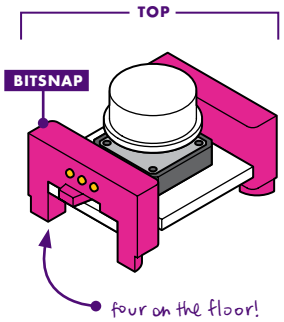
ARCADE GAME

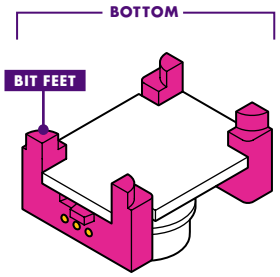
littleBits™

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.

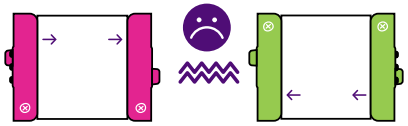
OUTPUT (GREEN)
Output Bits do something – light up, buzz, move...

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

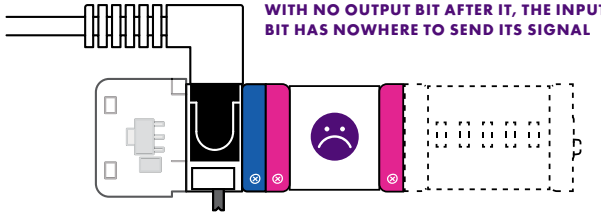
IF THE BITS WON'T SNAP TOGETHER, TRY SPINNING ONE AROUND AND MAKE SURE THE ARROWS POINT IN THE SAME DIRECTION



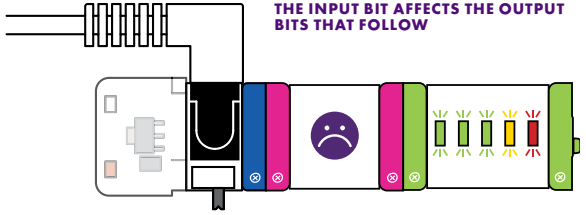
4 ORDER IS IMPORTANT

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

WITH NO OUTPUT BIT AFTER IT, THE INPUT BIT HAS NOWHERE TO SEND ITS SIGNAL

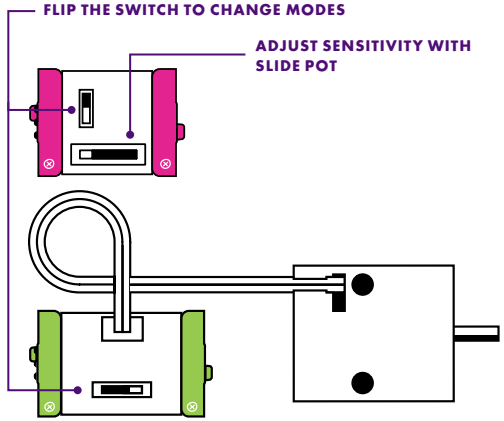


THE INPUT BIT AFFECTS THE OUTPUT BITS THAT FOLLOW

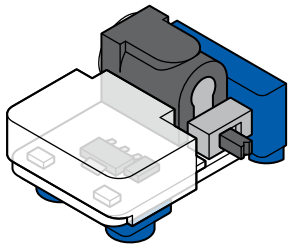


5 SOME BITS ARE ADJUSTABLE

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



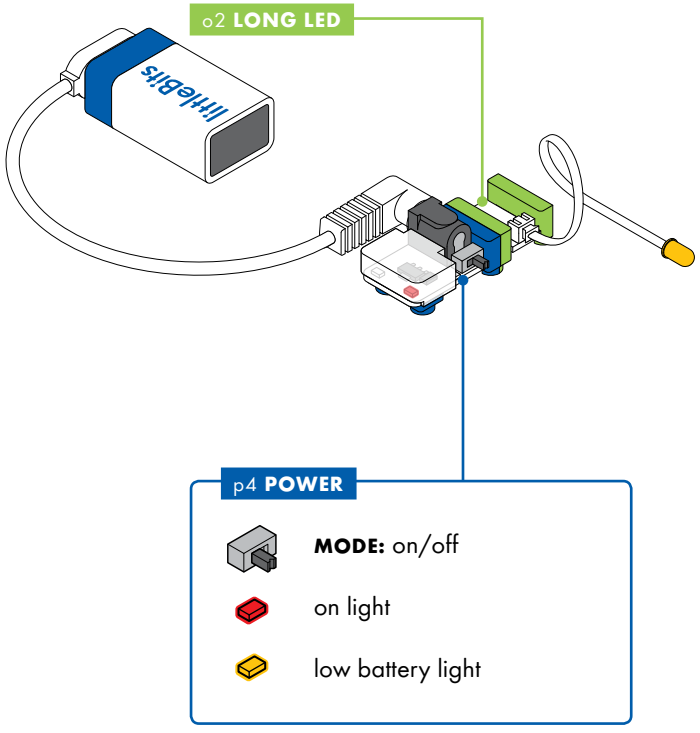
p4 POWER



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

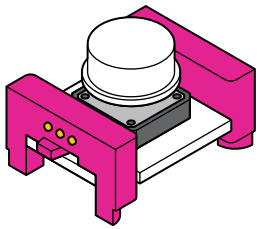
The p4 power Bit converts the 9 volts of electricity in the battery to the 5 volts that littleBits circuits run on.

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

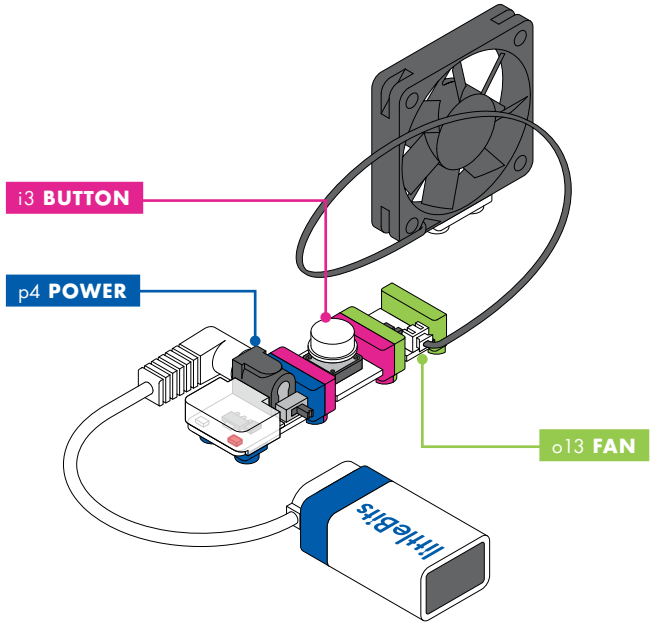
i3 BUTTON



MEET THE BIT

The button Bit is a classic: big, round, and springy for comfortable pressing! Push it to turn something on and release it to turn it off.

SAMPLE CIRCUIT



HOW IT WORKS

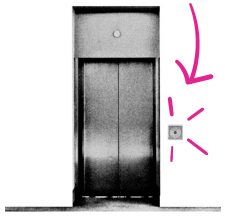
The button is like a door. When you press it, the door opens, letting the signal pass through the Bit and on to the next Bits in the circuit. The button is a momentary switch, you must continue to press it for the signal to flow. When you release the button, the door closes, stopping the signal from passing on to other Bits.

MINI-CHALLENGE

Can you invent a chair that makes noise when you sit down?

REAL WORLD ANALOGIES

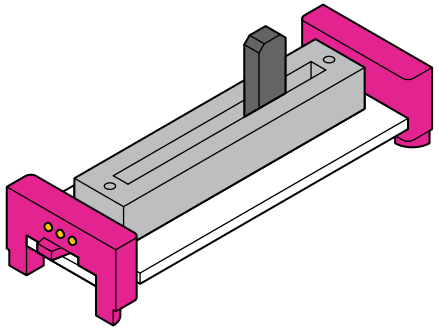
VIDEO GAME CONTROLLER



ELEVATOR BUTTON

GAME SHOW BUZZER

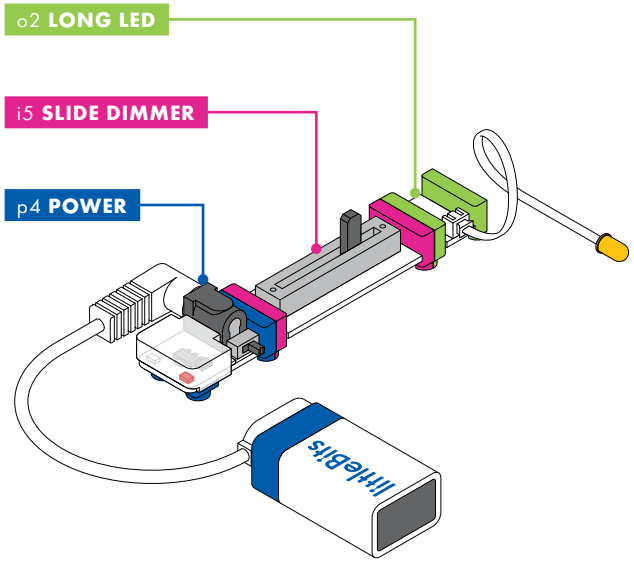
i5 SLIDE DIMMER



MEET THE BIT

Slide this dimmer back and forth to control your circuit. As you slide it up, more signal goes to the Bits that follow, brightening lights, speeding up motors, and raising the volume on your buzzer.

SAMPLE CIRCUIT



HOW IT WORKS

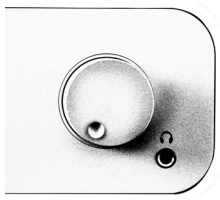
When the slider is all the way to the left, it's sending an off or 0 volt signal. When the slider is all the way to the right, it's sending a 5 volt signal. The slider can be positioned to send any signal between 0 and 5 volts.

MINI-CHALLENGE

Can you invent something with the slide dimmer that waves a flag back and forth? How could you change the speed that it waves?

REAL WORLD ANALOGIES

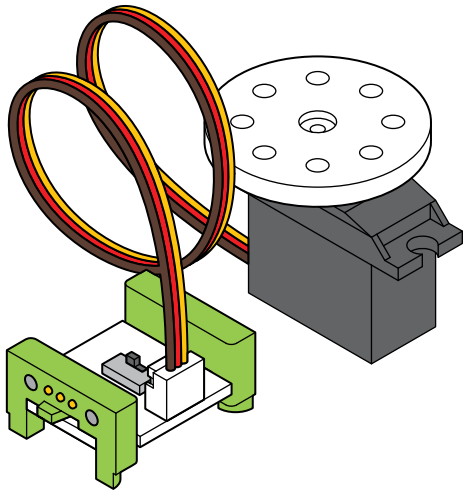
HOUSEHOLD DIMMER SWITCH



STEREO VOLUME CONTROL

CAR PEDAL

o11 SERVO

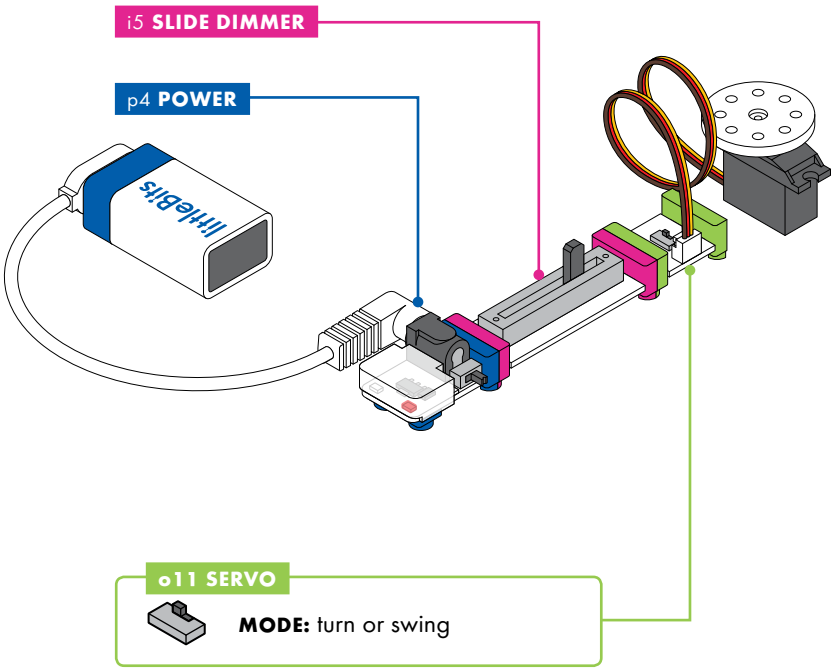


MEET THE BIT

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.

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.

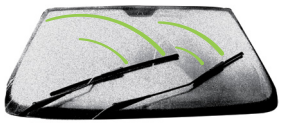
The servo's range of motion is about 110 degrees.

MINI-CHALLENGE

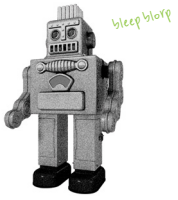
Can you invent something that uses the servo to clean up your desk?

REAL WORLD ANALOGIES

TRUCK CRANE

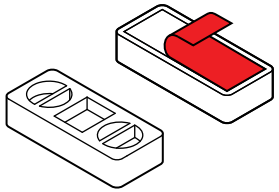


WINDSHIELD WIPERS



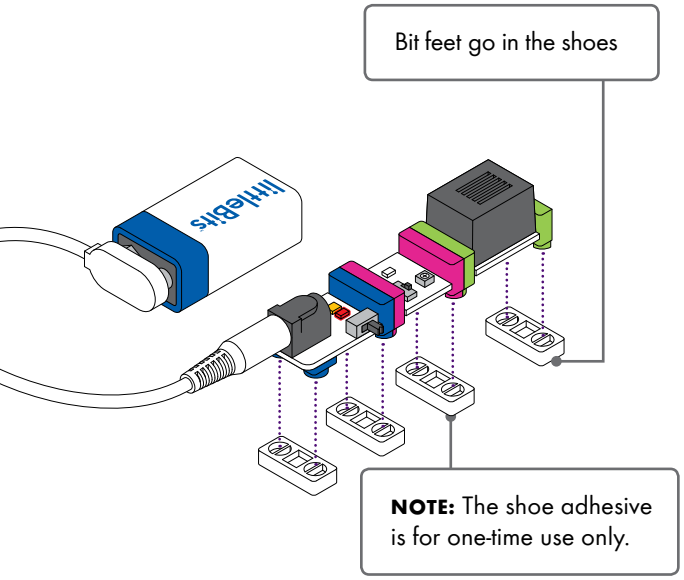
ROBOT

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.

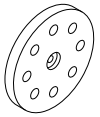


HOW IT WORKS

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.

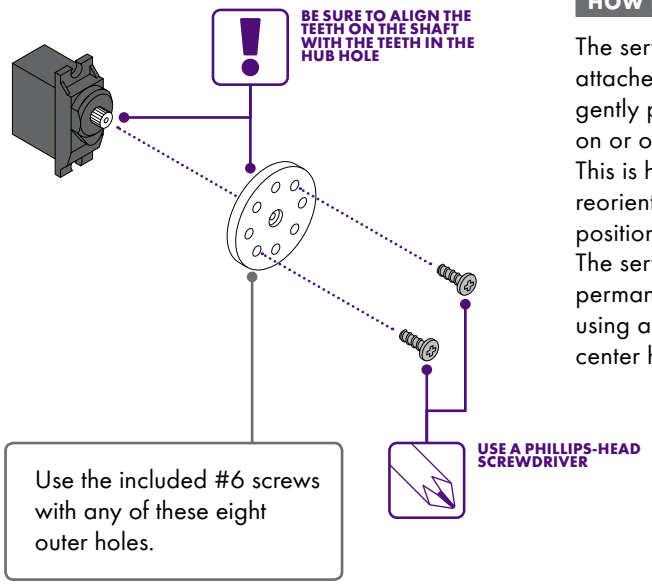
Adhesive shoes can be secured onto any surface – paper, cardboard, plastic – you name it! Just peel the adhesive backing off, and stick it on.

a19 SERVO HUB



MEET THE ACCESSORY

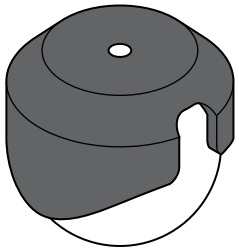
The servo hub lets you easily attach materials to your servo motor and add more complex movements to your littleBits inventions.



HOW IT WORKS

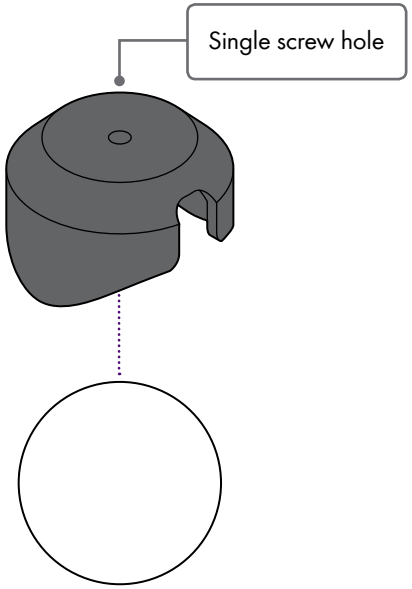
The servo hub can be attached and removed by gently pushing or pulling it on or off the servo motor. This is helpful if you need to reorient how the holes are positioned for a project. The servo hub can be permanently attached by using a small screw in the center hole.

a22 **BALL CASTER**



MEET THE ACCESSORY

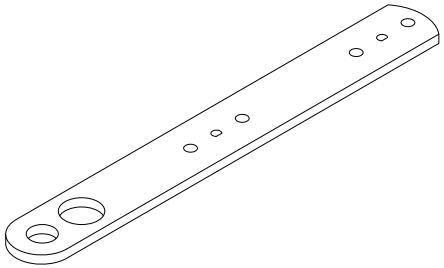
The ball caster works as a wheel, adding rolling support to your inventions. The ball can also be removed from the socket, so you can use it in games and contraptions. You can even use the socket as a ball stand!



HOW IT WORKS

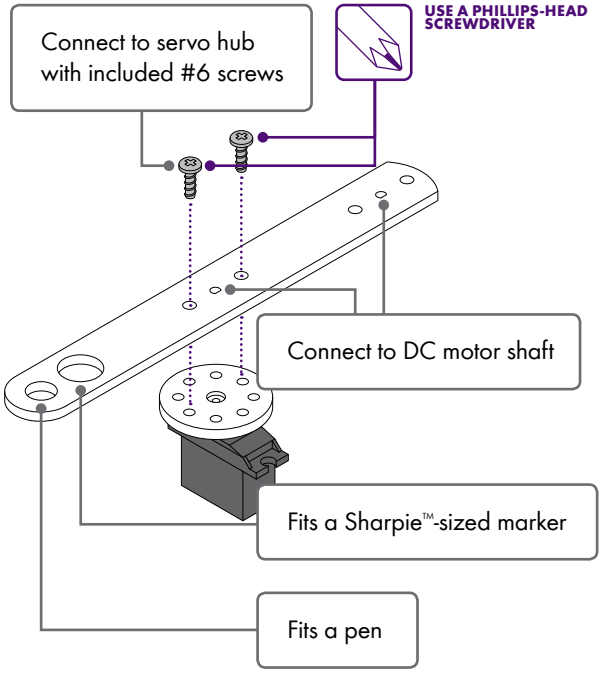
Attach the ball caster to a surface using small screws (not included) or Glue Dots®.

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.



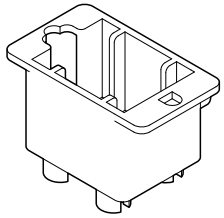
HOW IT WORKS

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.

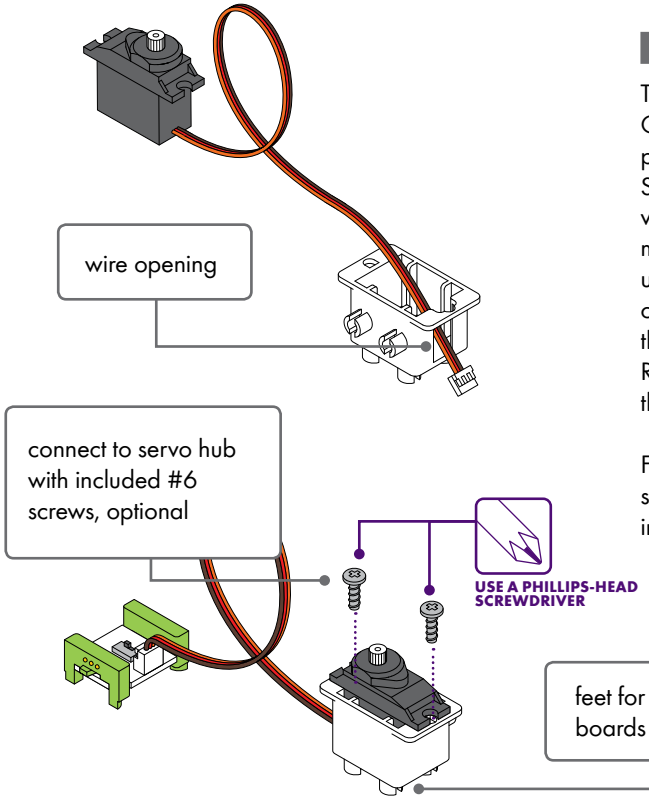
The two large holes on the end are perfect for holding pens and markers in place.

a24 SERVO MOUNT



MEET THE ACCESSORY

The servo mount lets you attach your servo to a mounting board or a pair of littleBits shoes. With feet on two sides of the mount, you can orient the servo in all directions. It's a great way to keep the servo steady so the arm can go wild.

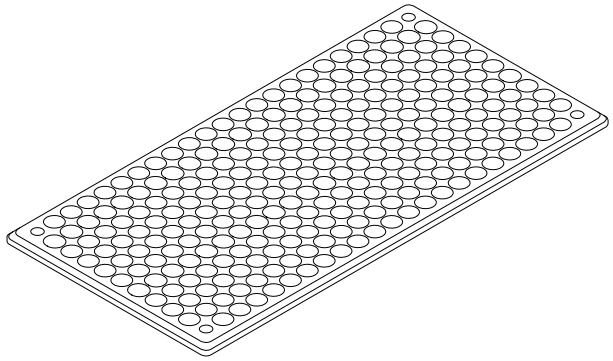


HOW IT WORKS

To use the servo mount: Carefully separate the white plug from the circuit board. Slip the plug through the vertical slot in the servo mount. Pull the wire through until the servo sits on top of the servo mount. Press the servo into the mount. Reconnect the white plug to the board.

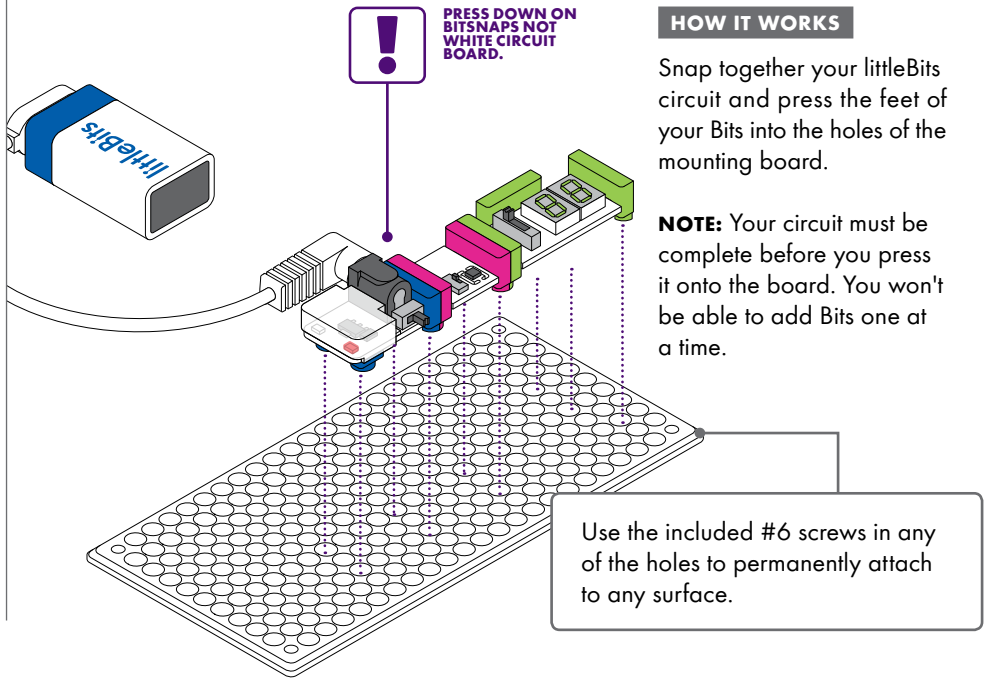
For extra security, screw the servo to the mount using the included #6 screws.

a26 MOUNTING BOARD



MEET THE ACCESSORY

The mounting board is like the backbone of some of your inventions. It allows you to keep your circuit intact and move it around with ease! It also provides structure, which is helpful for building out inventions like a vehicle.

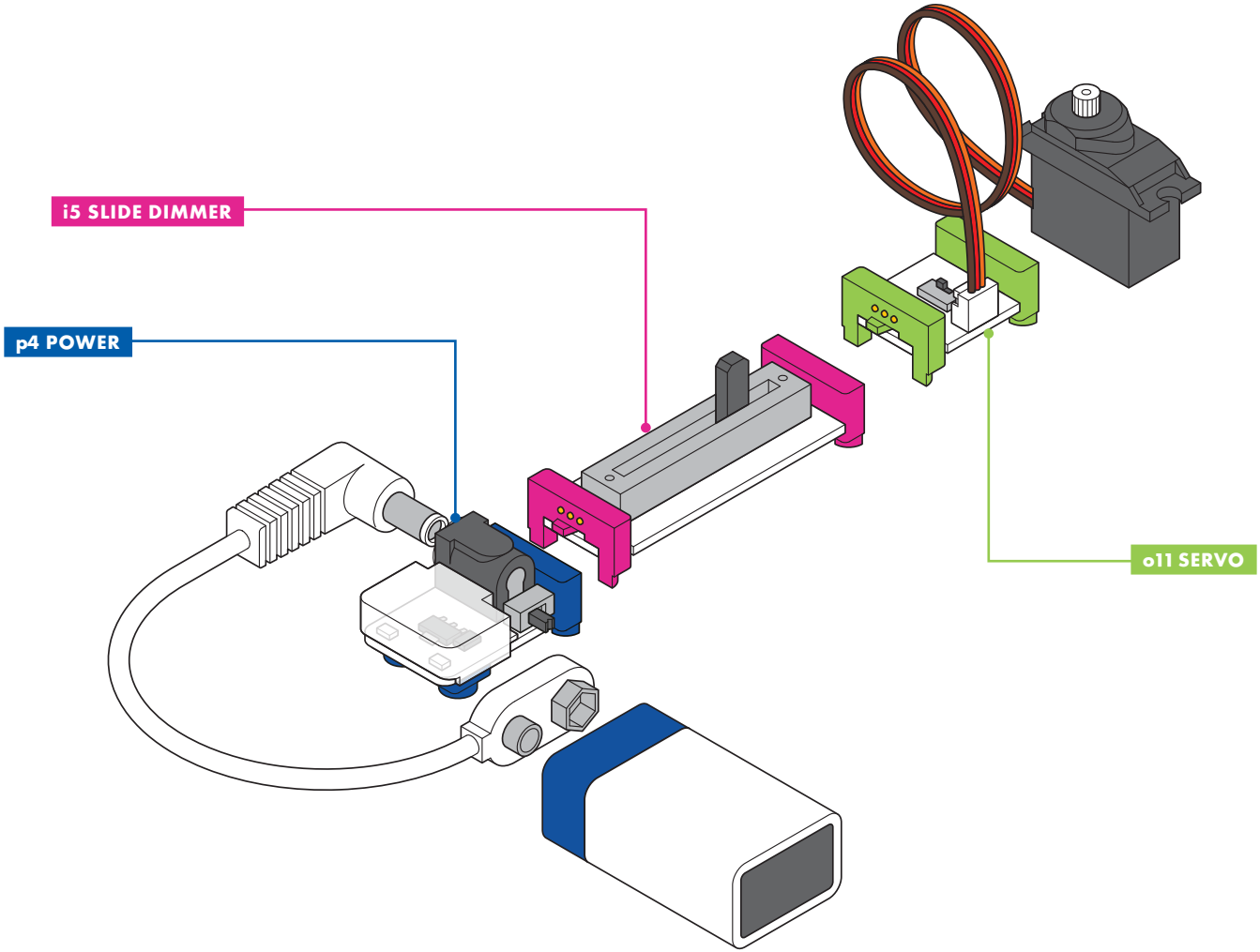


HOW IT WORKS

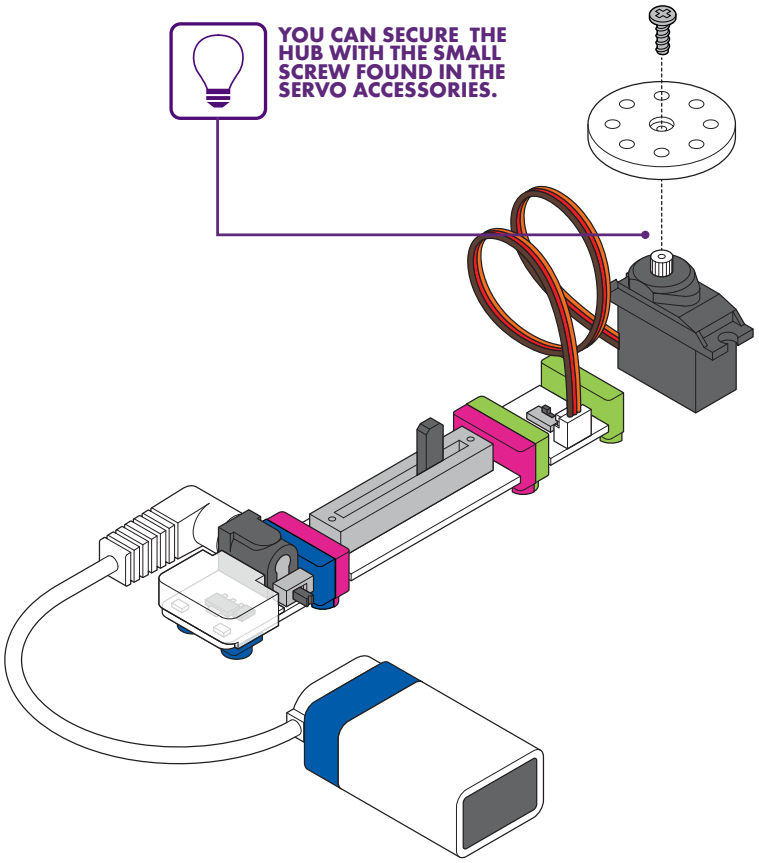
Snap together your littleBits circuit and press the feet of your Bits into the holes of the mounting board.

NOTE: Your circuit must be complete before you press it onto the board. You won't be able to add Bits one at a time.

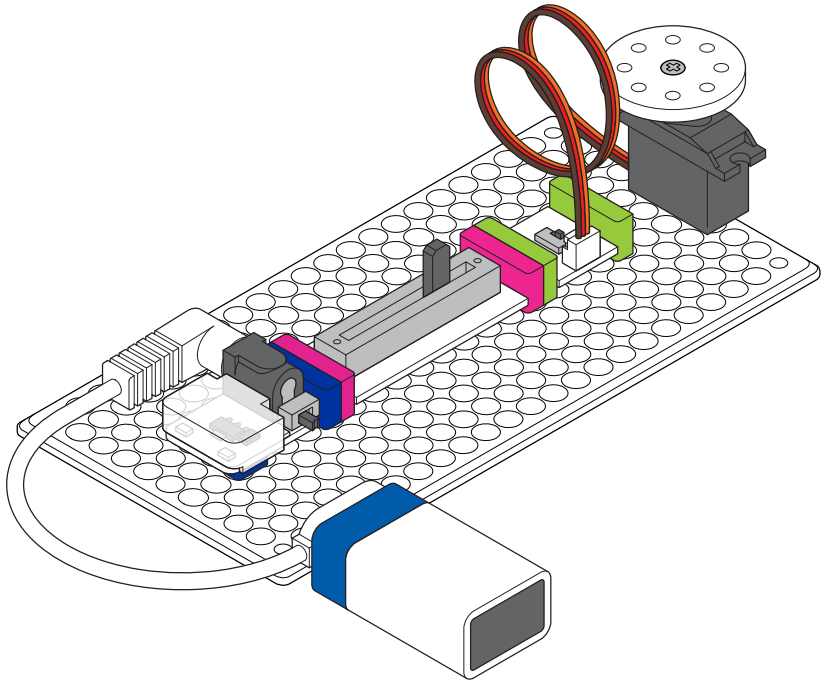
1 BUILD YOUR CIRCUIT.



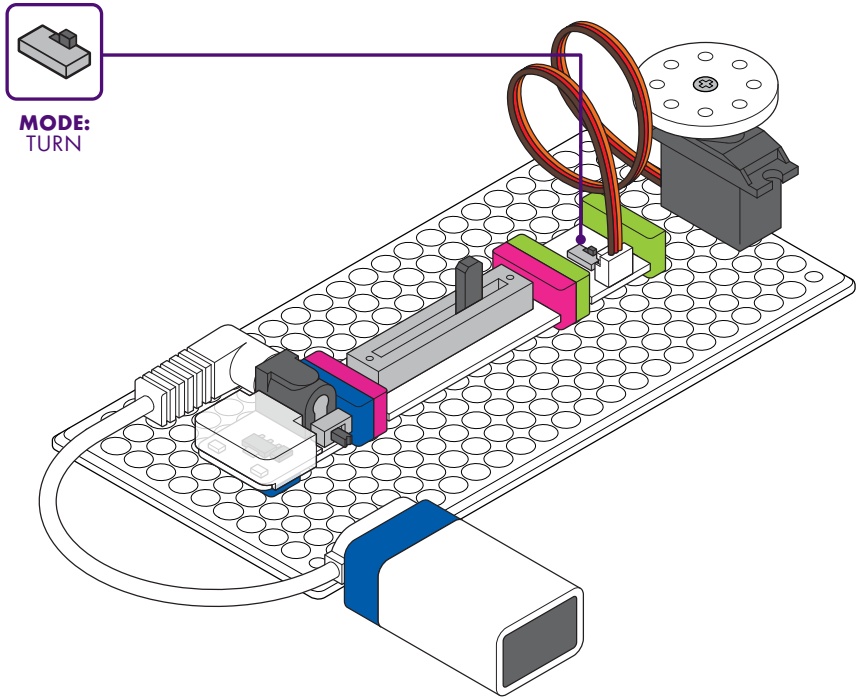
2 PRESS THE SERVO HUB ONTO THE SERVO.



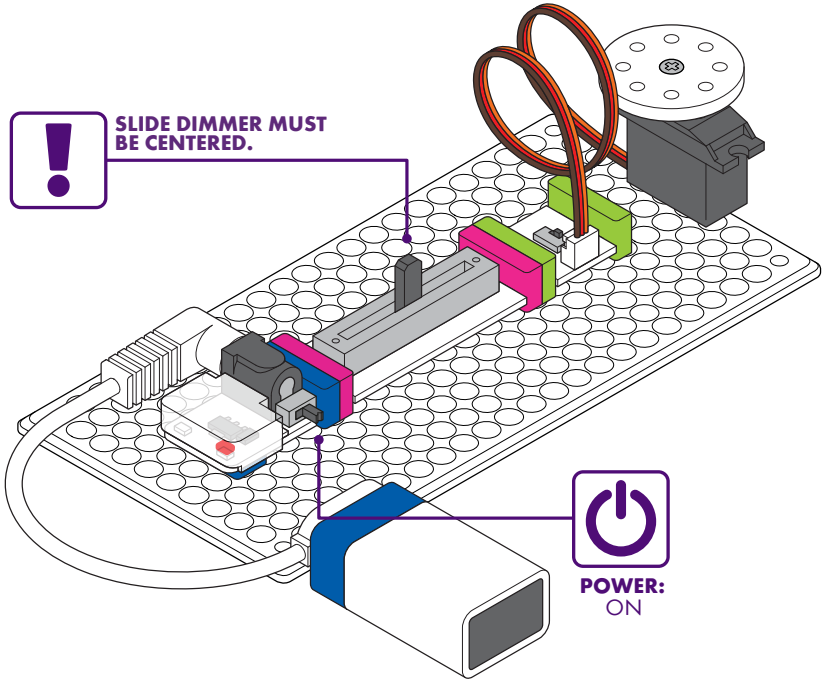
3 PRESS YOUR CIRCUIT ONTO THE MOUNTING BOARD.



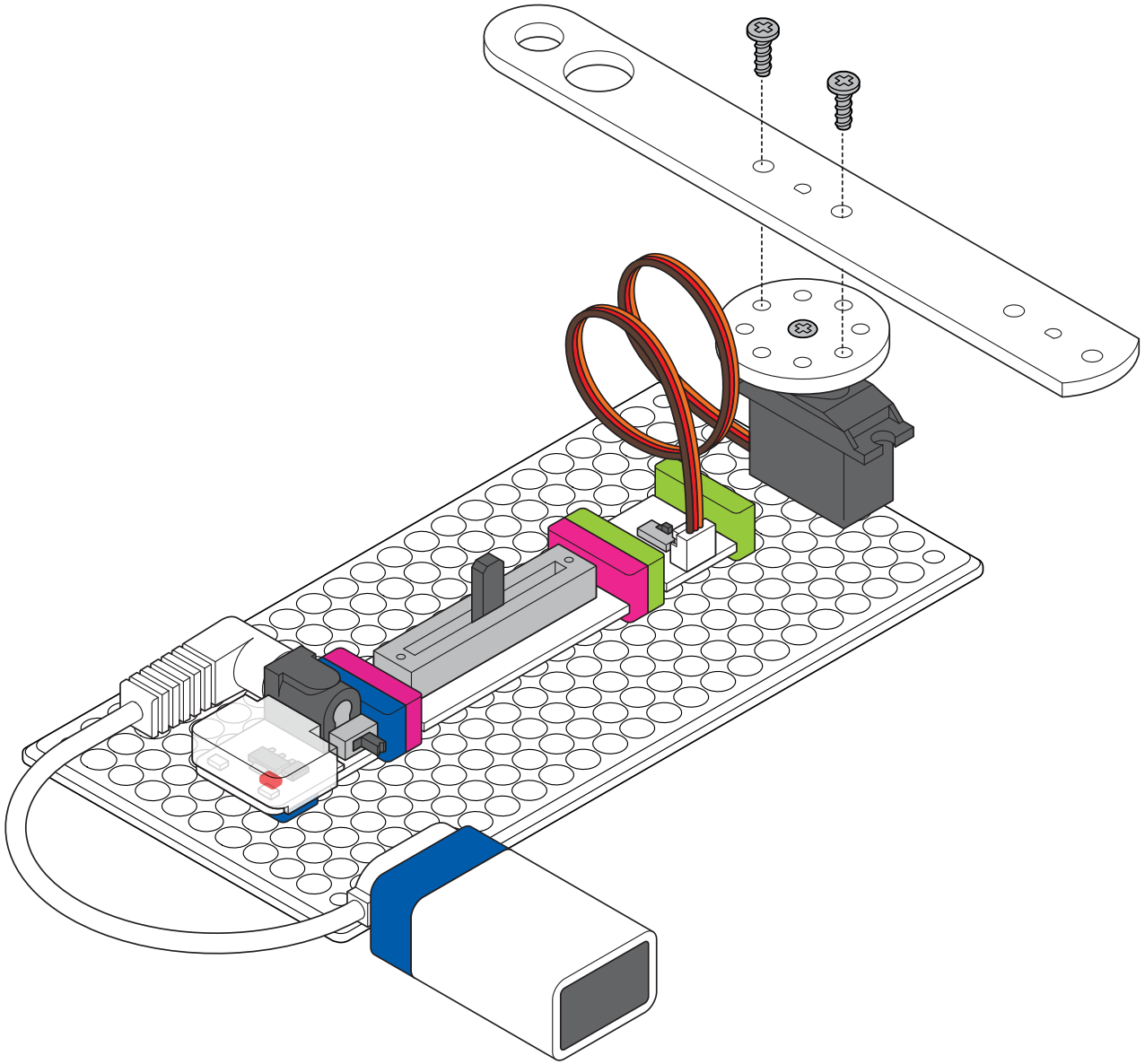
4 SET SERVO TO TURN MODE.



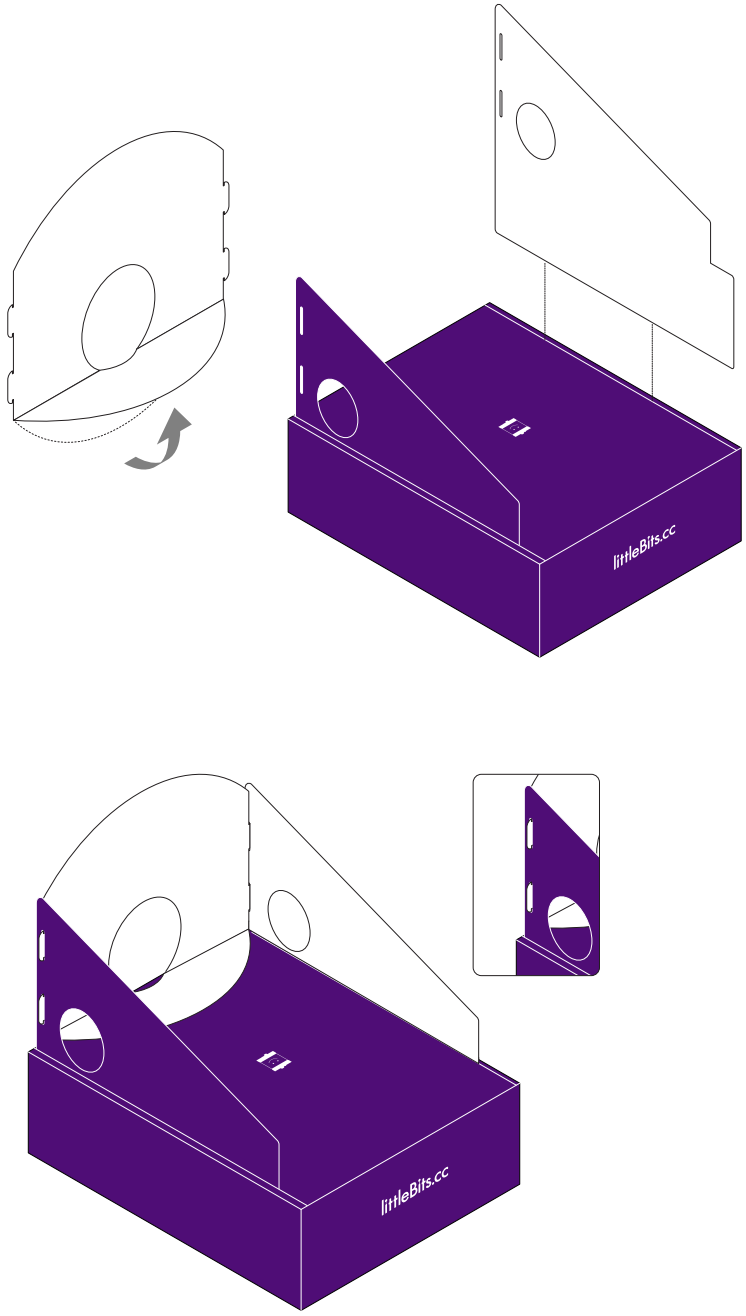
5 POWER ON, AND MOVE THE SLIDE DIMMER TO THE MIDDLE POSITION.



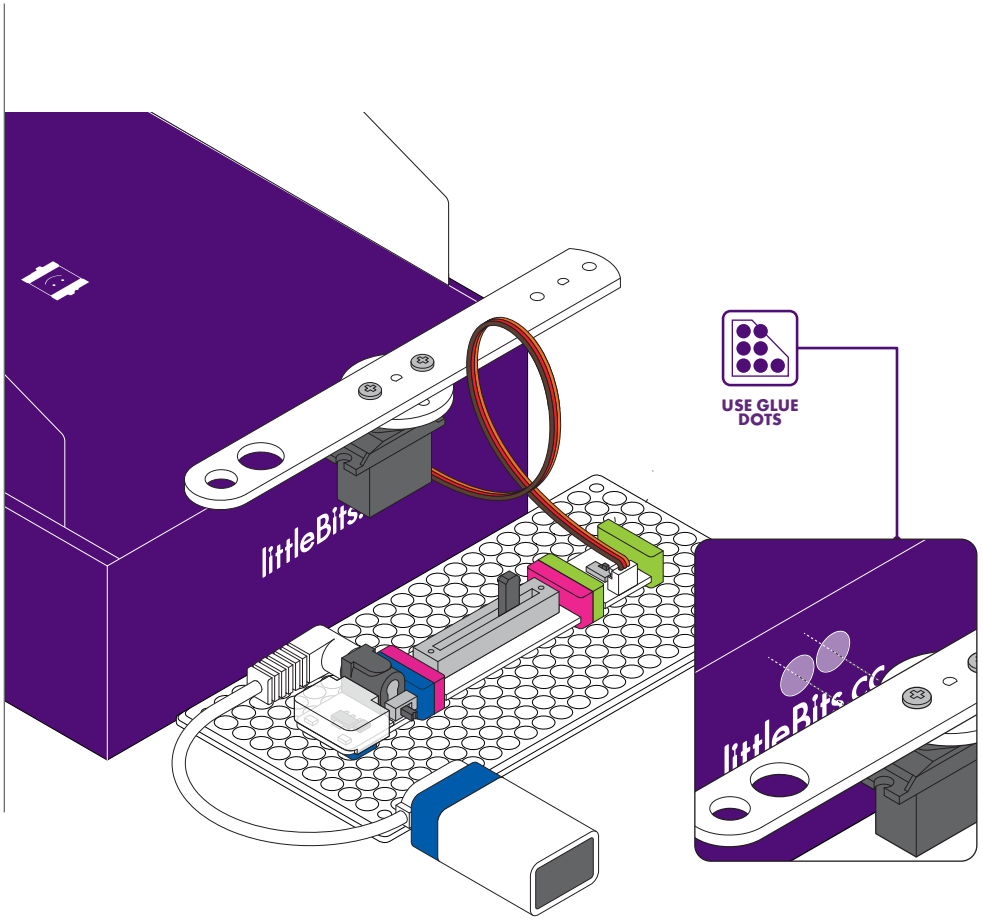
6 **ATTACH THE MECHANICAL ARM IN THIS POSITION.**



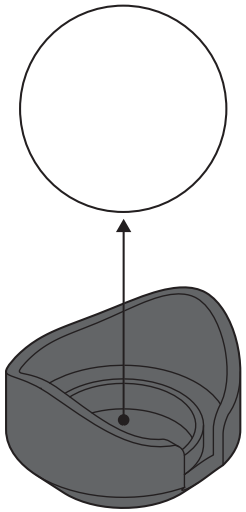
7 ASSEMBLE THE TEMPLATE.



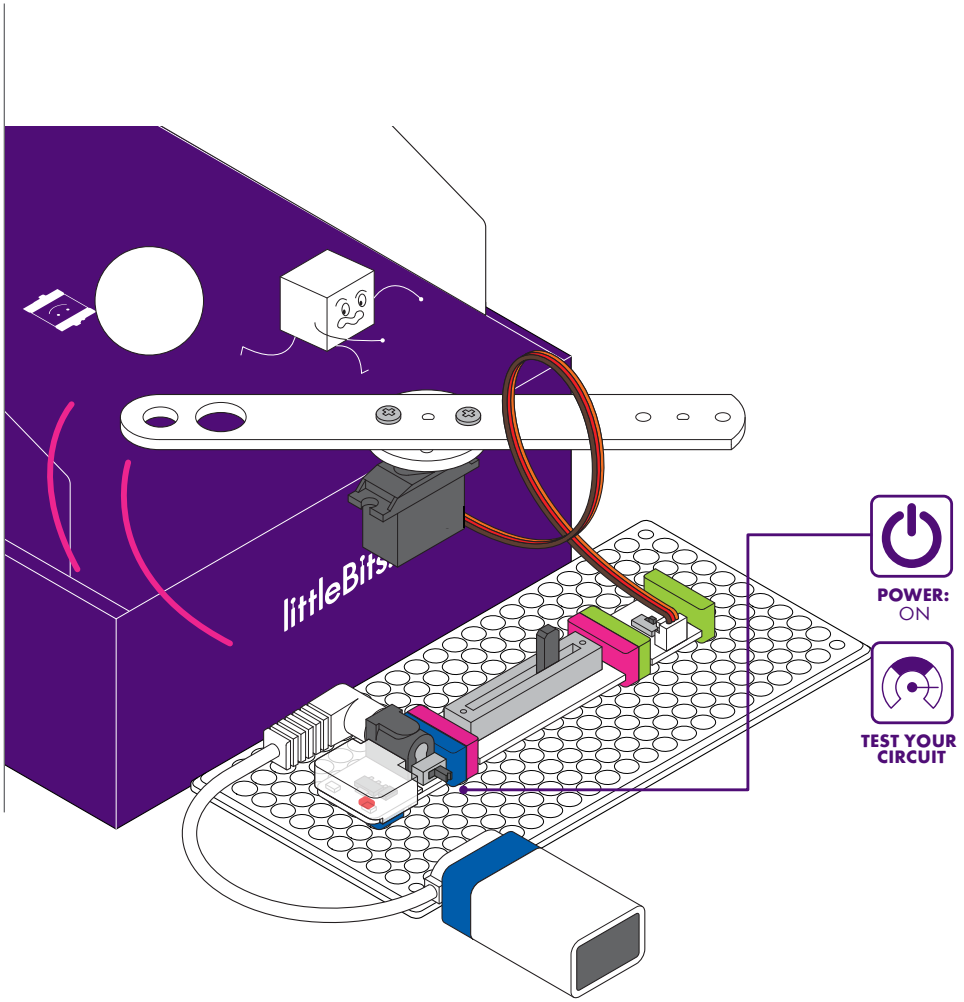
8 ATTACH THE SERVO TO THE KIT BOX. Make sure it is centered.



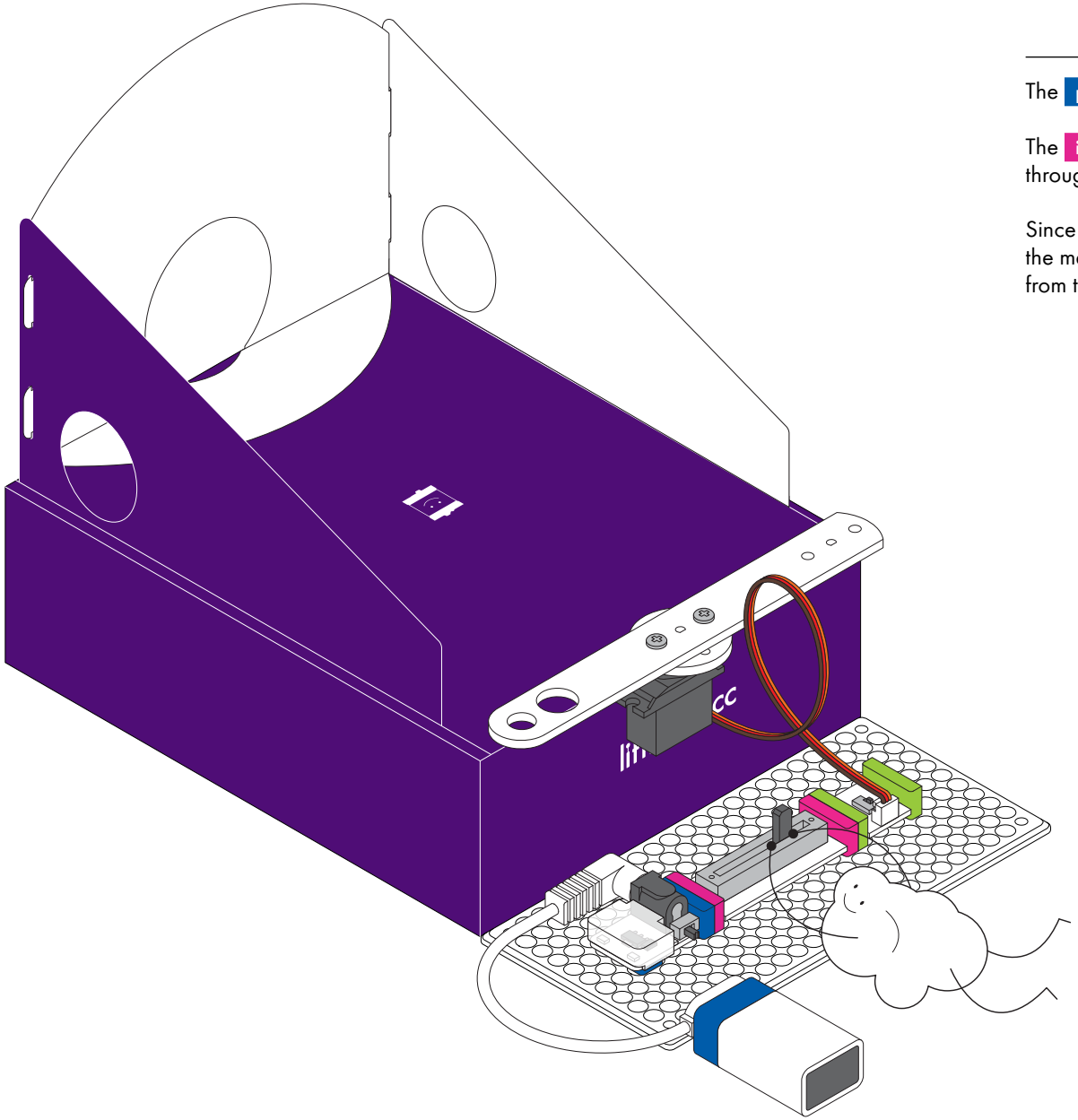
9 **USE THE BALL FROM THE BALL CASTER TO PLAY.**



10 **TAKE SOME PRACTICE SWINGS!** Moving the slide dimmer should make the mechanical arm rotate side to side.



HOW IT WORKS



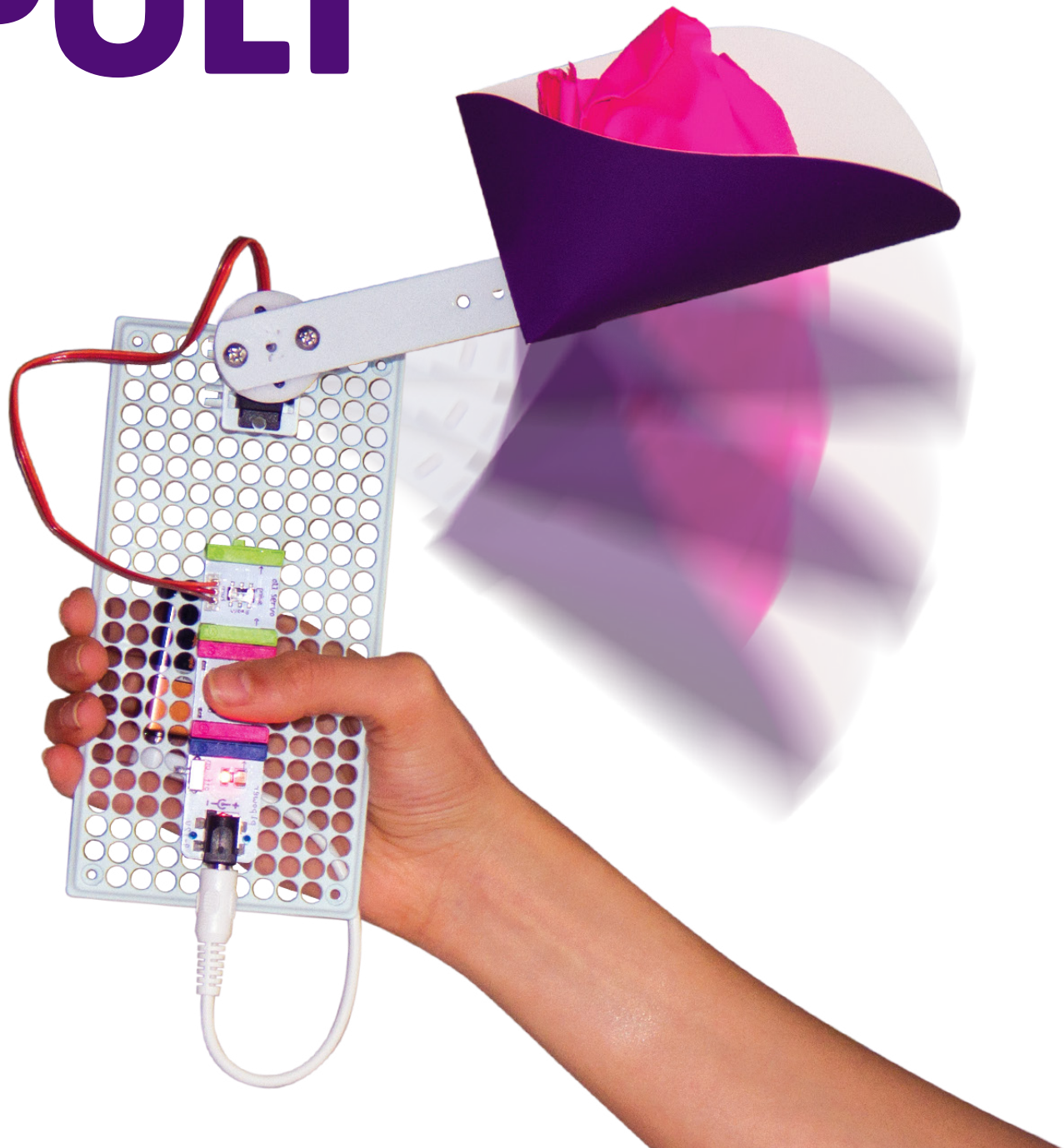
The **p4 POWER** sends a signal through the circuit.

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

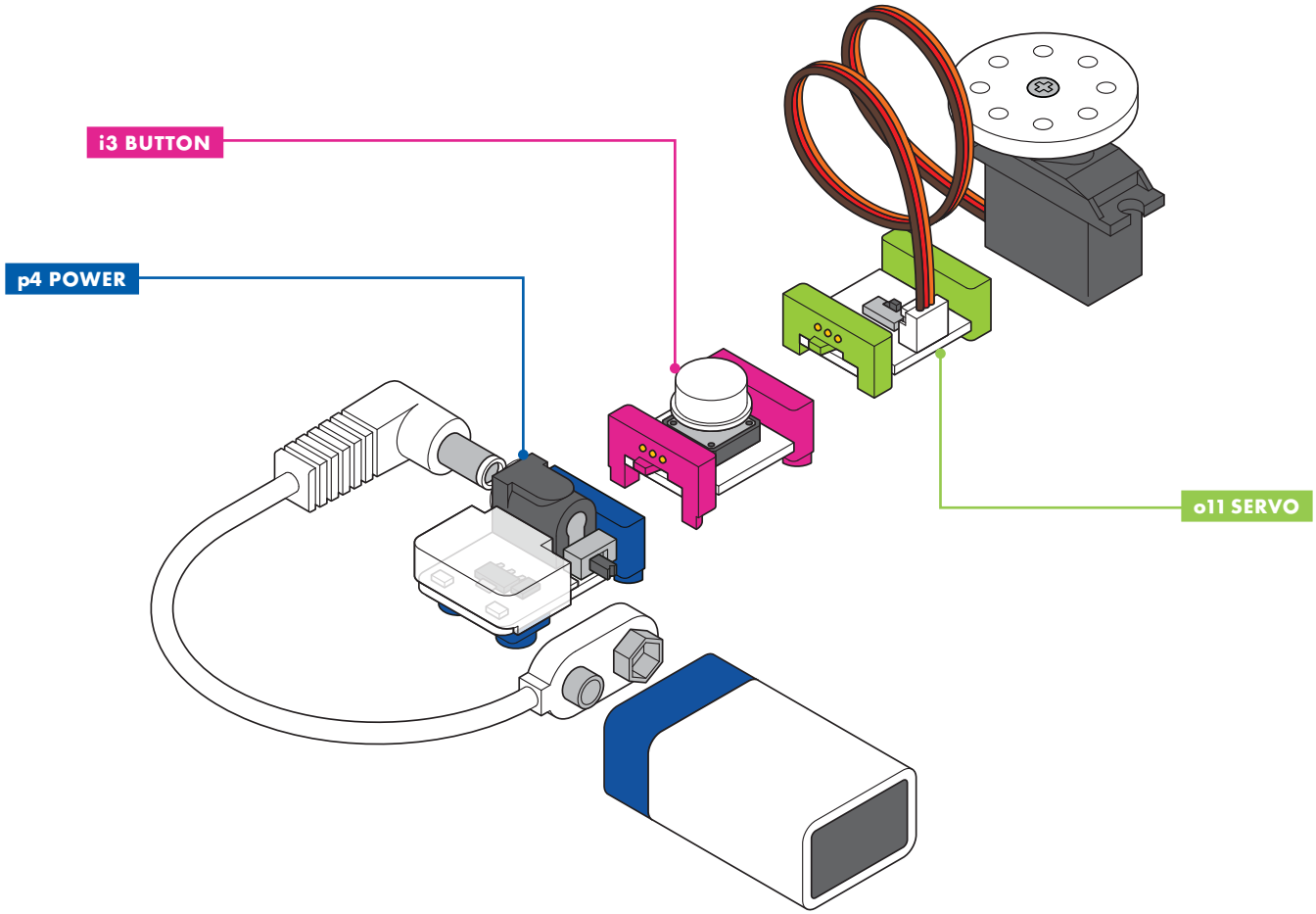
Since the **o9 BARGRAPH** is in **TURN** mode, the position of the mechanical arm depends on how much signal it receives from the slide dimmer.

INVENTION #2

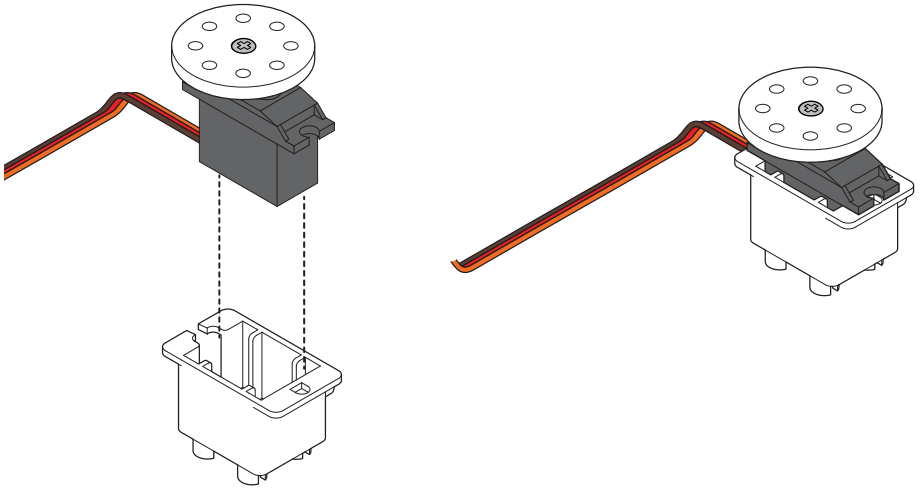
CATAPULT



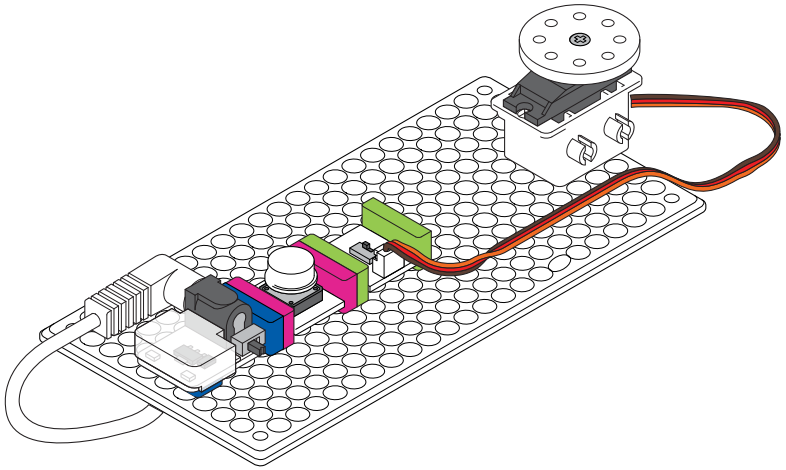
1 BUILD YOUR CIRCUIT.



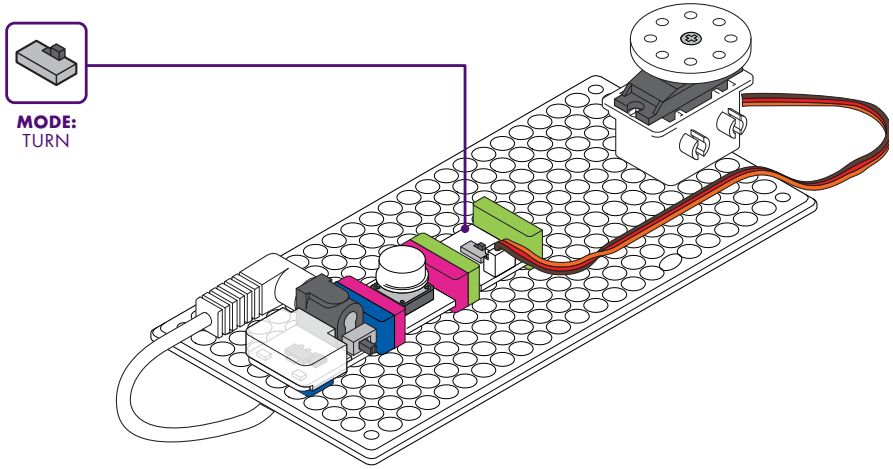
2 PRESS SERVO INTO THE SERVO BUCKET.



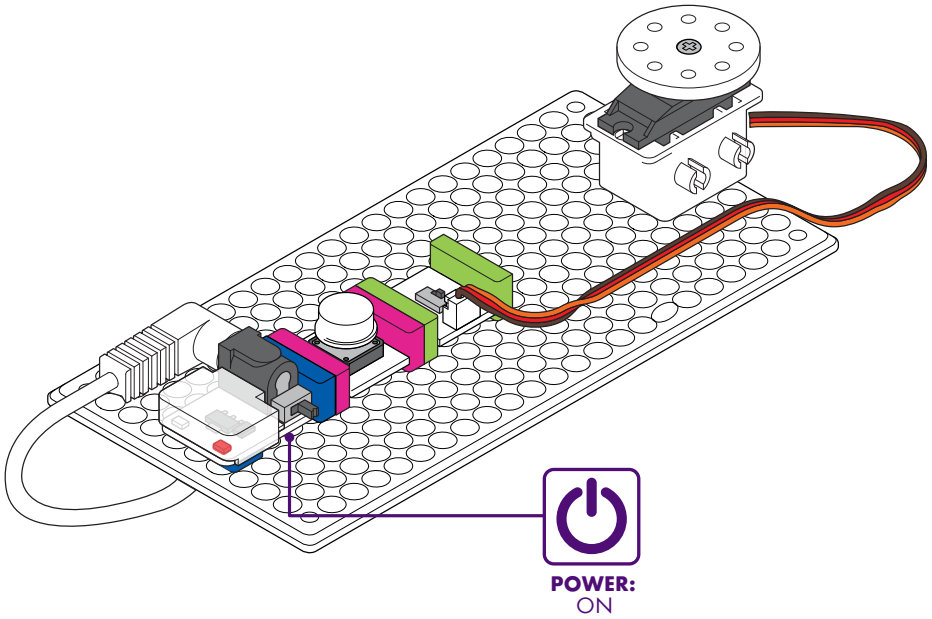
3 PRESS YOUR CIRCUIT ONTO THE MOUNTING BOARD.



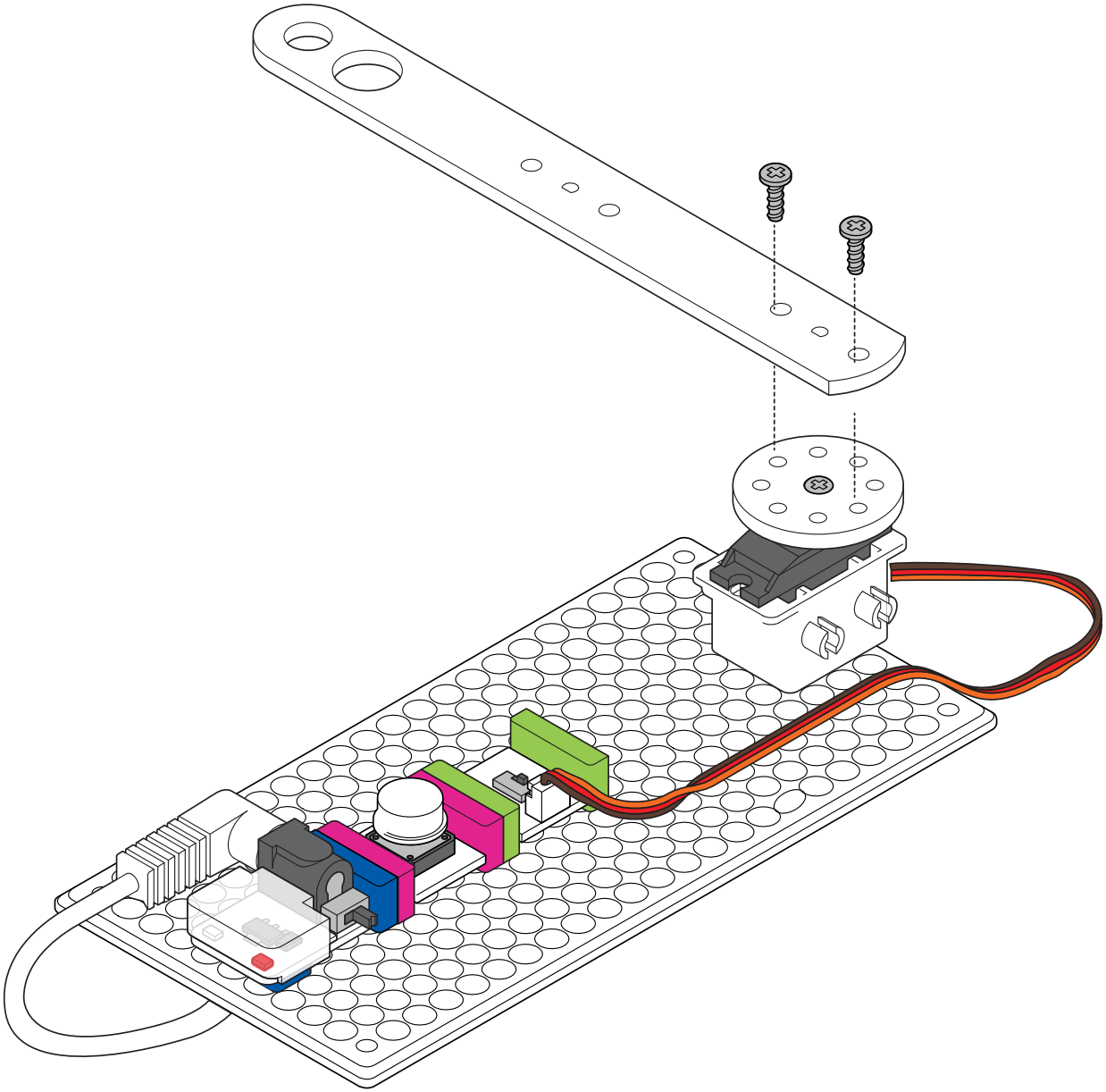
4 SET THE SERVO MODE TO “TURN”.



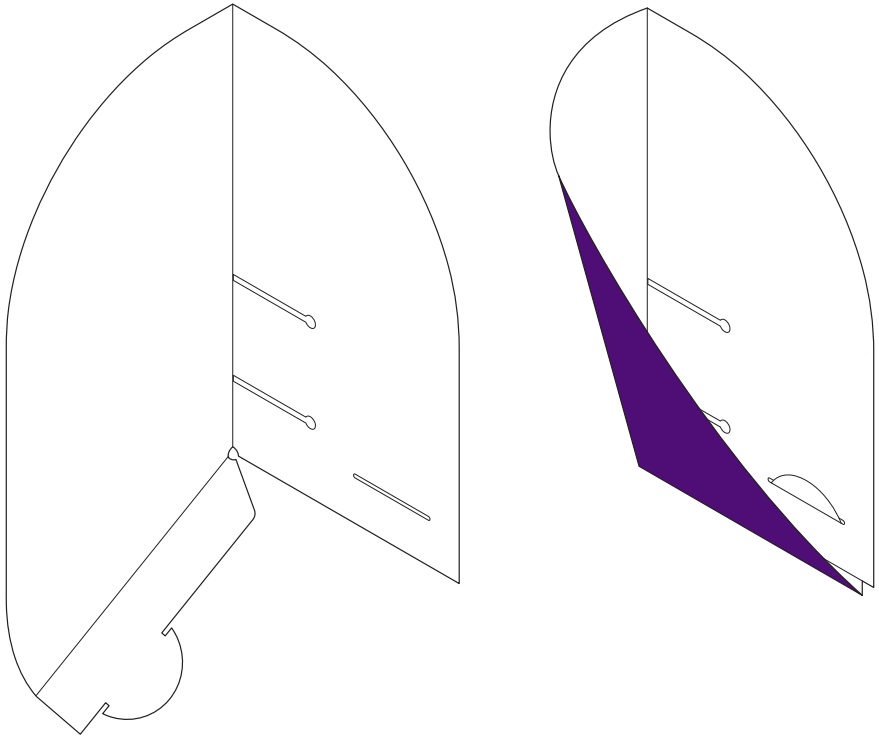
5 TURN POWER ON.



6 **WITH POWER ON, CONNECT THE MECHANICAL ARM TO THE SERVO IN THIS POSITION.**

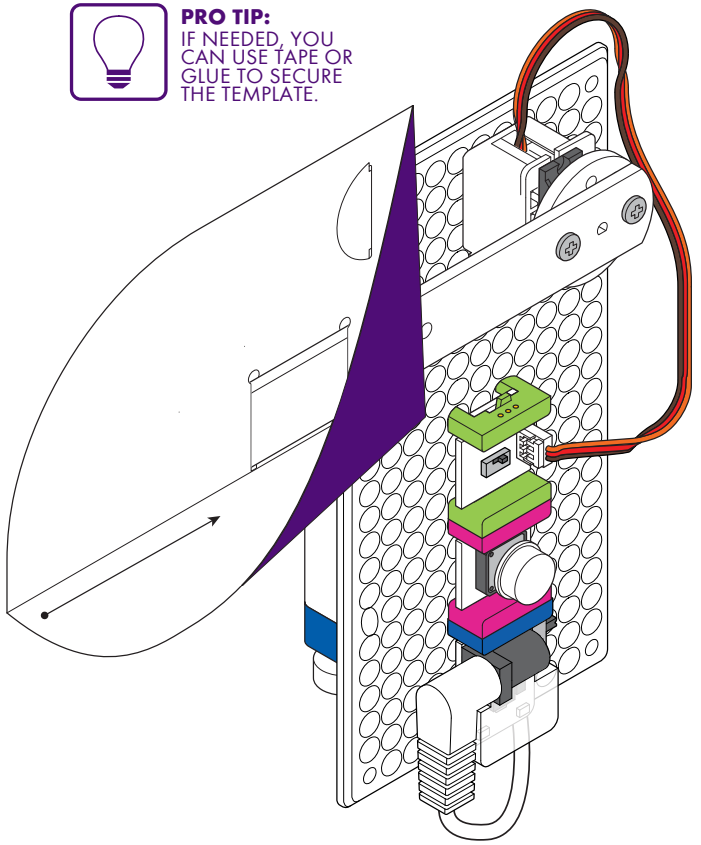


7 MAKE A BUCKET FOR THE CATAPULT.

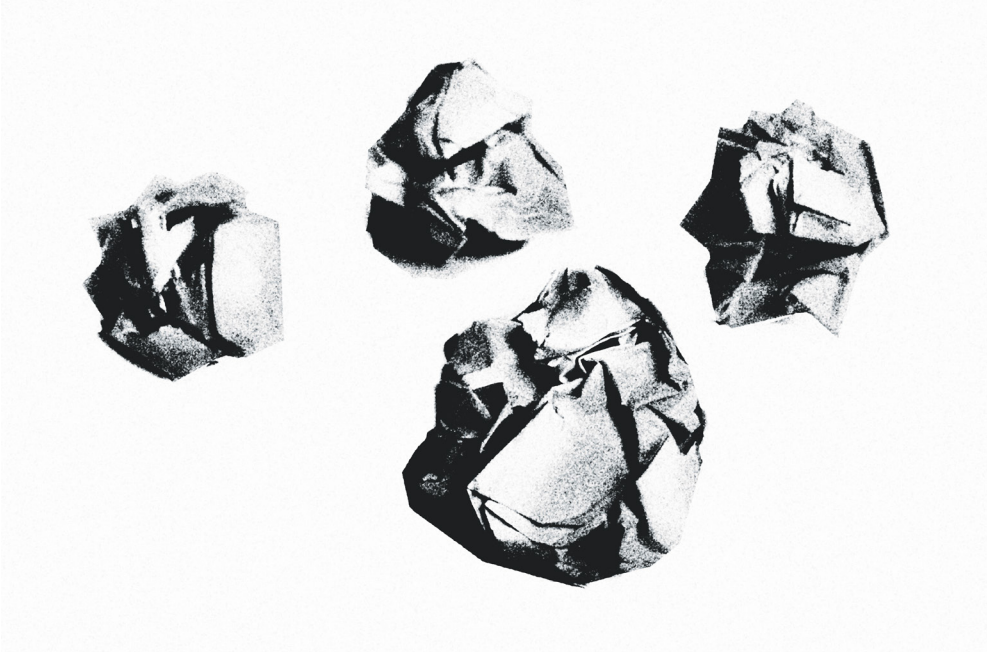


8 ATTACH THE BUCKET TO THE FREE END OF THE MECHANICAL ARM.

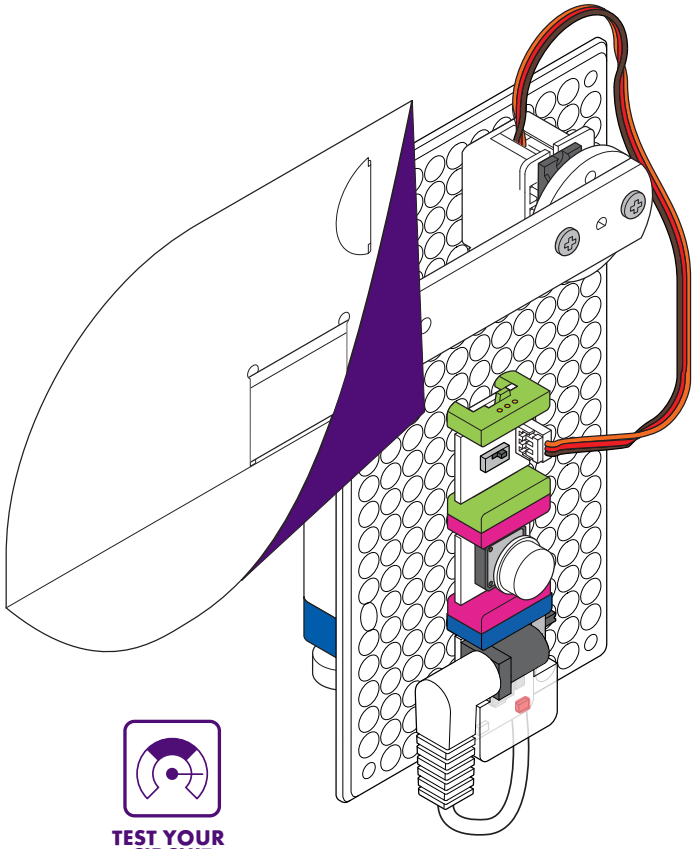
PRO TIP:
IF NEEDED, YOU CAN USE TAPE OR GLUE TO SECURE THE TEMPLATE.



9 **CRUMPLE UP A HALF SHEET OF NOTEBOOK PAPER TO LAUNCH.**

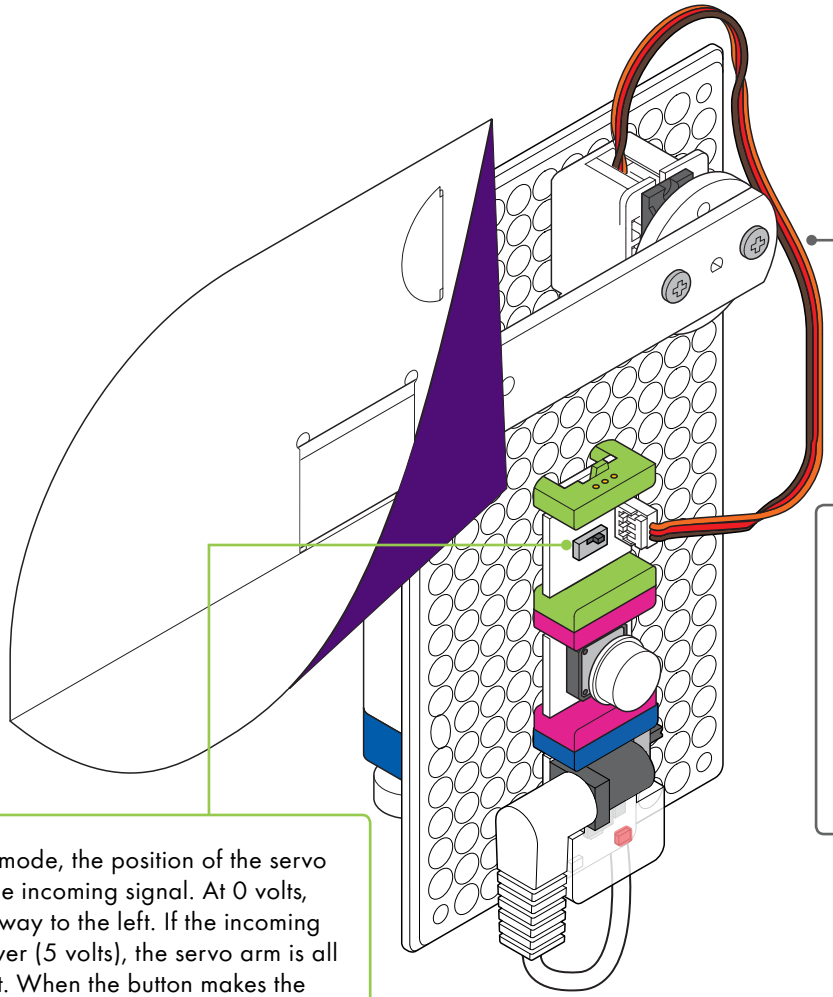


10 **SWISH!** Pressing the button should rotate the mechanical arm, sending the balls of paper soaring into the nearest recycling bin.



TEST YOUR CIRCUIT

HOW IT WORKS



p4 POWER sends a signal to the button.

When pressed, the **i3 BUTTON** lets the signal through to the servo.

When the **o11 SERVO** gets the signal, it turns, rotating the arm and throwing the projectile.

a23 MECHANICAL ARM

The farther you place your cup from the servo hub, the faster it will swing. You can experiment with extending the mechanical arm with other materials, but you'll have to pay attention to weight.

As the cup gets farther from the hub, it also takes more force to move it. If your arm gets too long it will over-power the servo motor and will be hard to move. This relationship between distance and force is called torque.

o11 SERVO

When it's in **TURN** mode, the position of the servo is determined by the incoming signal. At 0 volts, the servo is all the way to the left. If the incoming signal is at full power (5 volts), the servo arm is all the way to the right. When the button makes the signal go from 0 to 5 volts quickly, the arm swings quickly. This speed helps your ball fly farther.

VIDEO LINKS

click to explore!