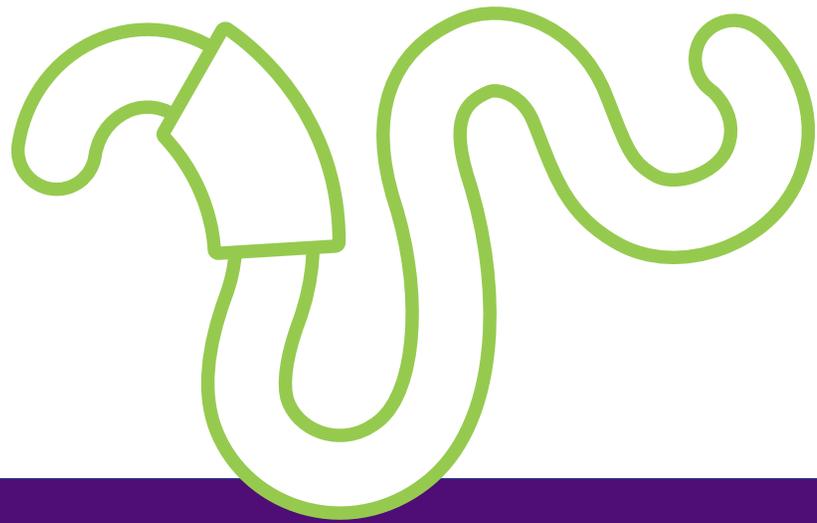


# CRAWLY CREATURE



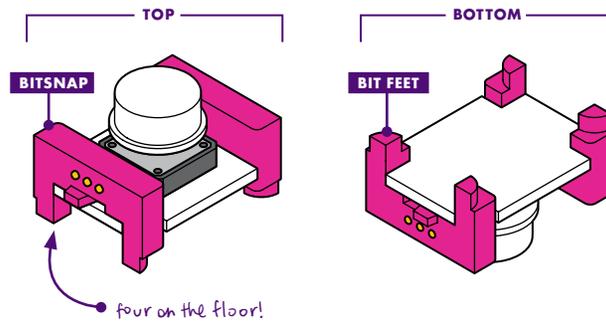
littleBits™

# littleBits™ BASICS

1

## ANATOMY OF A BIT™

Learn how you can tell top from bottom.



2

## COLOR-CODED BY FUNCTION

Bits™ are grouped into four different categories, which are color-coded.

### POWER (BLUE)

Power Bits, plus a power supply, run power through your circuit.

### WIRE (ORANGE)

Wire Bits connect to other systems and let you build circuits in new directions.

### INPUT (PINK)

Input Bits accept input from you or the environment and send signals that affect the Bits that follow.

### OUTPUT (GREEN)

Output Bits do something - light up, buzz, move...

3

## MAGNET MAGIC!

Bits snap together with magnets. The magnets are always right - you can't snap them together the wrong way.

### ARROWS SHOULD POINT IN THE SAME DIRECTION



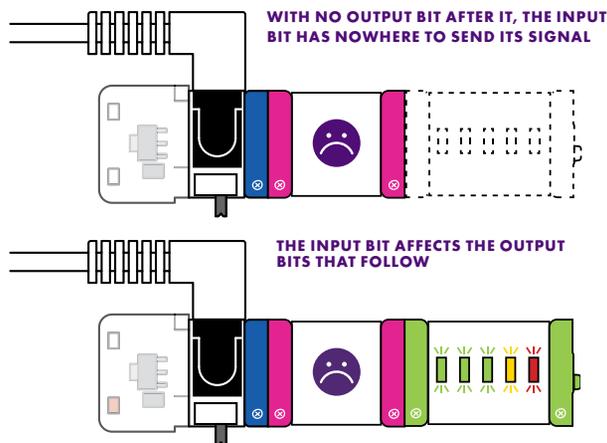
IF THE BITS WON'T SNAP TOGETHER, TRY SPINNING ONE AROUND AND MAKE SURE THE ARROWS POINT IN THE SAME DIRECTION



4

## ORDER IS IMPORTANT

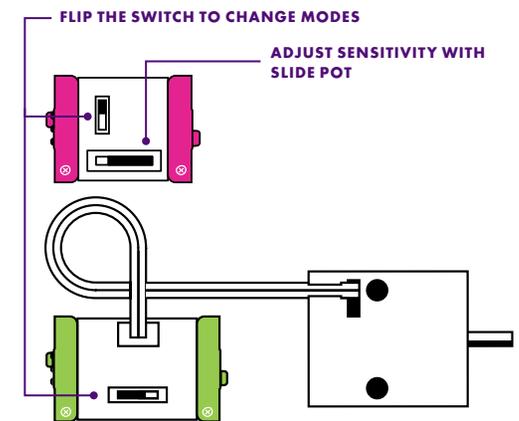
POWER BITS always come first and INPUT BITS only affect the OUTPUT BITS that come after them.



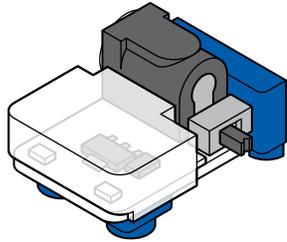
5

## SOME BITS ARE ADJUSTABLE

Switches, buttons, and dials on the Bit allow you to change how the Bit functions.



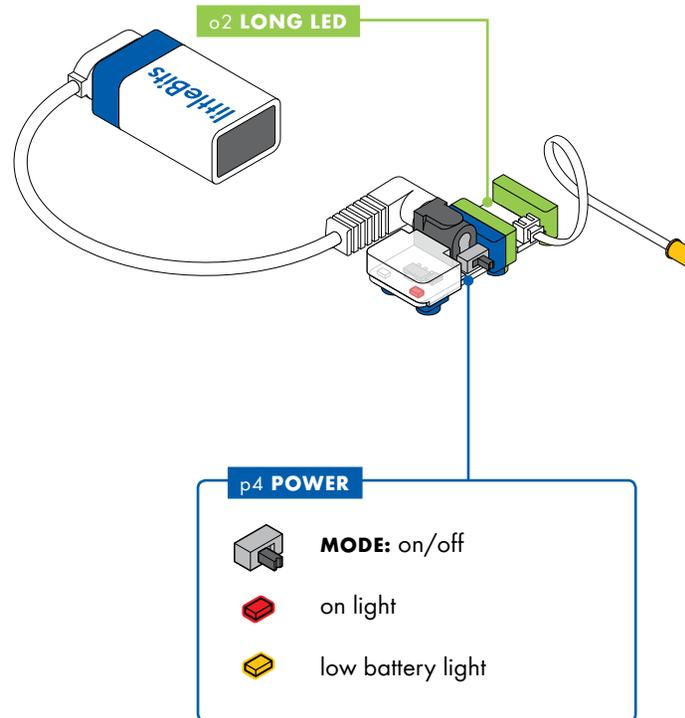
## p4 POWER



### MEET THE BIT

Every circuit starts with power. It provides the electricity that makes your Bits spin, buzz, blink, and shine.

### SAMPLE CIRCUIT



### HOW IT WORKS

The p4 power Bit converts the 9 volts of electricity in the battery to the 5 volts that littleBits circuits run on.

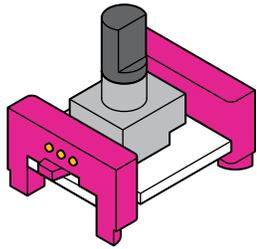
The power Bit also sends a signal through your circuit. Controlling this signal with inputs is how you control your circuit.

### REAL WORLD ANALOGIES



PHONE CHARGER

## i6 DIMMER



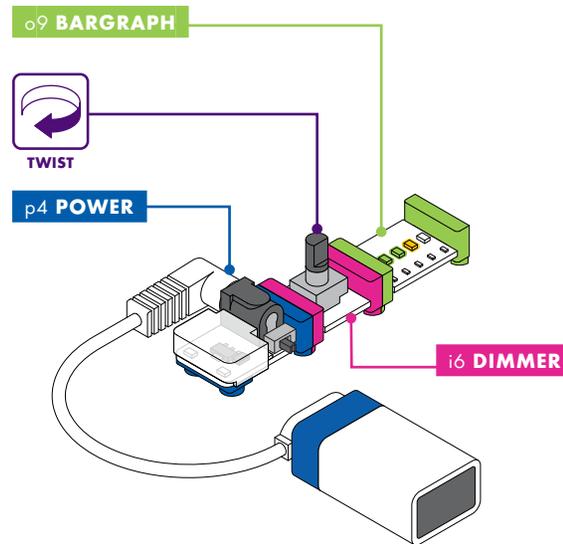
### MEET THE BIT

Twist this dimmer back and forth to control your circuit. As you twist the dimmer clockwise, more signal goes to the Bits that follow, brightening lights, speeding up motors, or raising the volume on buzzers.

### MINI-CHALLENGE

Can you invent a light that changes color?

### SAMPLE CIRCUIT



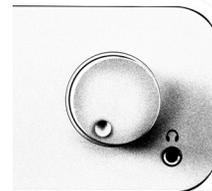
### HOW IT WORKS

The dimmer is like the knob on a water faucet. The more you turn the knob, the more the water flows from the faucet. The dimmer is similar – the more you twist it clockwise, the more signal it lets through. When the dimmer is all the way to the left, it's sending an off or 0 volt signal. When the dimmer is all the way to the right, it's sending an on or 5 volt signal. The dimmer can be positioned to send any signal between 0 and 5 volts.

### REAL WORLD ANALOGIES



HOUSEHOLD DIMMER SWITCH



STEREO VOLUME CONTROL

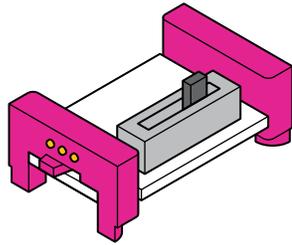


FAUCET



STOVE KNOB

## i16 PULSE



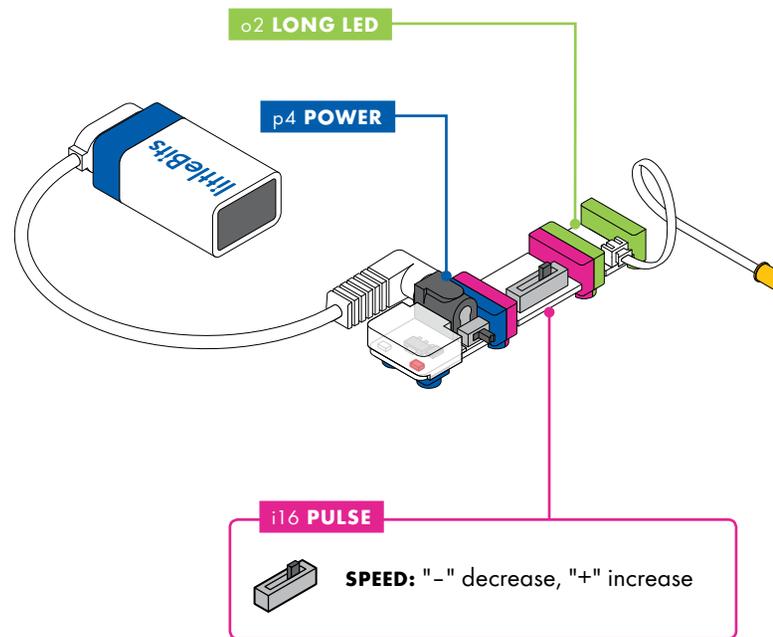
### MEET THE BIT

The pulse is like a heartbeat that makes the Bits after it turn on and off in a steady rhythm.

### MINI-CHALLENGE

Can you invent a warning signal with the pulse? How can you make the signal pulse faster or slower?

## SAMPLE CIRCUIT



## HOW IT WORKS

The pulse is a switch that opens and closes over and over again. When it's open, the signal from the previous Bit passes through to the next Bit. When the switch closes, the signal is blocked.

Use the slider to adjust the speed of the pulse. Moving the slider to the right will increase the speed of the pulse.

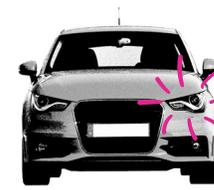
## REAL WORLD ANALOGIES



POLICE SIREN



FIREFLY

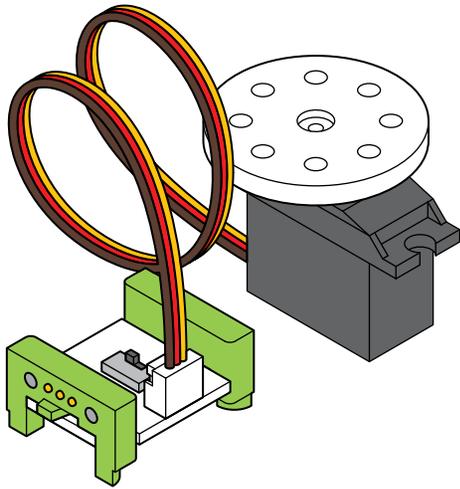


TURN SIGNAL



CLOCK SECONDHAND

## o11 SERVO



### MEET THE BIT

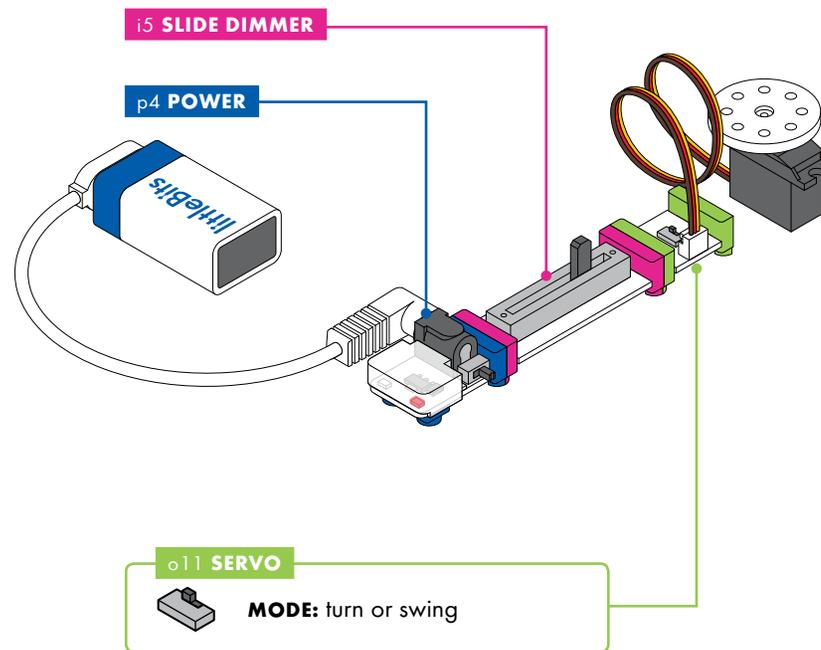
The servo is a motor that can swing back and forth or be turned to a specific position.

There are a few accessories you can use with the servo (like the mechanical arm). You can find out how to use those on pages 26 and 27.

### MINI-CHALLENGE

Can you invent something that uses the servo to clean up your desk?

## SAMPLE CIRCUIT



## HOW IT WORKS

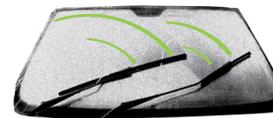
The servo has two modes. In **TURN** mode, the input from other Bits determines the position of the hub – try using a dimmer to set the angle you want. In **SWING** mode, the servo will move back and forth on its own like a pair of windshield wipers – the input signal controls the speed of the swing.

The servo's range of motion is about 110 degrees.

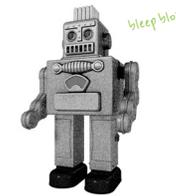
## REAL WORLD ANALOGIES



TRUCK CRANE

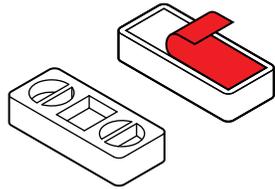


WINDSHIELD WIPERS



ROBOT

## a7 ADHESIVE SHOES



### MEET THE ACCESSORY

Shoes slip onto your Bit feet and hold your circuit together. On the bottom of your shoes you'll find adhesive, which is great for securing your circuits to different surfaces.

### HOW IT WORKS

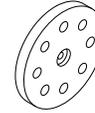
First, snap together your littleBits circuit. Then press the feet of your Bits into the holes of the shoes and place it on your chosen surface.

Adhesive shoes can be secured onto any surface – paper, cardboard, plastic – you name it! Just peel the adhesive backing off, and stick it on.

Bit feet go in the shoes

**NOTE:** The shoe adhesive is for one-time use only.

## a19 SERVO HUB

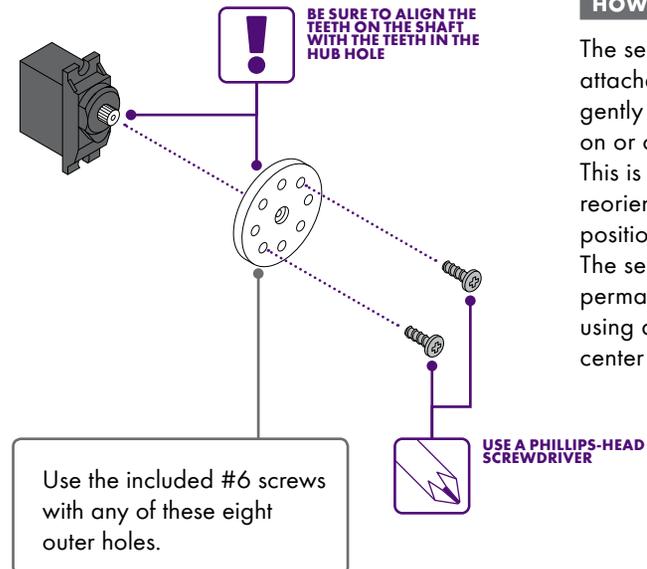


### MEET THE ACCESSORY

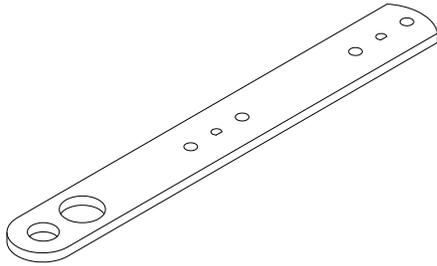
The servo hub lets you easily attach materials to your servo motor and add more complex movements to your littleBits inventions.

### HOW IT WORKS

The servo hub can be attached and removed by gently pushing or pulling it on or off the servo motor. This is helpful if you need to reorient how the holes are positioned for a project. The servo hub can be permanently attached by using a small screw in the center hole.



## a23 MECHANICAL ARM



### MEET THE ACCESSORY

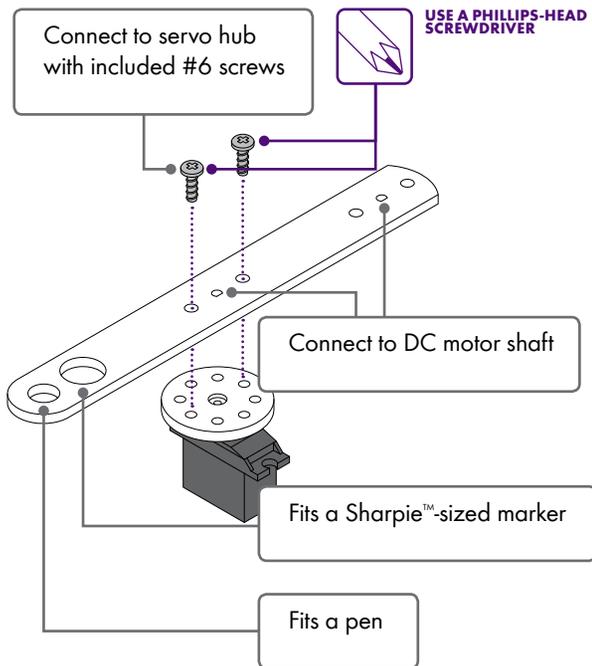
The mechanical arm attaches to both the servo hub and the DC motor shaft, and offers lots of leverage for pushing, pulling, and throwing.

### HOW IT WORKS

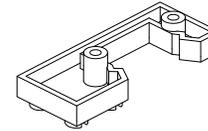
To attach the mechanical arm to the servo hub, use two of the #6 screws (included) and a Phillips-head screwdriver (not the purple screwdriver). Be sure to screw through the holes on the servo hub.

To attach the mechanical arm to the DC motor, line up the flat edge of the DC motor shaft with the flat edge of either of the flat-edged holes on the mechanical arm.

The two large holes on the end are perfect for holding pens and markers in place.



## a24 SERVO MOUNT

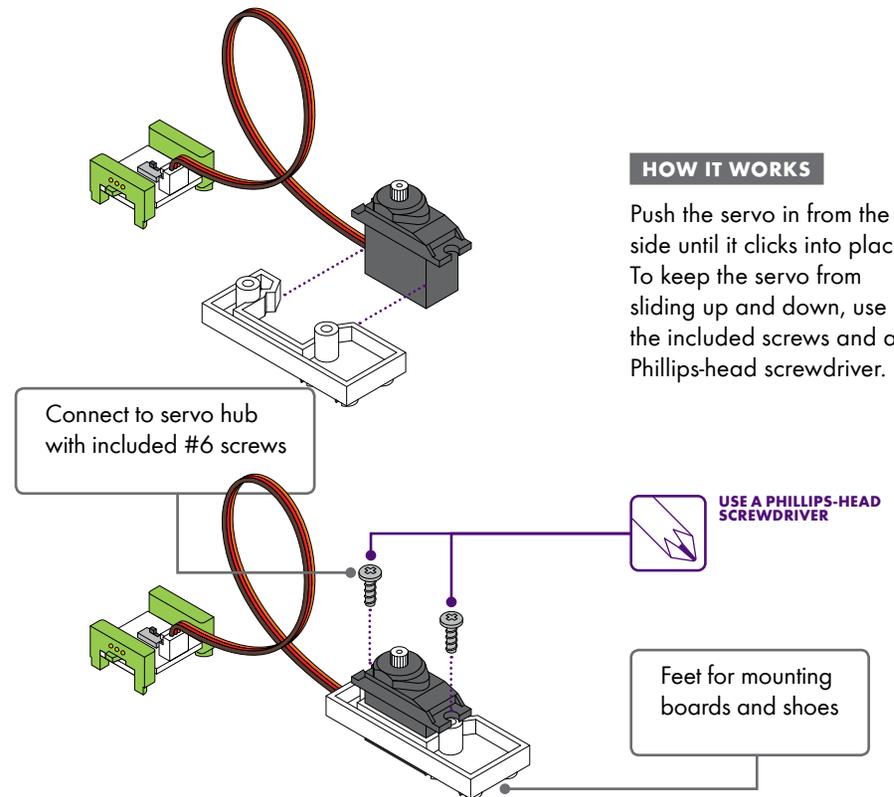


### MEET THE ACCESSORY

The servo mount lets you attach your servo to a mounting board or a pair of littleBits shoes. It's a great way to keep the servo steady so the arm can go wild.

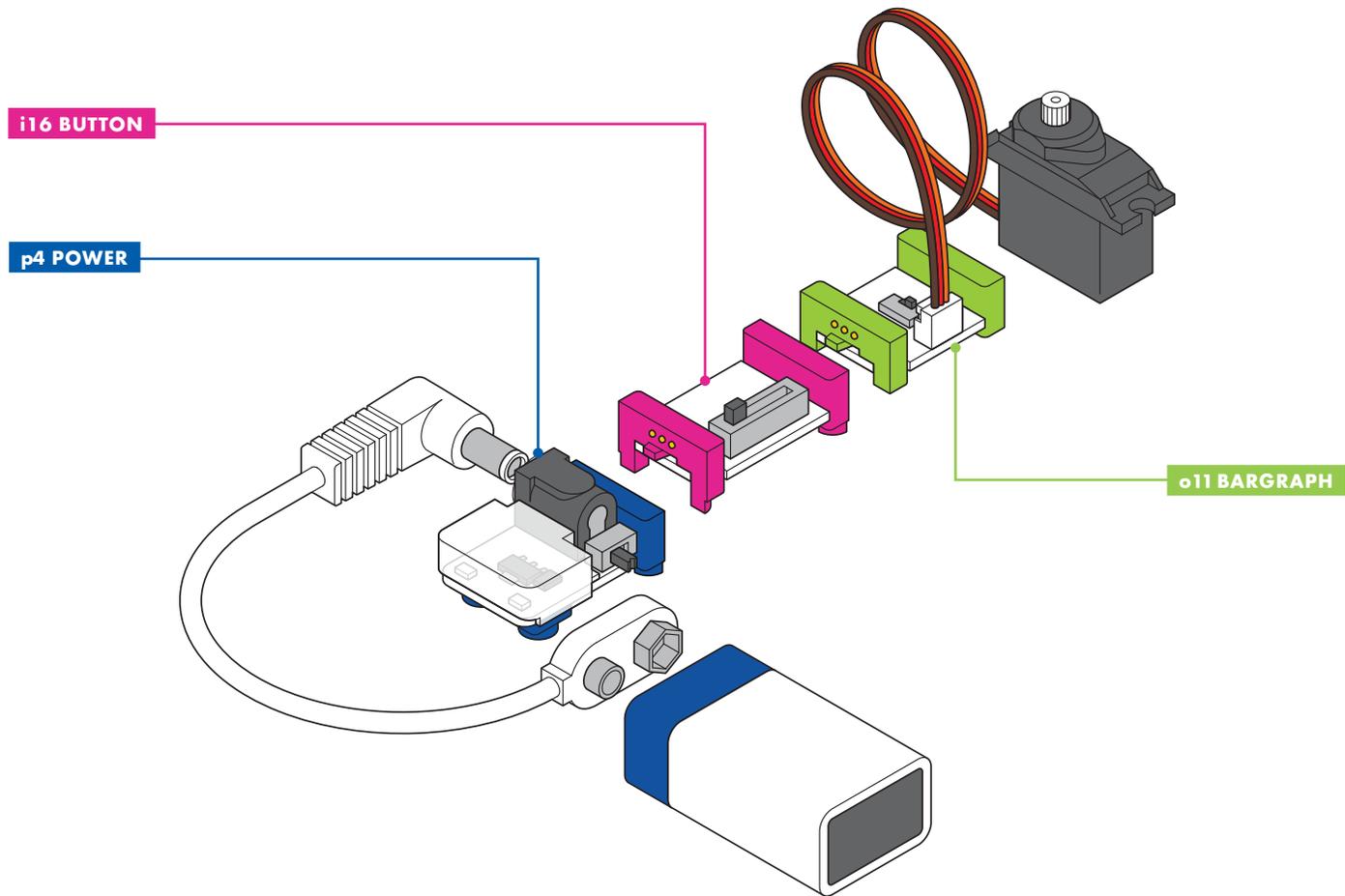
### HOW IT WORKS

Push the servo in from the side until it clicks into place. To keep the servo from sliding up and down, use the included screws and a Phillips-head screwdriver.



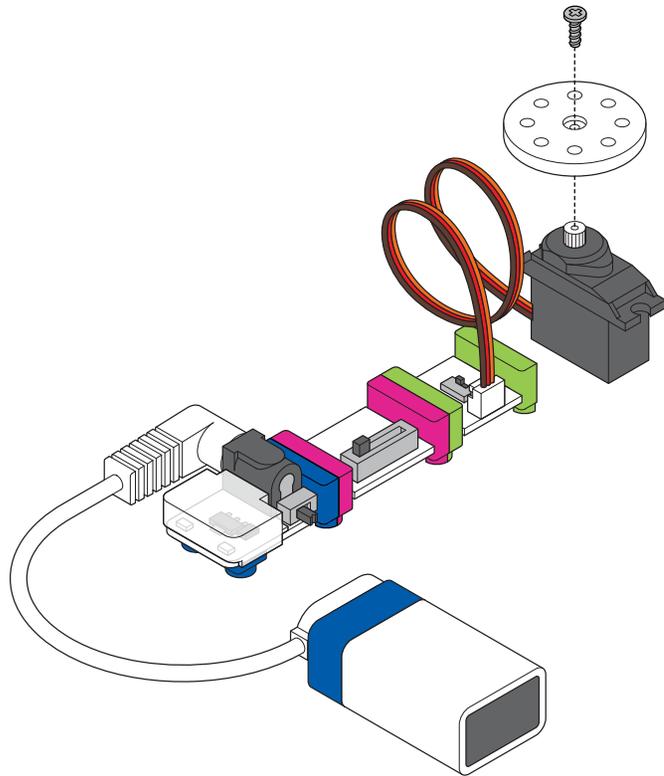
1

**BUILD YOUR CIRCUIT.**



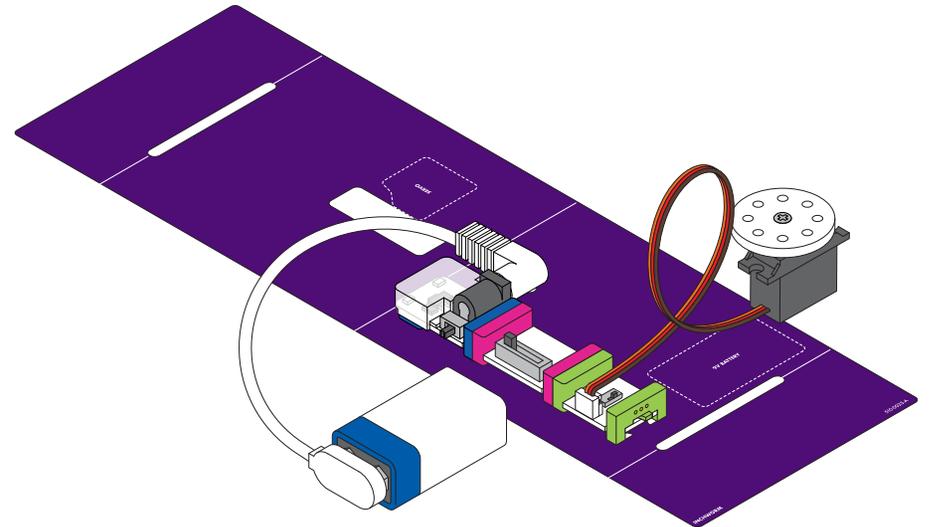
2

**PRESS THE SERVO HUB ONTO THE SERVO.** You can secure the hub with the included small screw found with the servo accessories.



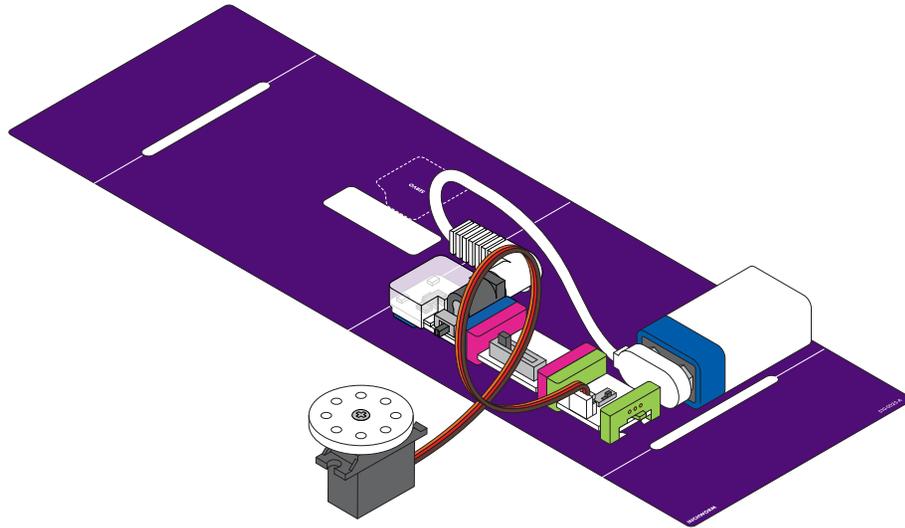
3

**ATTACH YOUR CIRCUIT TO THE INCHWORM TEMPLATE.**



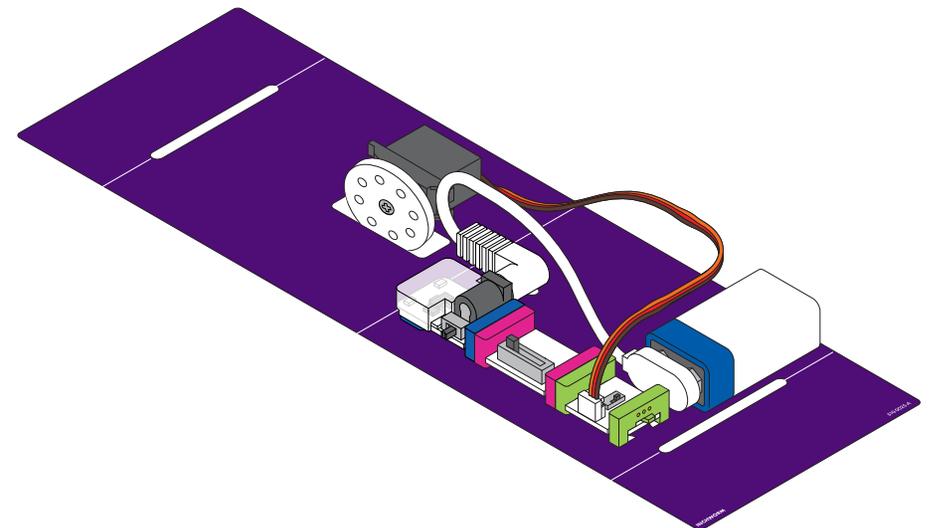
4

**ATTACH THE BATTERY TO THE TEMPLATE.** Use Glue Dots.



5

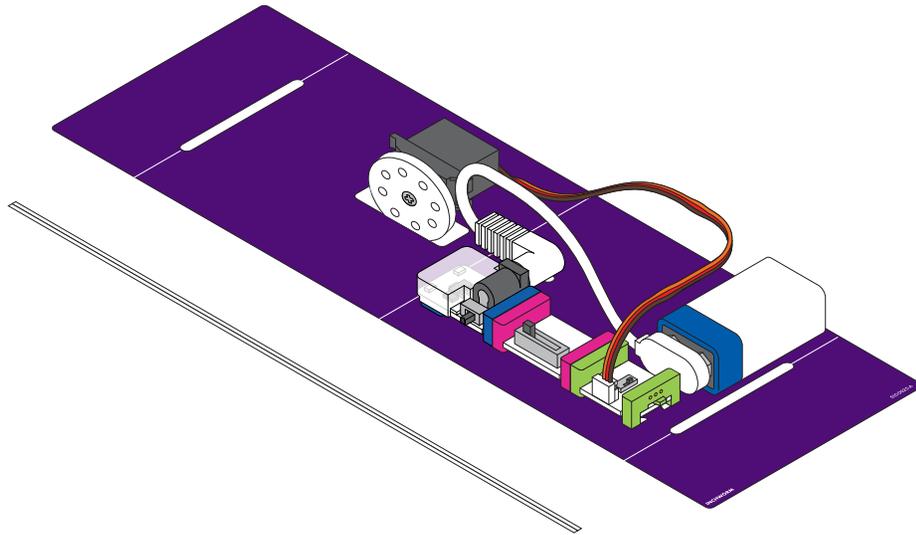
**ATTACH THE SERVO TO THE TEMPLATE WHERE INDICATED.** Use Glue Dots.



6

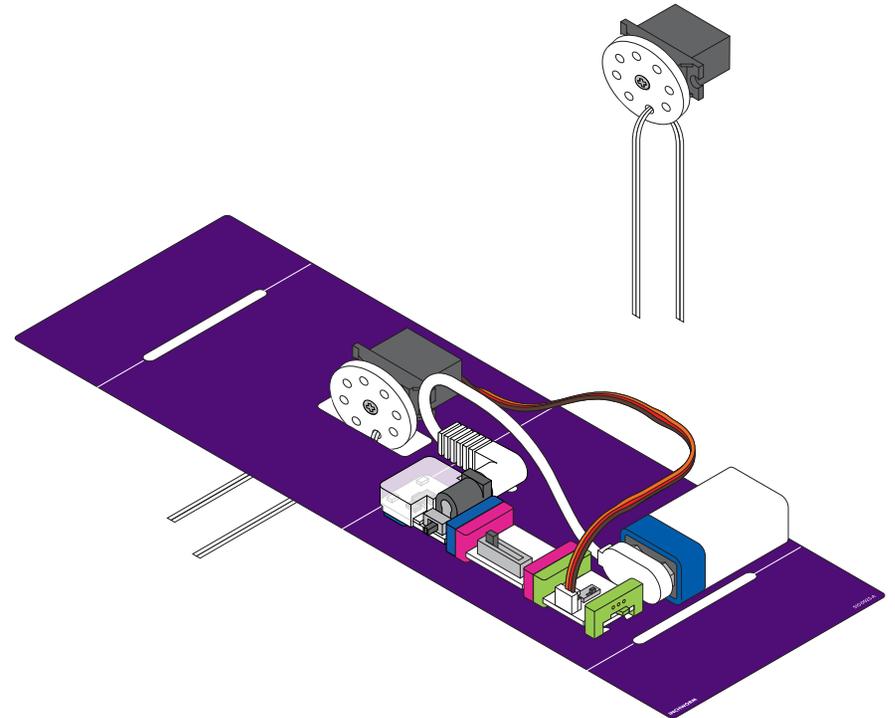
**GIVE YOUR INCHWORM SOME MUSCLES.**

Use a twist tie.



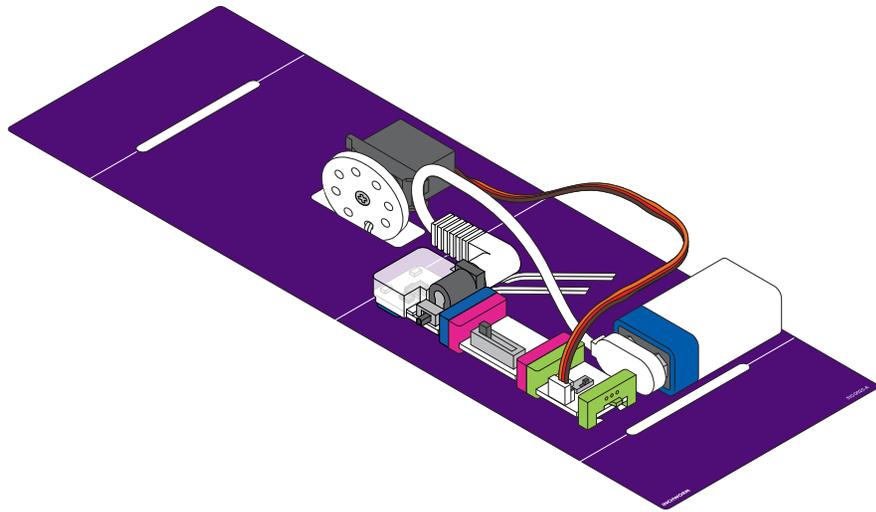
7

**FEED THE TWIST TIE THROUGH THE SERVO HUB.**



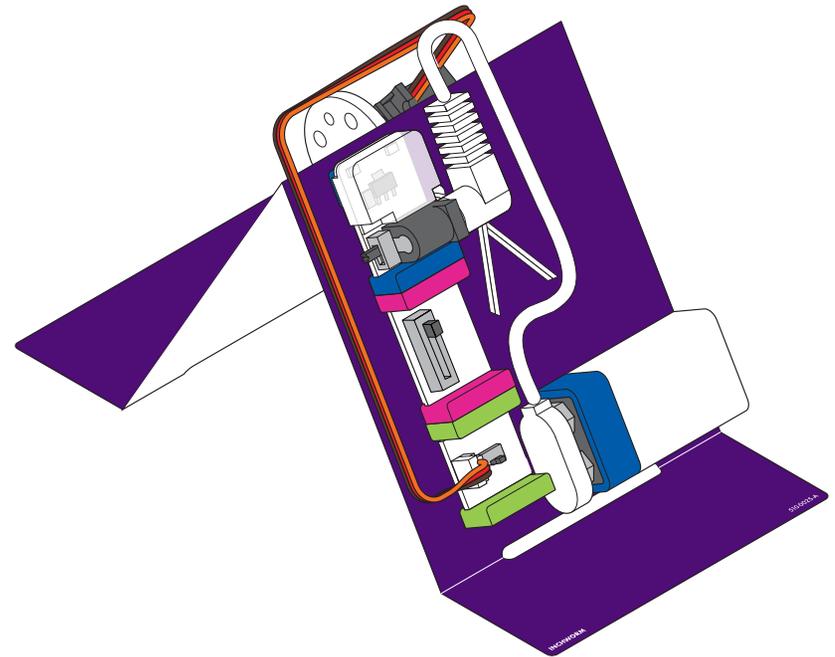
8

**THREAD THE FREE ENDS OF THE TWIST TIE THROUGH THE TWO SMALL HOLES ON THE INCHWORM TEMPLATE.**



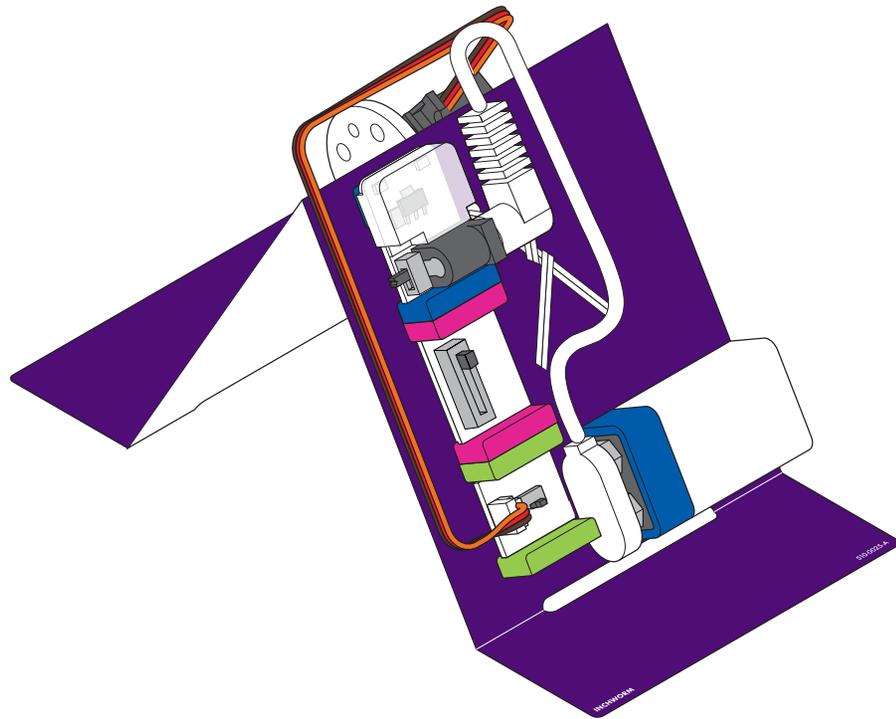
9

**FOLD THE TEMPLATE, AND TWIST THE TWIST TIE.**



10

**TWIST THE TIES 2 OR 3 TIMES.** This will keep the template in an "A" shape.

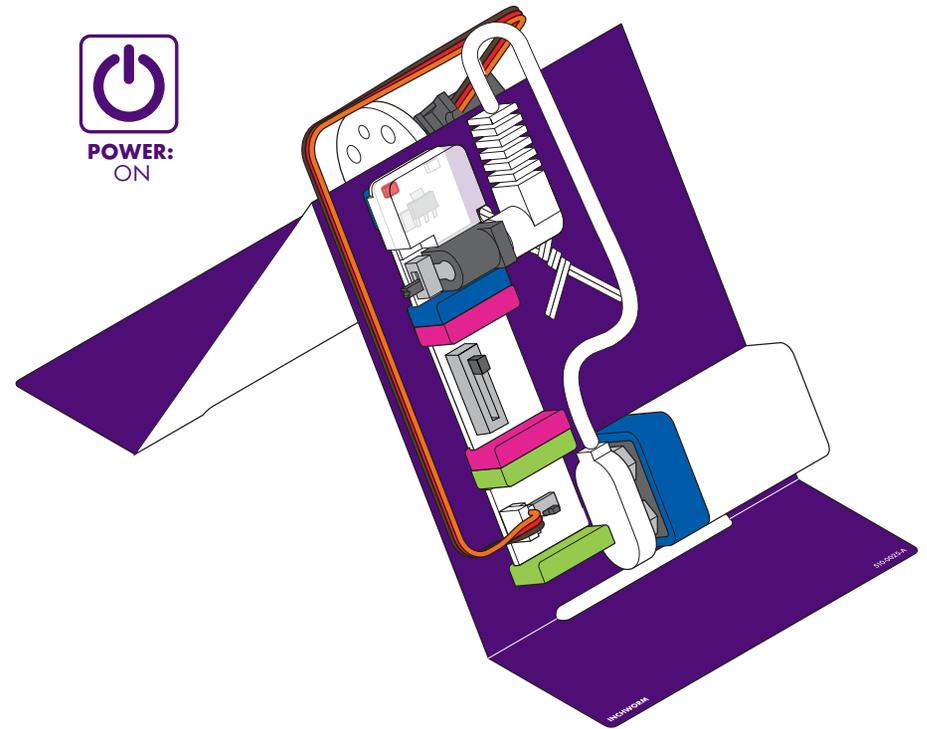


11

**POWER ON YOUR CIRCUIT.**

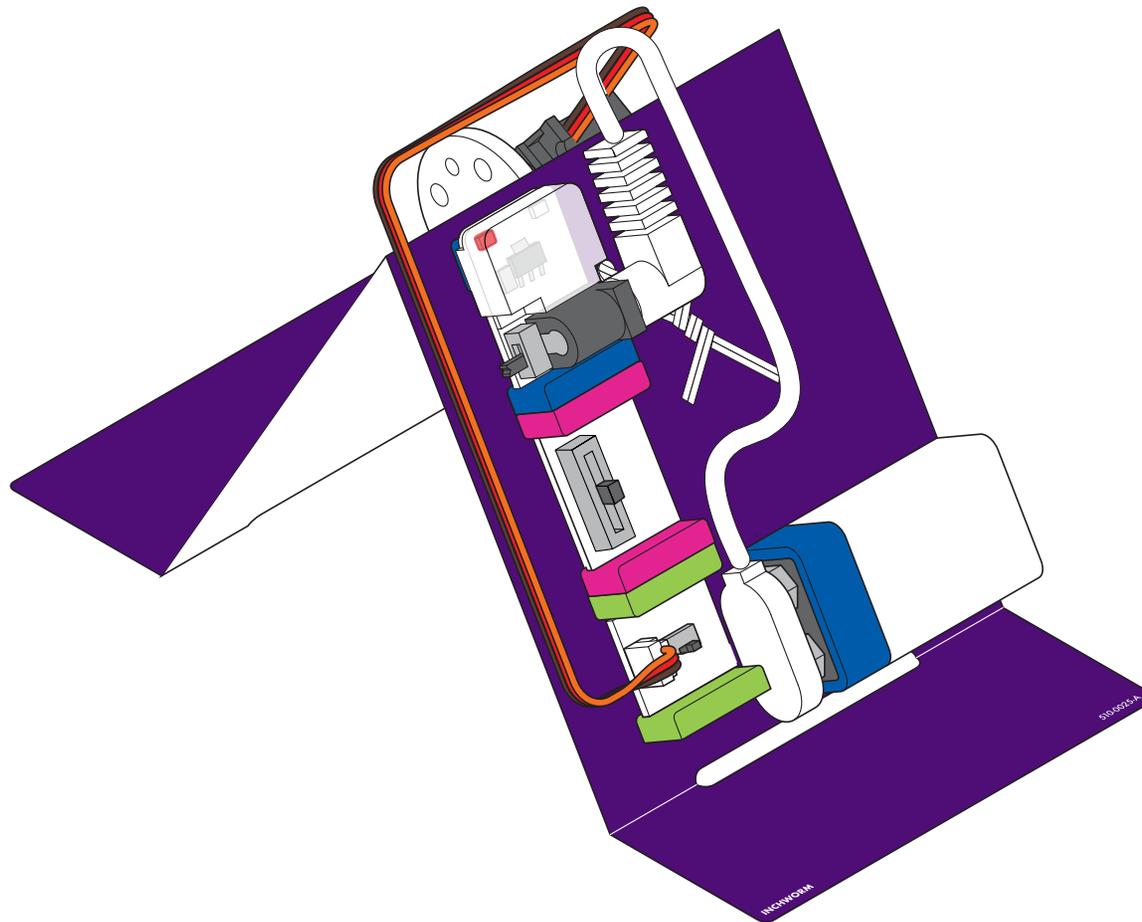


**POWER:**  
**ON**

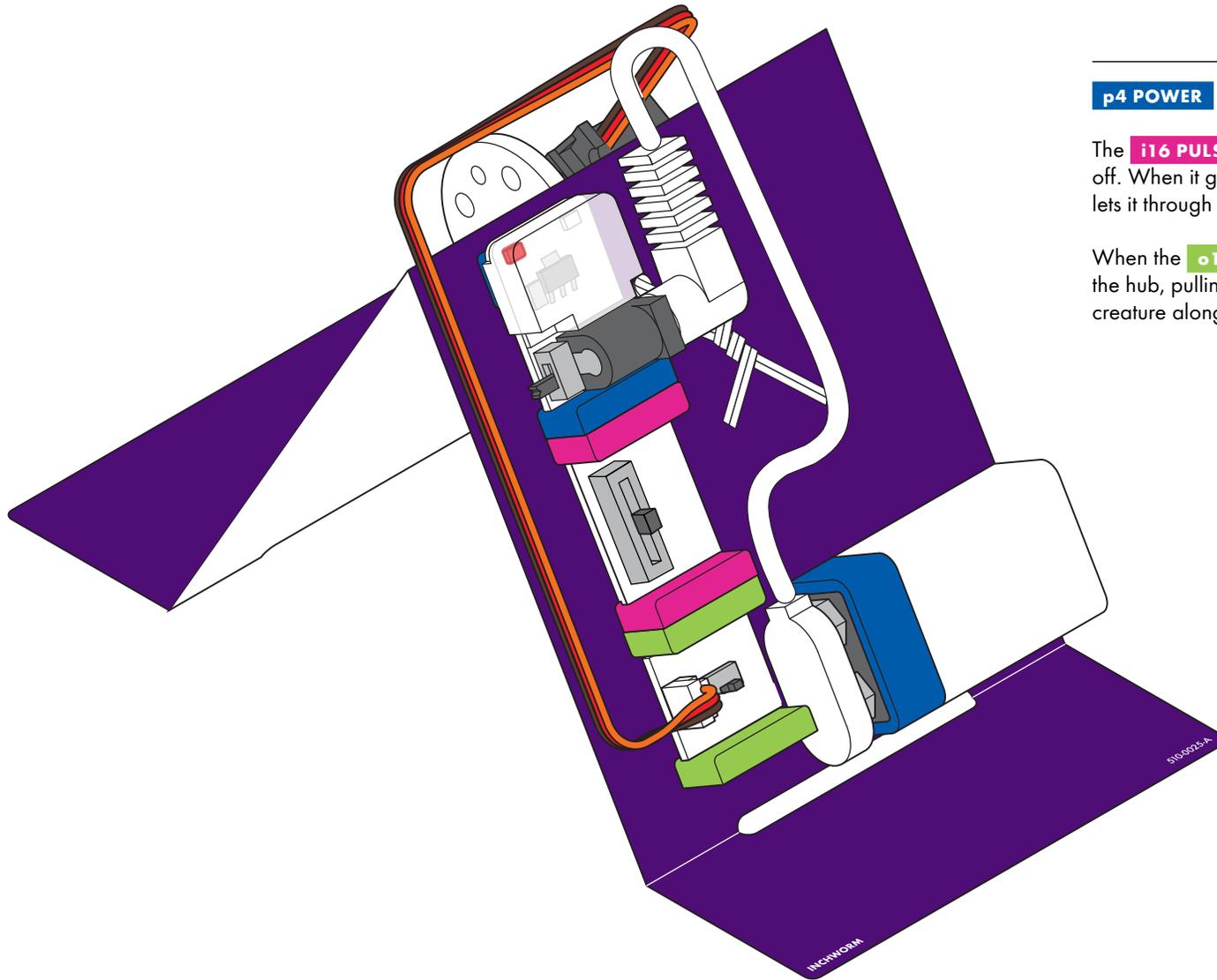


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# 12 **START INCHING.** Adjust the slider on the pulse Bit to change your Inchworm's speed.



# HOW IT WORKS



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**p4 POWER** sends a signal through the circuit.

The **i16 PULSE** Bit is continuously switching on and off. When it gets a signal from the light sensor, it only lets it through in short bursts.

When the **o11 SERVO** gets the signal, it rotates the hub, pulling and pushing the twist tie to inch the creature along.

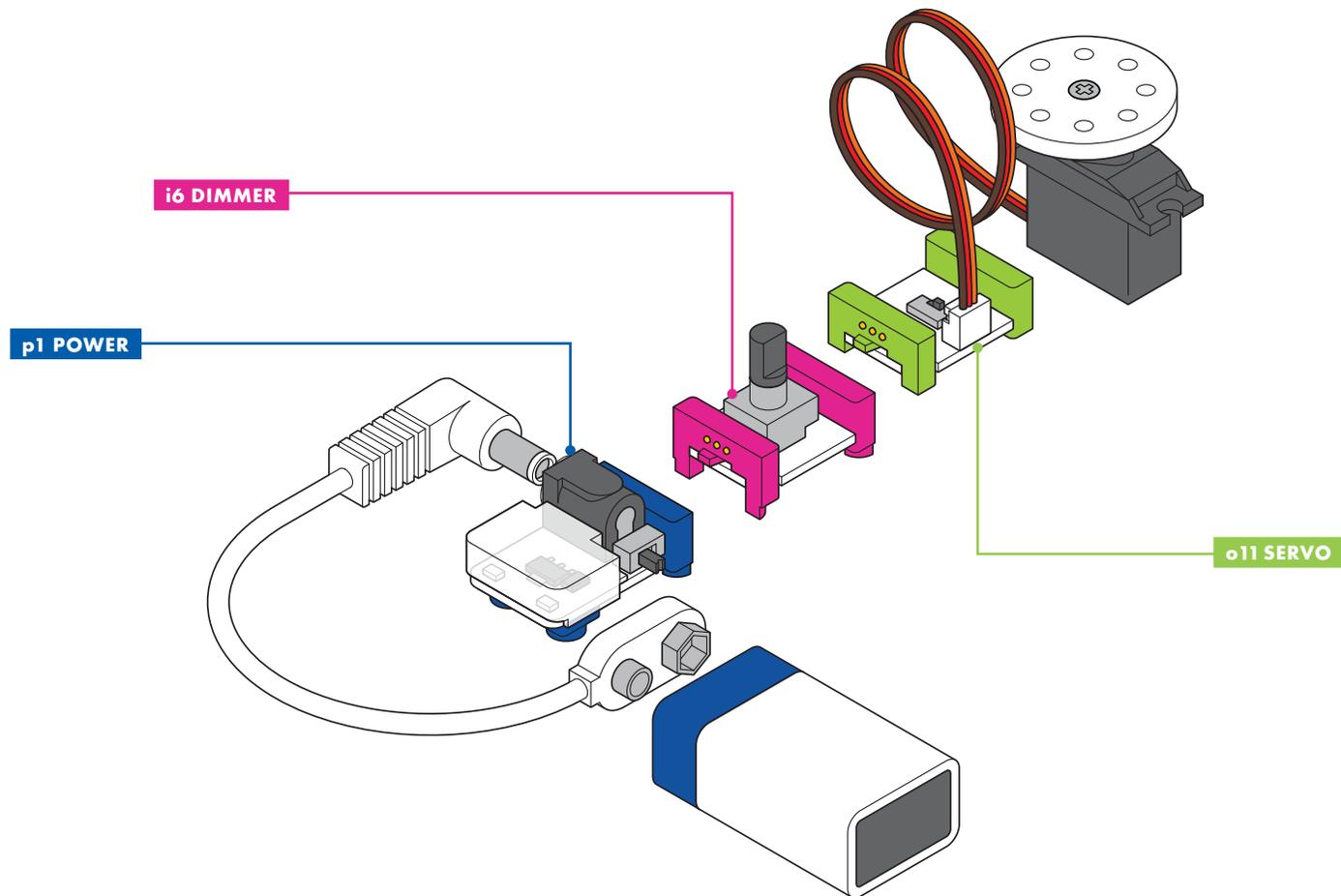
INVENTION #2

# MOVING POSTER



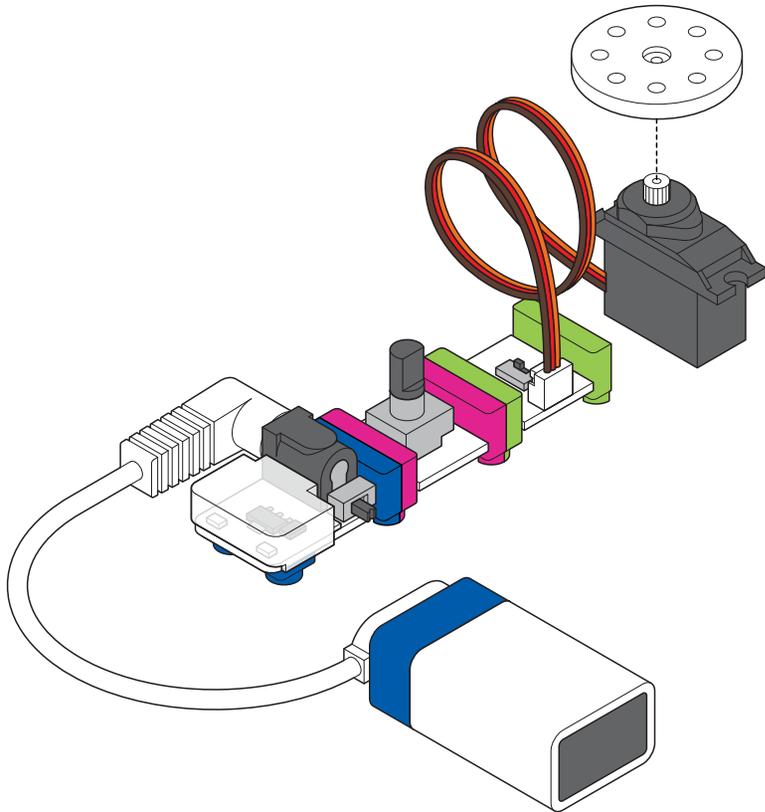
1

**BUILD YOUR CIRCUIT.**



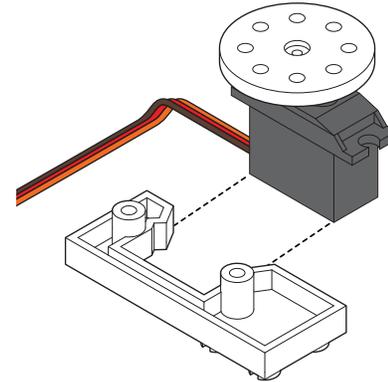
2

PRESS THE SERVO HUB ONTO THE SERVO.

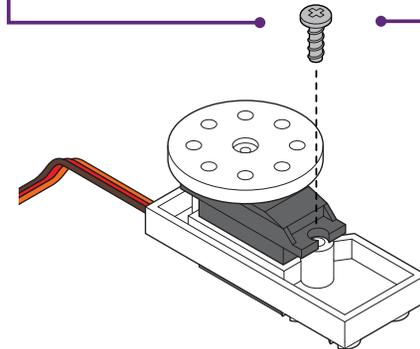


3

PRESS THE SERVO INTO THE SERVO MOUNT FROM THE SIDE AND SCREW IN.



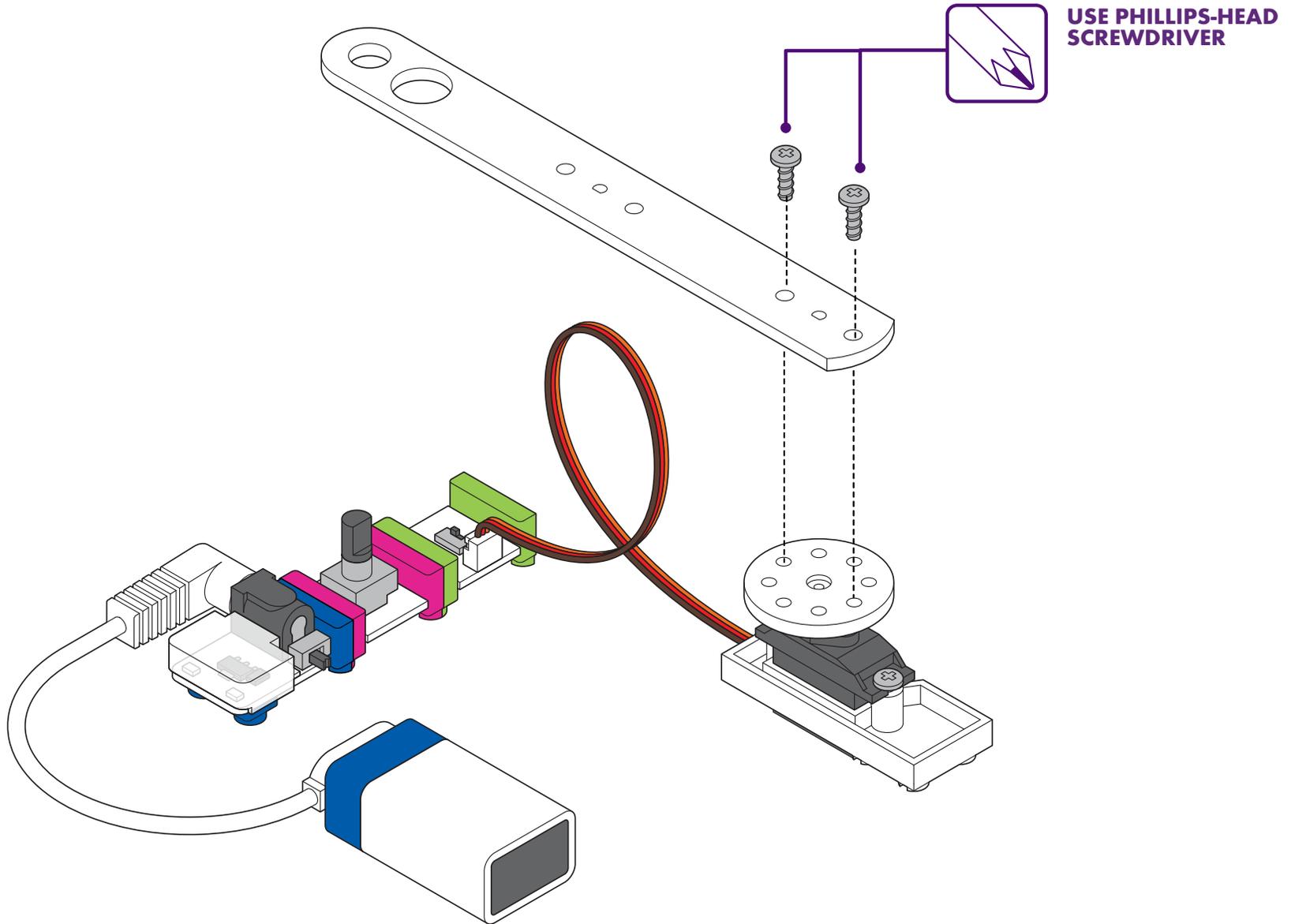
USE PHILLIPS-HEAD  
SCREWDRIVER



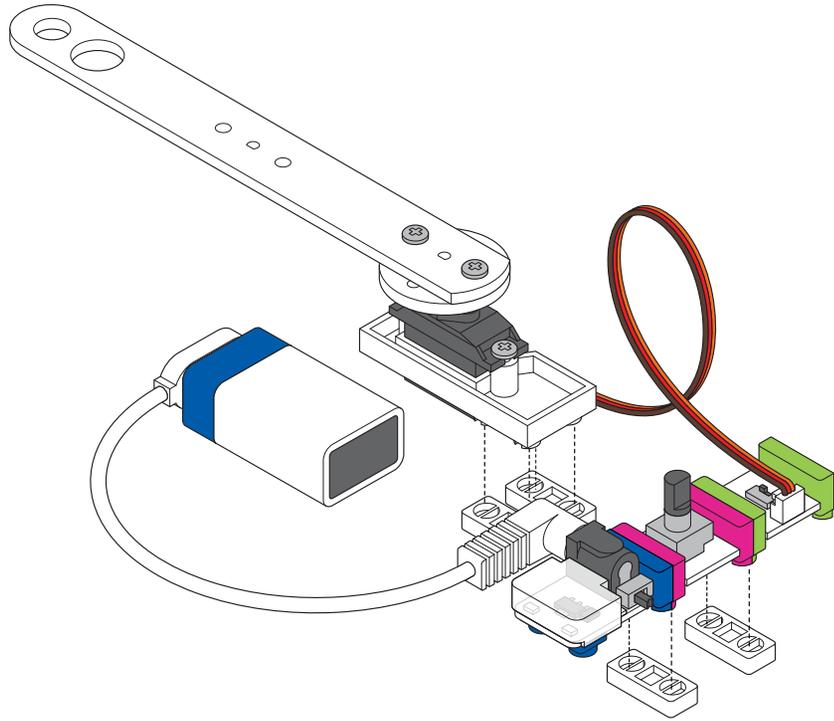
JUST ONE  
SCREW NEEDED

4

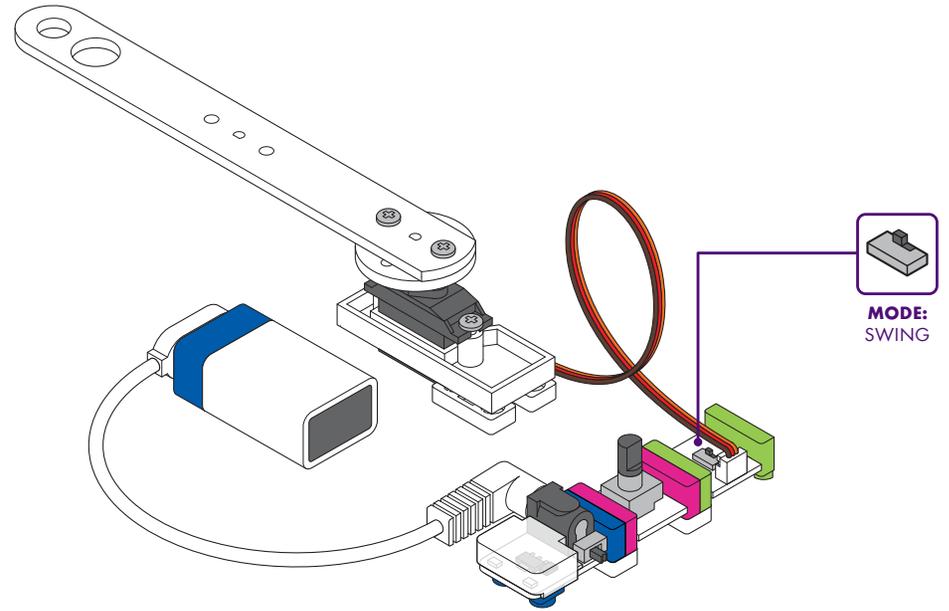
CONNECT THE MECHANICAL ARM TO THE SERVO HUB.



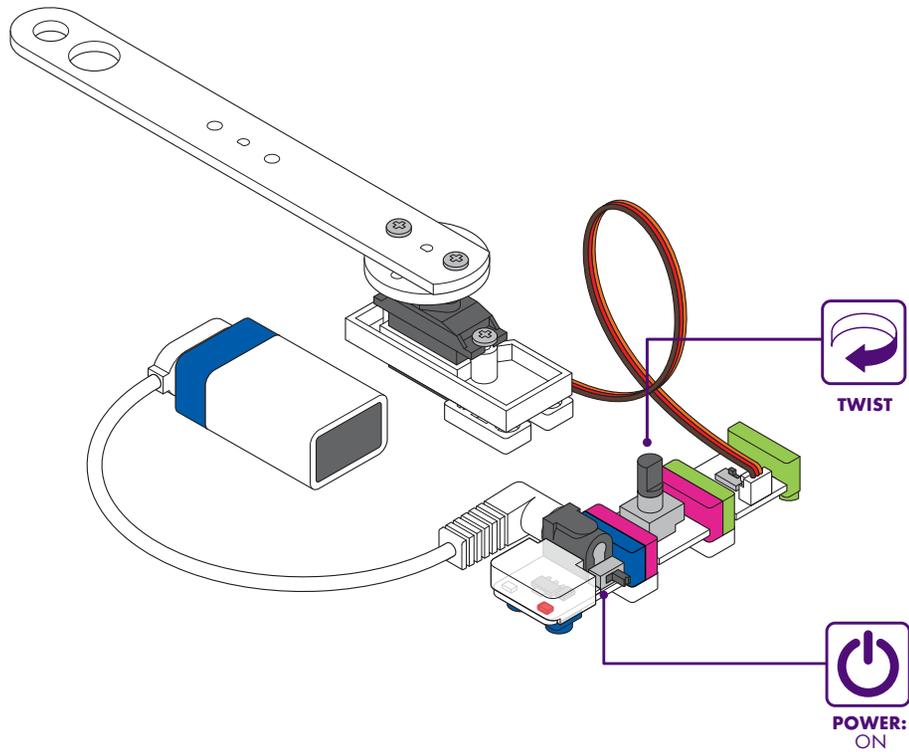
5 PRESS ADHESIVE SHOES ONTO YOUR CIRCUIT.



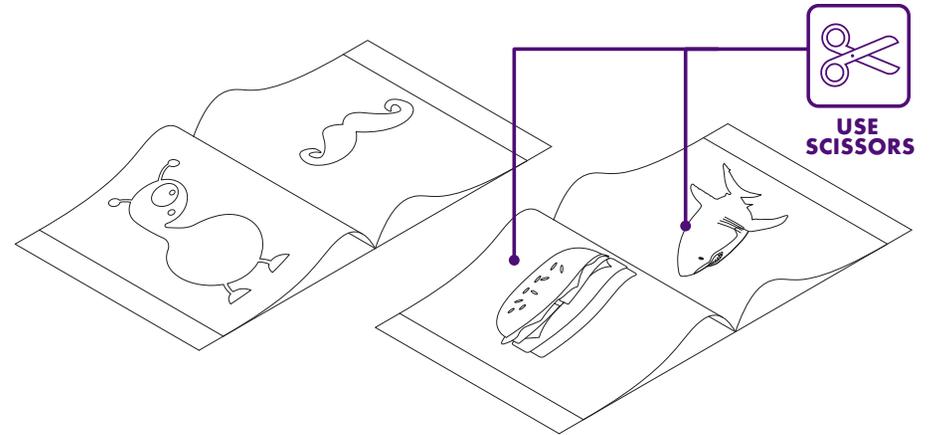
6 SET SERVO TO SWING MODE.



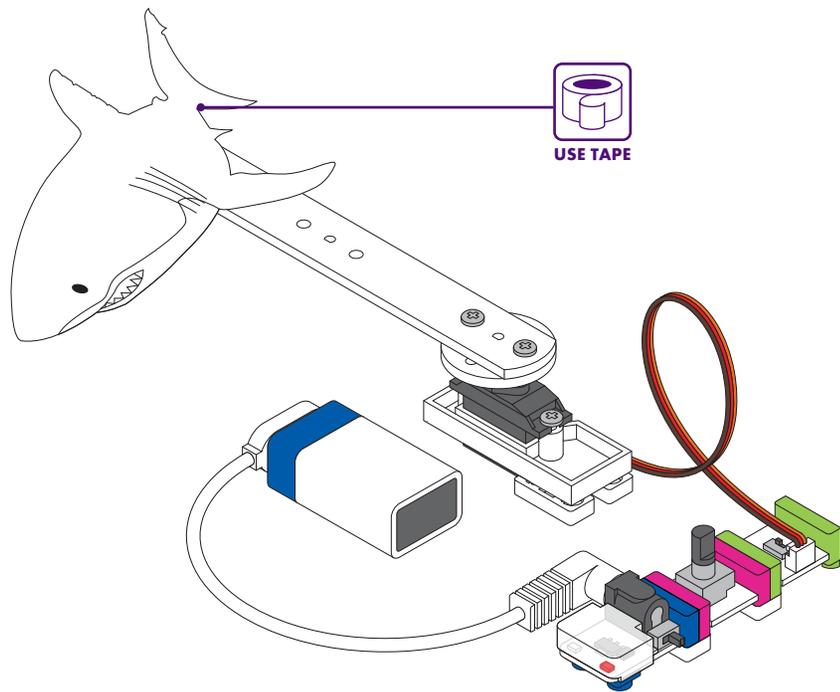
**7 TEST YOUR CIRCUIT.** Turn the power on and twist the dimmer knob. The servo arm should swing back and forth.



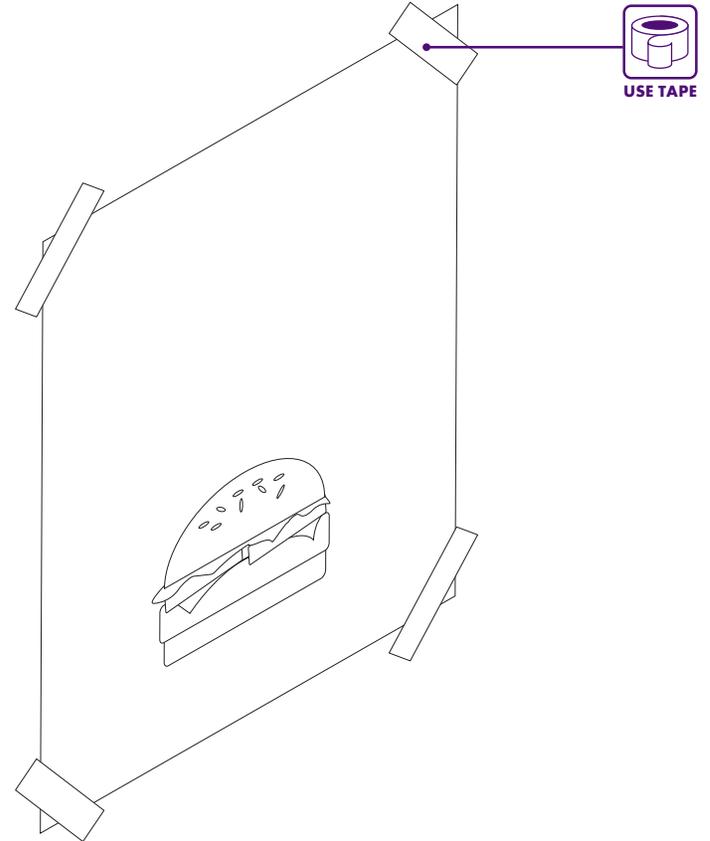
**8 MAKE THE STORY OF YOUR MOVING COLLAGE.** You will need two images. Cut out a background image and a moving image.



**9 ATTACH THE MOVING IMAGE TO THE MECHANICAL ARM.**

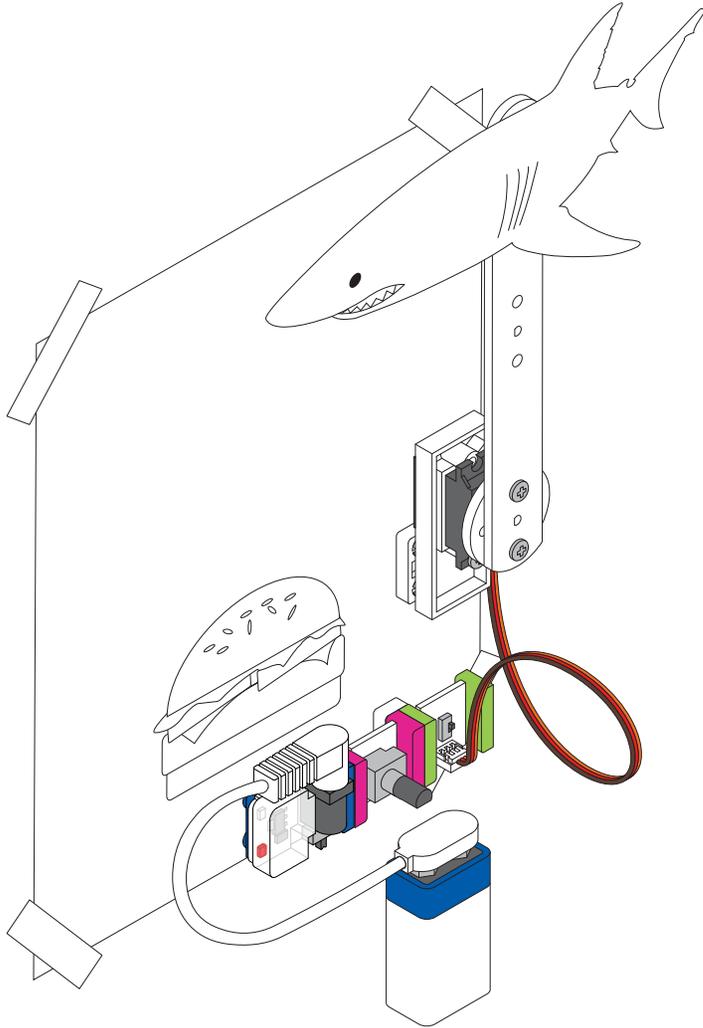


**10 MOUNT YOUR BACKGROUND IMAGE TO THE WALL AND TAPE ALL FOUR CORNERS DOWN WELL.**



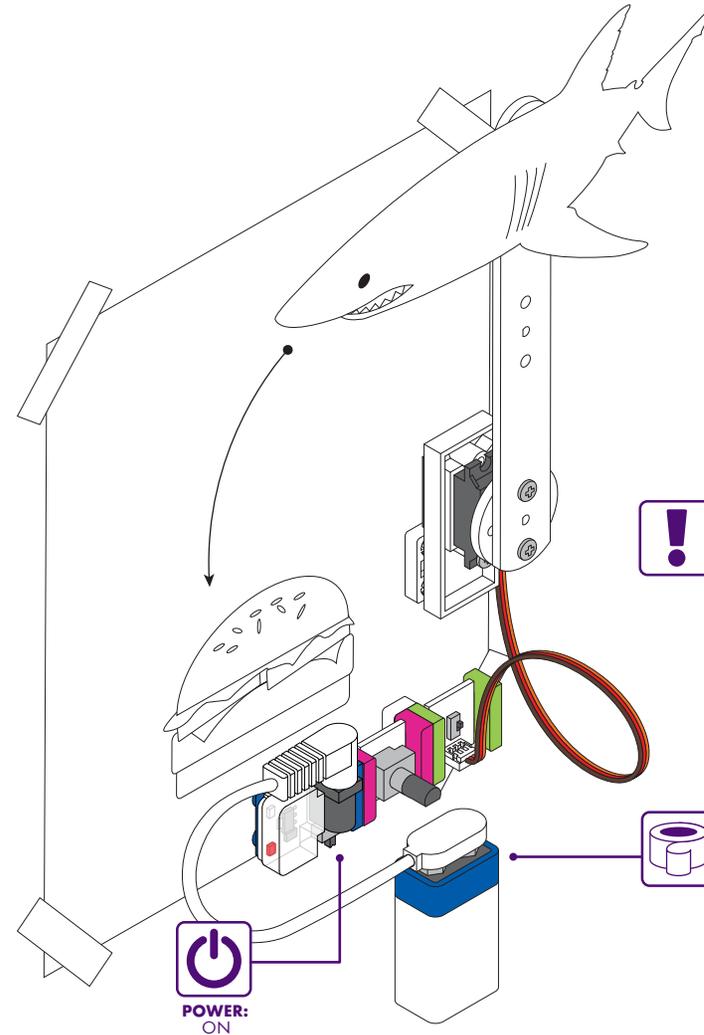
11

**PEEL THE BACK OFF THE ADHESIVE SHOES AND STICK YOUR CIRCUIT TO THE COLLAGE.**



12

**SET IT IN MOTION!** Twist the dimmer to make the animated element move faster or slower across the background.

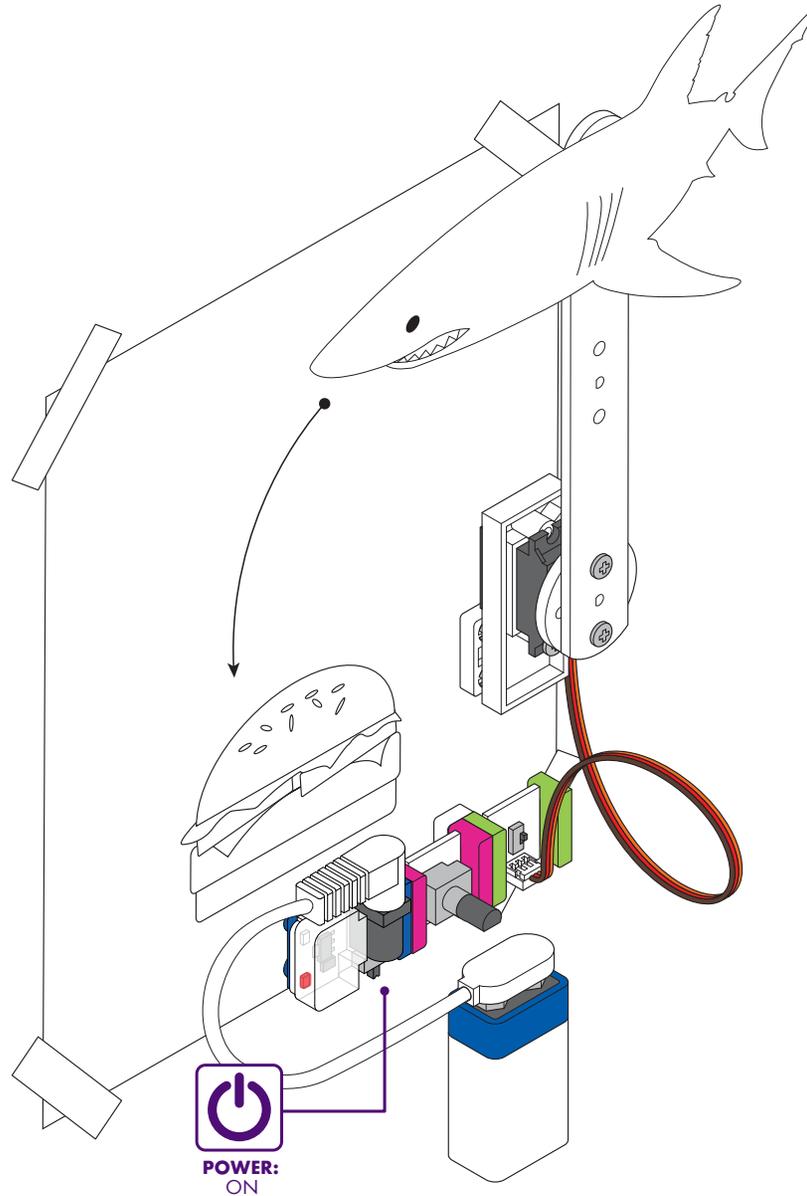


**!** ADJUST THE POSITION OF THE MECHANICAL ARM SO THAT IT SWINGS WHERE YOU WANT IT TO.

**USE TAPE** TO SECURE YOUR BATTERY TO THE WALL

**POWER:**  
ON

# HOW IT WORKS



---

**p4 POWER** sends a signal through the circuit.

The **i5 SLIDE DIMMER** controls how much signal moves through to the servo.

The speed of the **o11 SERVO** depends on the amount of signal it receives from the dimmer. The more signal it receives, the faster it swings.

# VIDEO LINKS

*click to explore!*

