU:

- Use the materials provided (string or pipe cleaner) to determine the length of a “Bee Unit” (one Bee-Bot move forward)?
- Predict if the perimeter of the two shapes are the same or difference?
- Write a code for your Bee-Bot to determine the actual perimeter in Bee-Units?
- Create a strategy to solve for area?

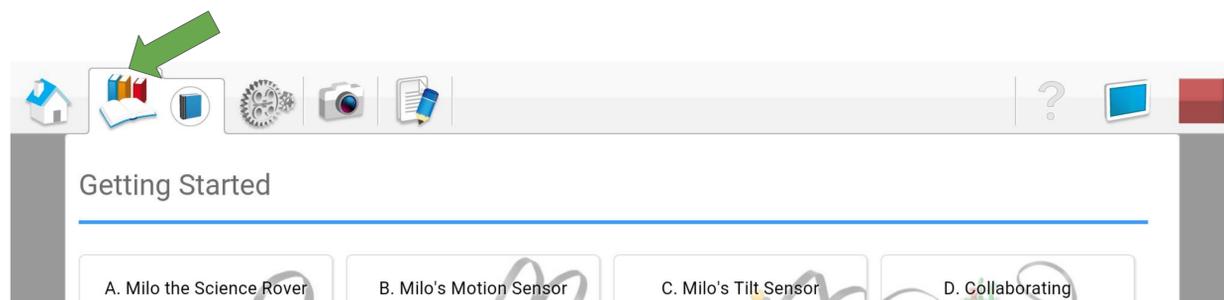


# WeDo 2.0 Tips



## Starting from Scratch

1. Tap this icon to start a new program 
2. Tap the books to hide the "Getting Started" guides



3. Tap the picture of the WeDo Hub in the bottom right hand corner to start the pairing process



4. Press the green button on top of the WeDo Hub then select the right number Hub on the tablet. (Each WeDo hub has a numbered sticker on the front)



5. When the blue light comes on the WeDo Hub you are ready to start programming!