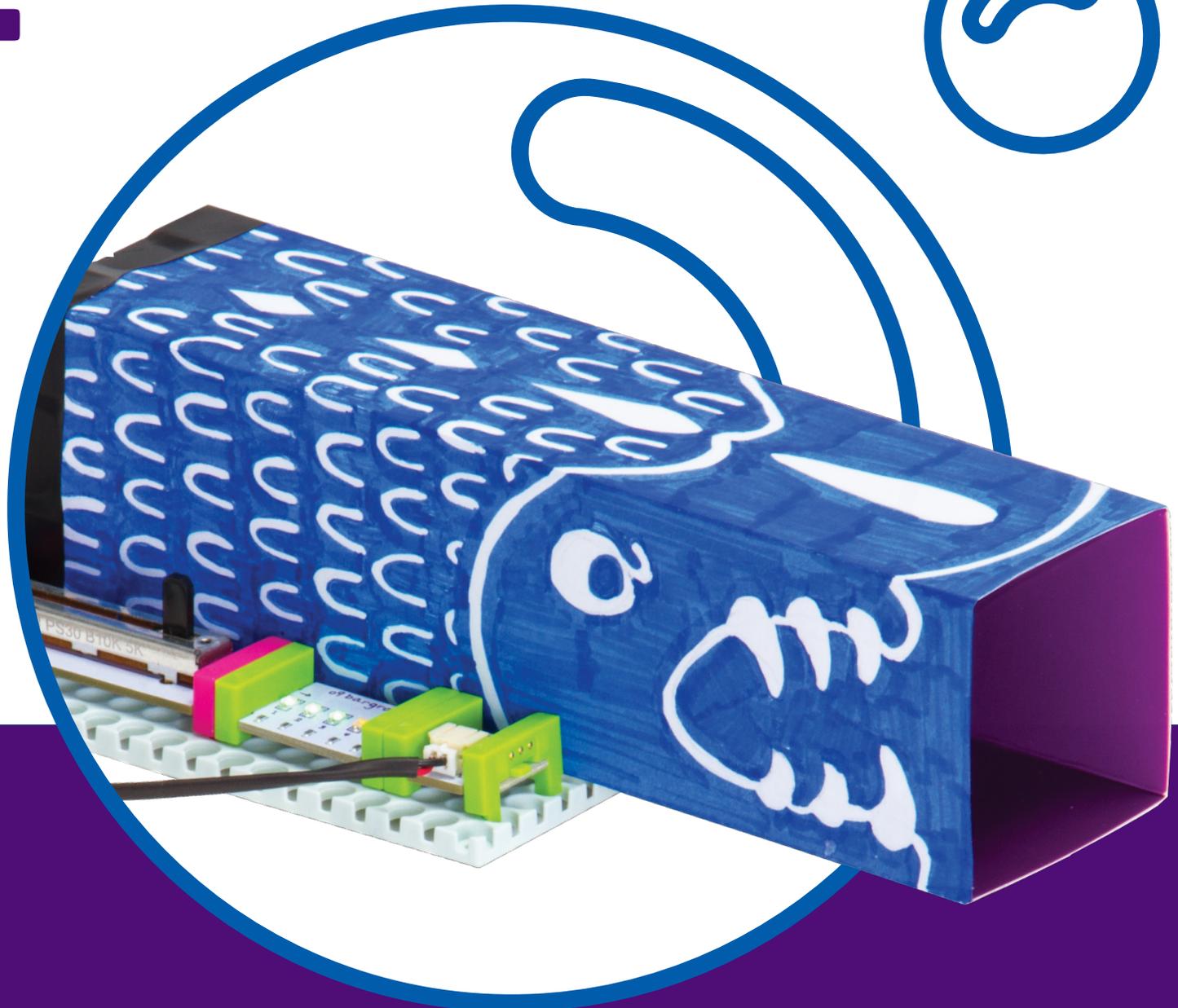


# BUBBLE BOT



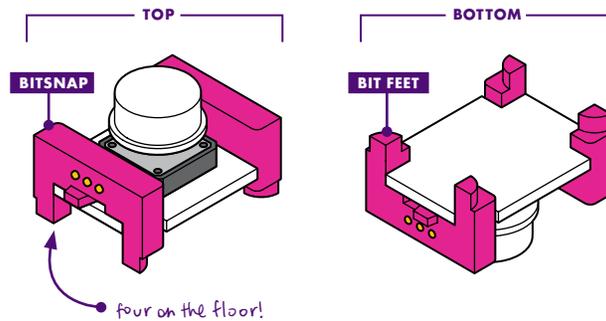
littleBits™

# 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



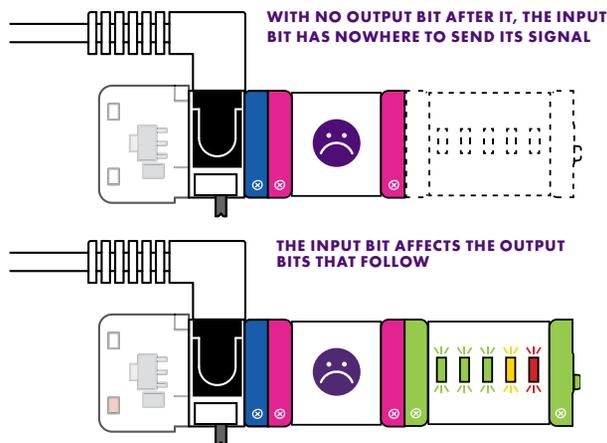
IF THE BITS WON'T SNAP TOGETHER, TRY SPINNING ONE AROUND AND MAKE SURE THE ARROWS POINT IN THE SAME DIRECTION



4

## ORDER IS IMPORTANT

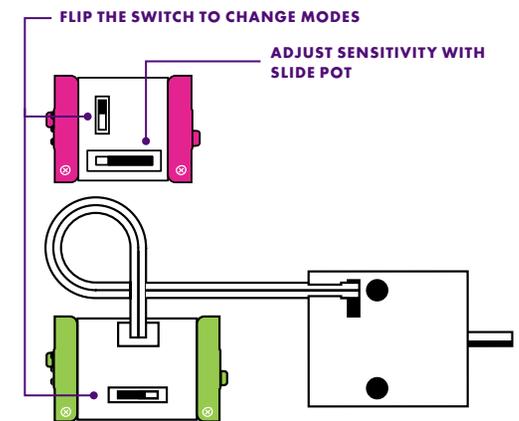
POWER BITS always come first and INPUT BITS only affect the OUTPUT BITS that come after them.



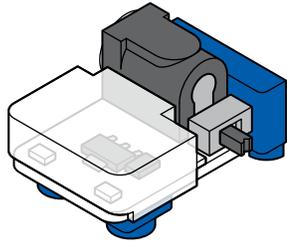
5

## SOME BITS ARE ADJUSTABLE

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



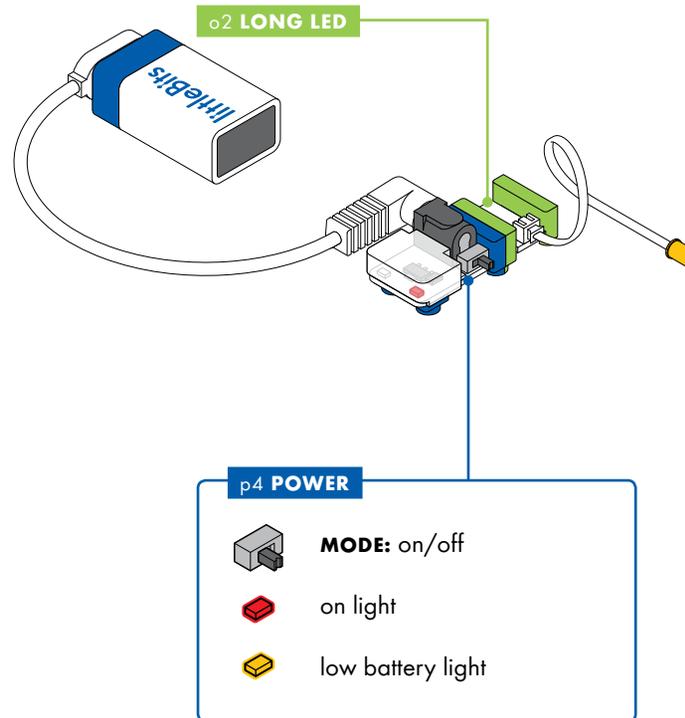
## p4 POWER



### 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.

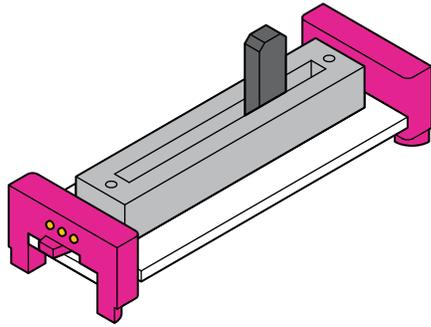
The power Bit also sends a signal through your circuit. Controlling this signal with inputs is how you control your circuit.

### REAL WORLD ANALOGIES



PHONE CHARGER

## i5 SLIDE DIMMER



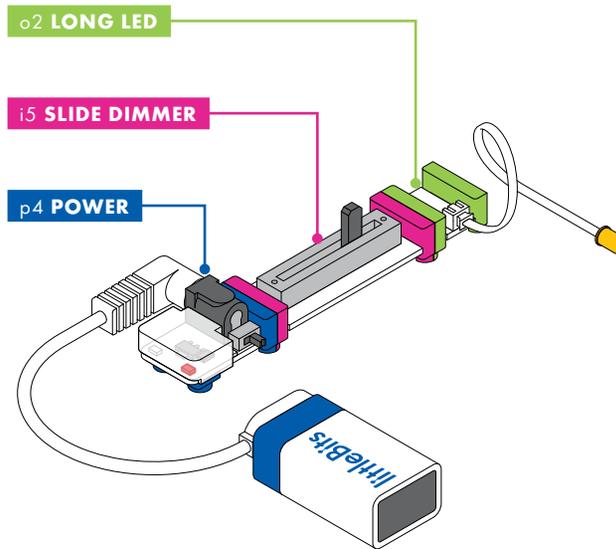
### MEET THE BIT

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.

### 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?

## SAMPLE CIRCUIT



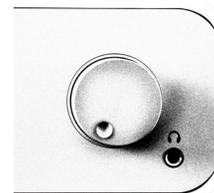
## HOW IT WORKS

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.

## REAL WORLD ANALOGIES



HOUSEHOLD DIMMER SWITCH

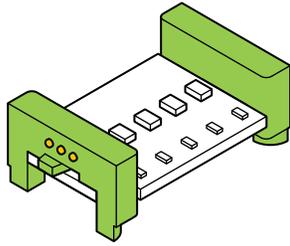


STEREO VOLUME CONTROL



CAR PEDAL

## 09 BARGRAPH



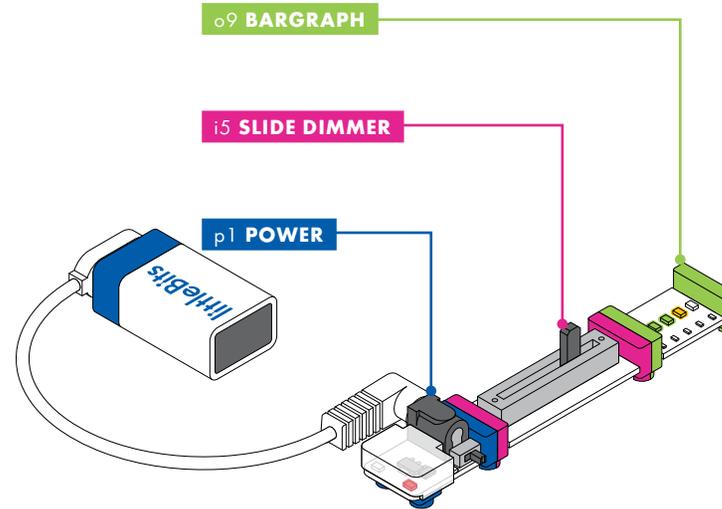
### MEET THE BIT

The bargraph shows you how much signal the Bit is receiving with a display of five light-emitting diodes (LEDs) in different colors. Try it with a dimmer to make your own adjustable lamp.

### MINI-CHALLENGE

Can you invent a way to show your mood to a friend?

### SAMPLE CIRCUIT



### HOW IT WORKS

The bargraph uses five LEDs to turn electricity into light. Each LED on the board needs a certain amount of signal in order to light up. As you increase the signal sent to the bargraph, more LEDs will shine.

### REAL WORLD ANALOGIES



MUSIC VISUALIZER

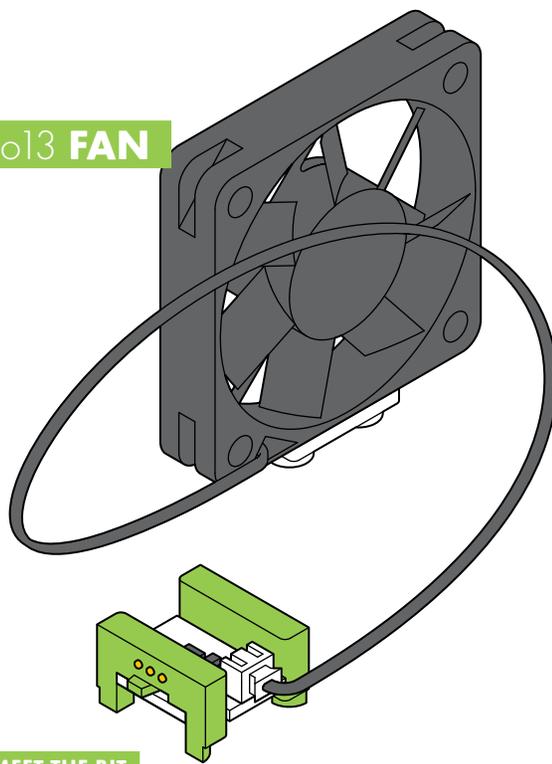


TV VOLUME



PHONE SCREEN BRIGHTNESS

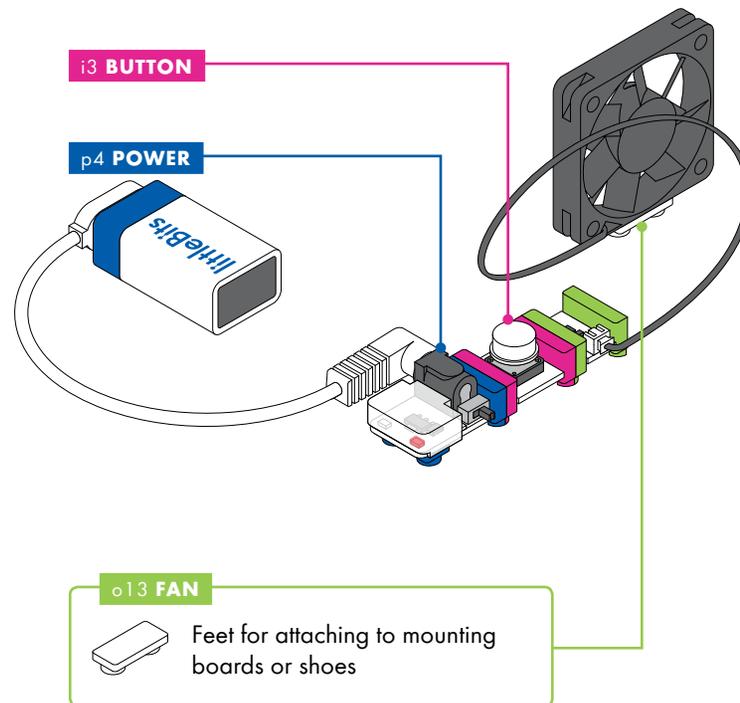
## o13 FAN



### MEET THE BIT

Use the fan to create a gentle breeze, perfect for cooling things off. You can also try taping small things (like stickers or pieces of paper) to the center of the fan for some spinning visuals.

## SAMPLE CIRCUIT



## HOW IT WORKS

Inside the fan is a tiny motor. When it receives a signal, it spins. The more signal it receives, the faster it spins.

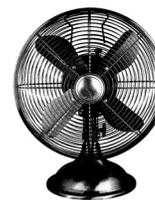
## MINI-CHALLENGE

Can you invent something that uses the fan to move an object across the table?

## REAL WORLD ANALOGIES



LEAF BLOWER



PERSONAL FAN

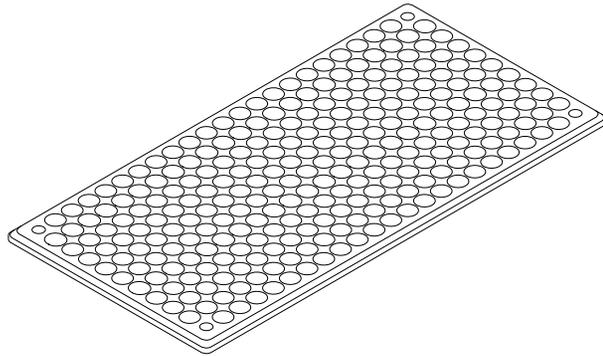


AIRPLANE PROPELLER

## a26 MOUNTING BOARD

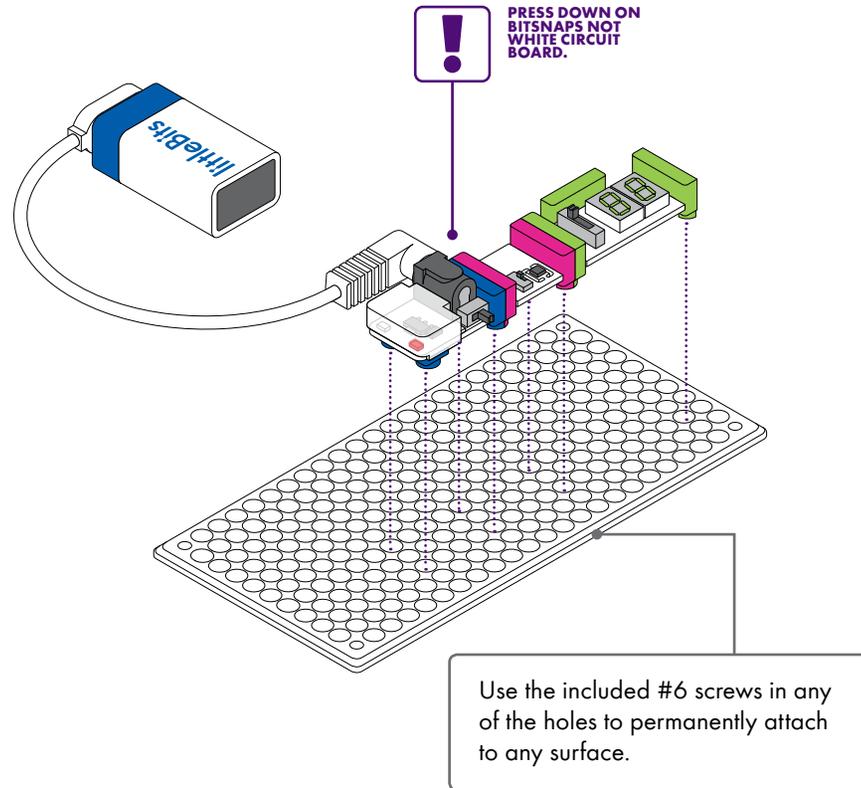
## SAMPLE CIRCUIT

## HOW IT WORKS



### 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.

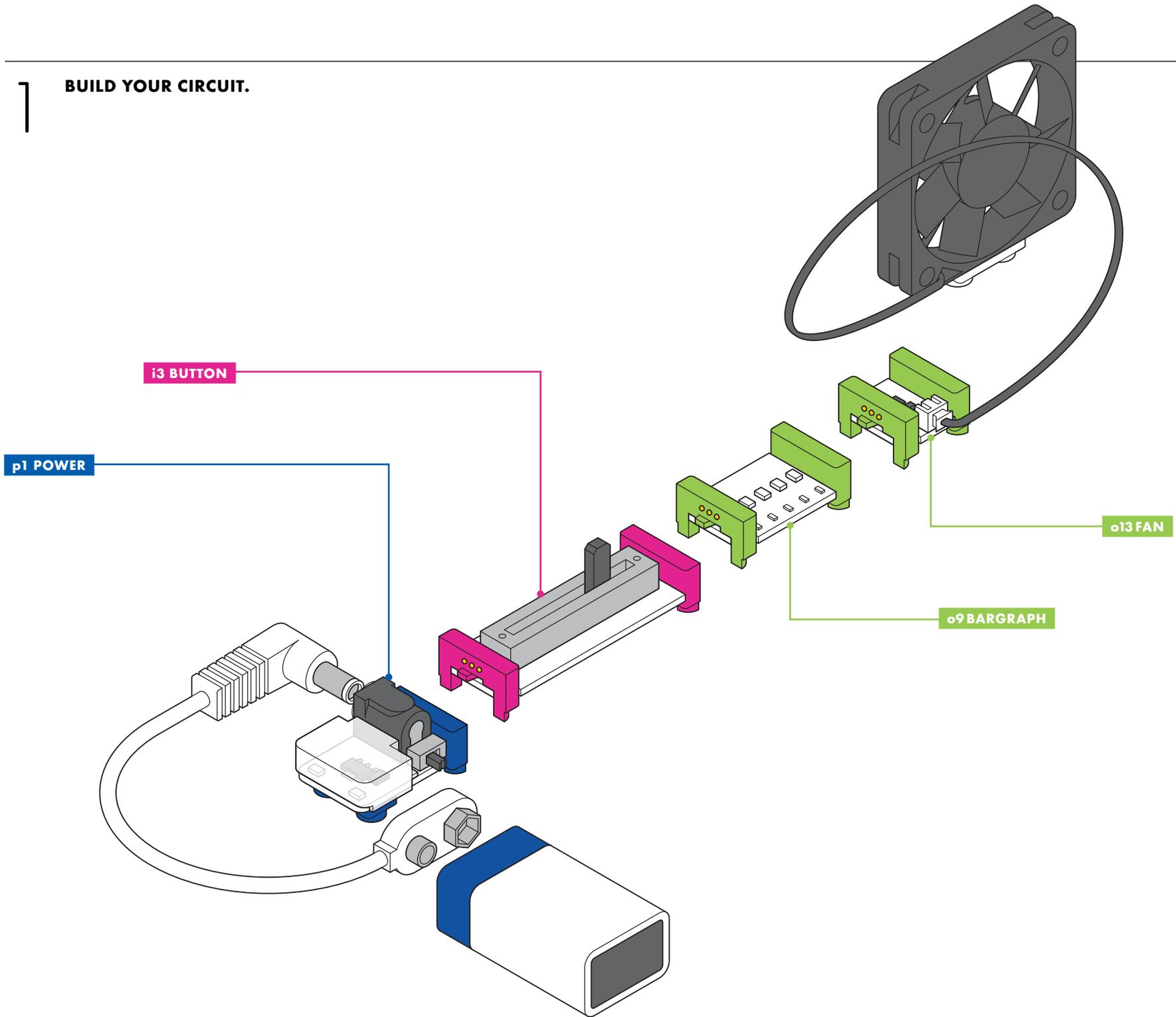


Snap together your littleBits circuit and press the feet of your Bits into the holes of the mounting board.

**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.

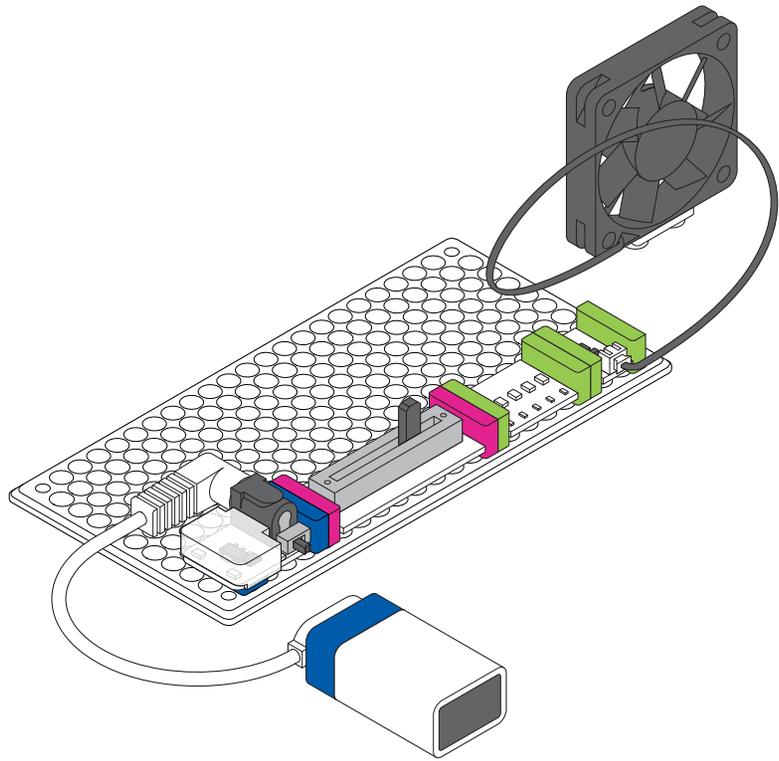
1

**BUILD YOUR CIRCUIT.**



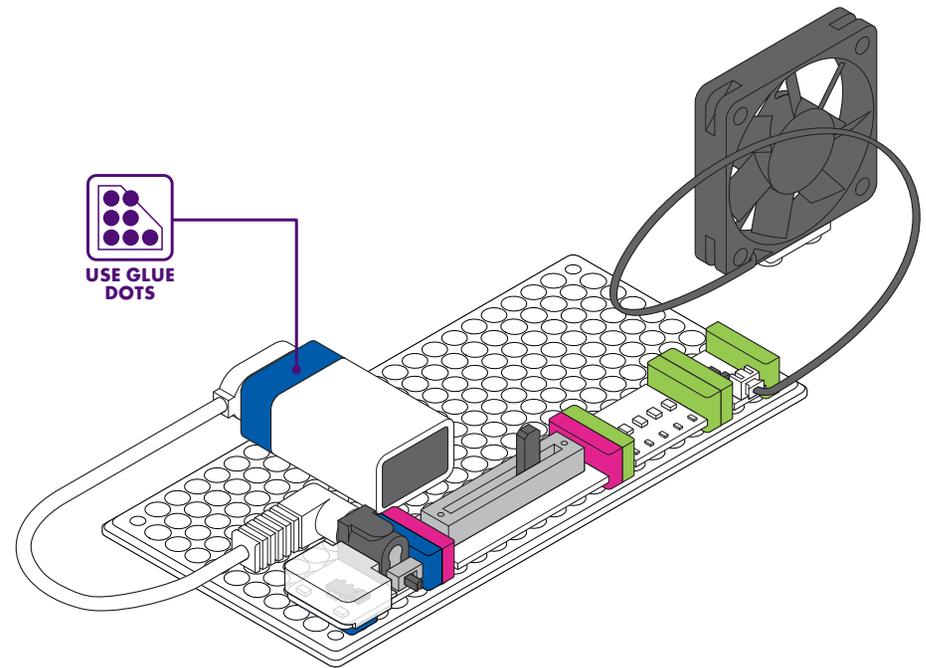
2

**PRESS YOUR CIRCUIT ONTO THE MOUNTING BOARD.**



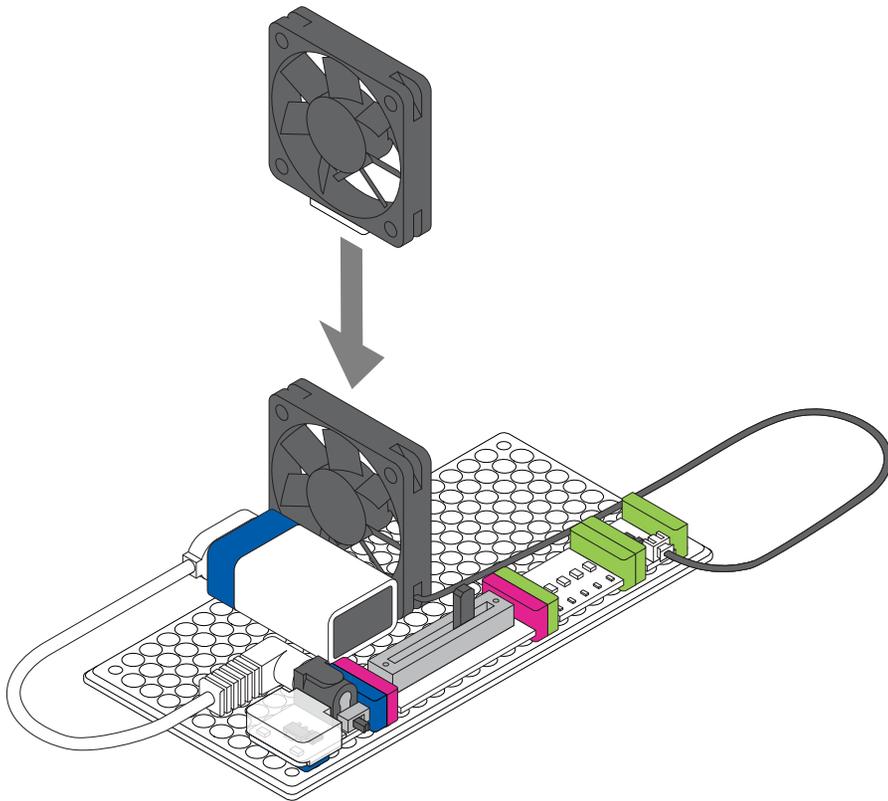
3

**ATTACH THE BATTERY TO THE MOUNTING BOARD NEXT TO THE SLIDE DIMMER BIT.**



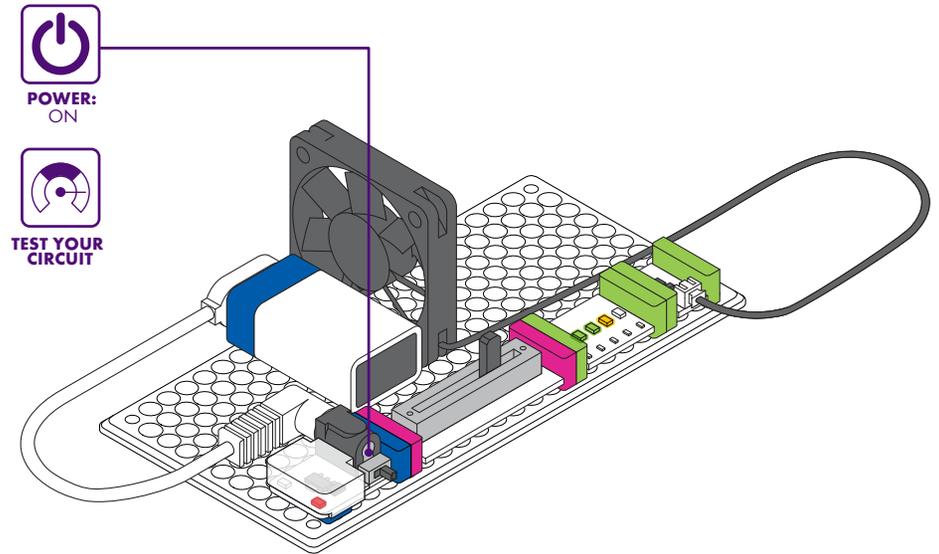
4

**PRESS THE FAN ONTO THE MOUNTING BOARD.**



5

**TURN POWER ON AND TEST YOUR CIRCUIT.** When you slide the dimmer, the bargraph should light up and the fan should spin.

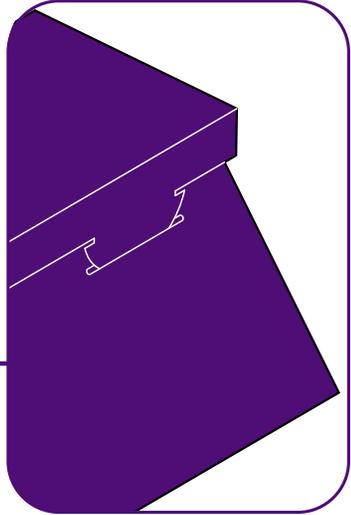
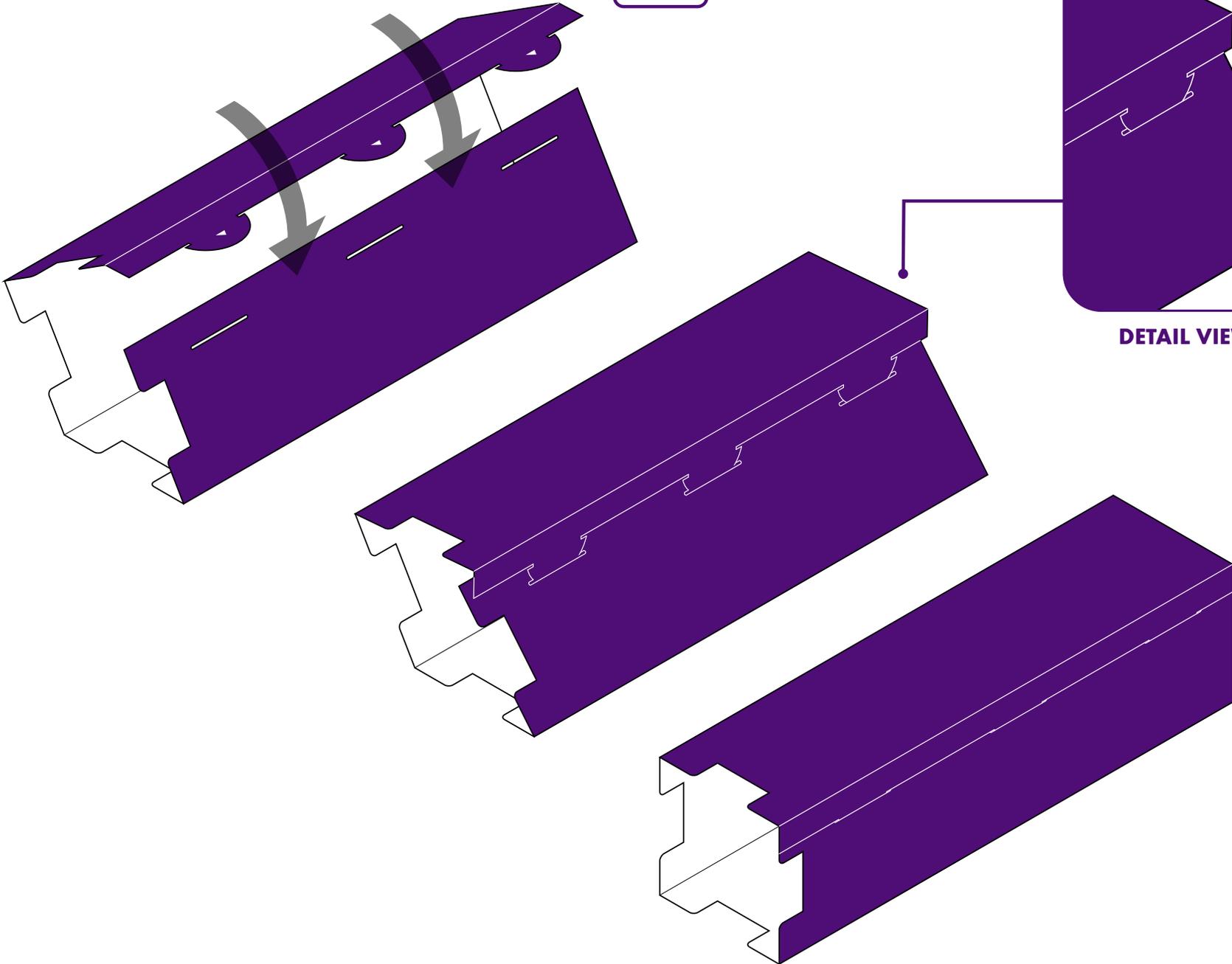


6

ASSEMBLE THE BUBBLE BOT TEMPLATE.

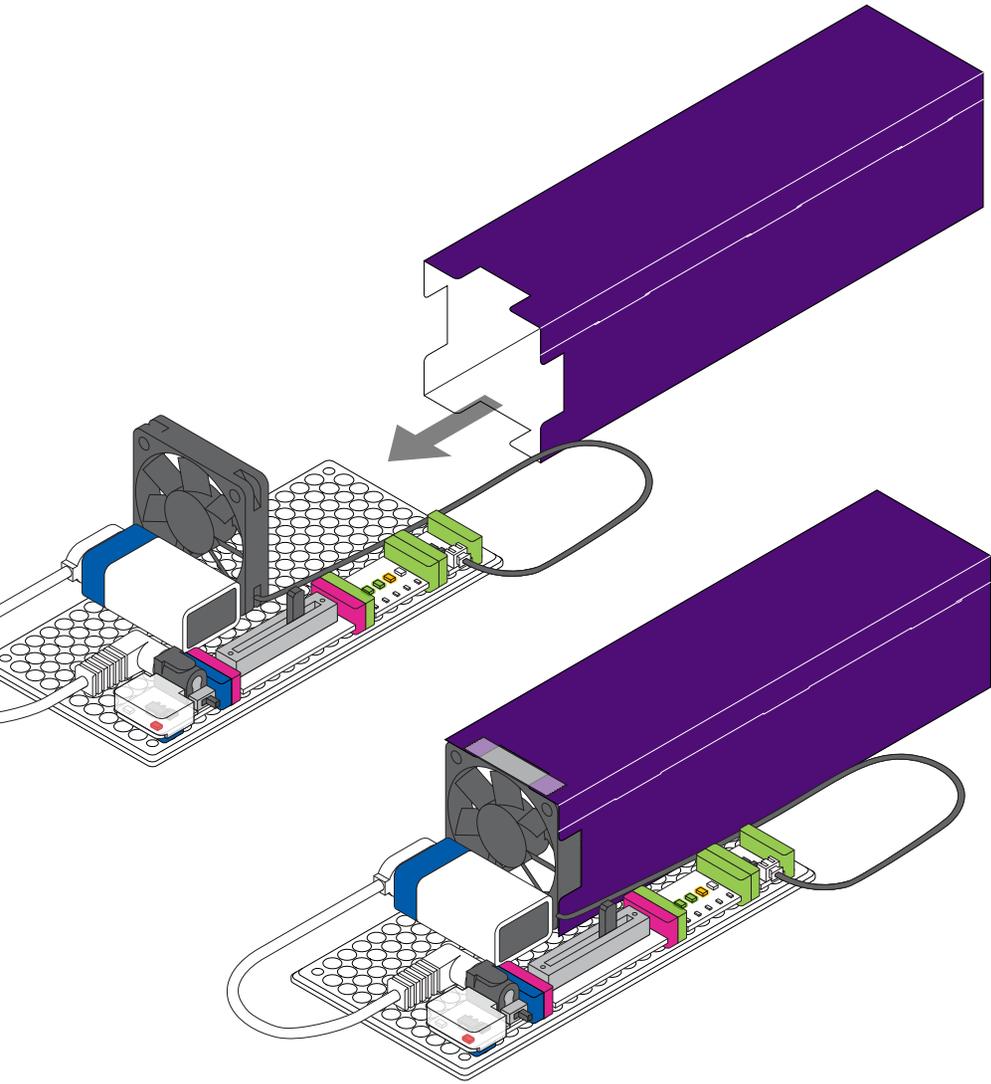


WANT TO CUSTOMIZE  
YOUR BUBBLE BOT?  
NOW'S THE TIME!

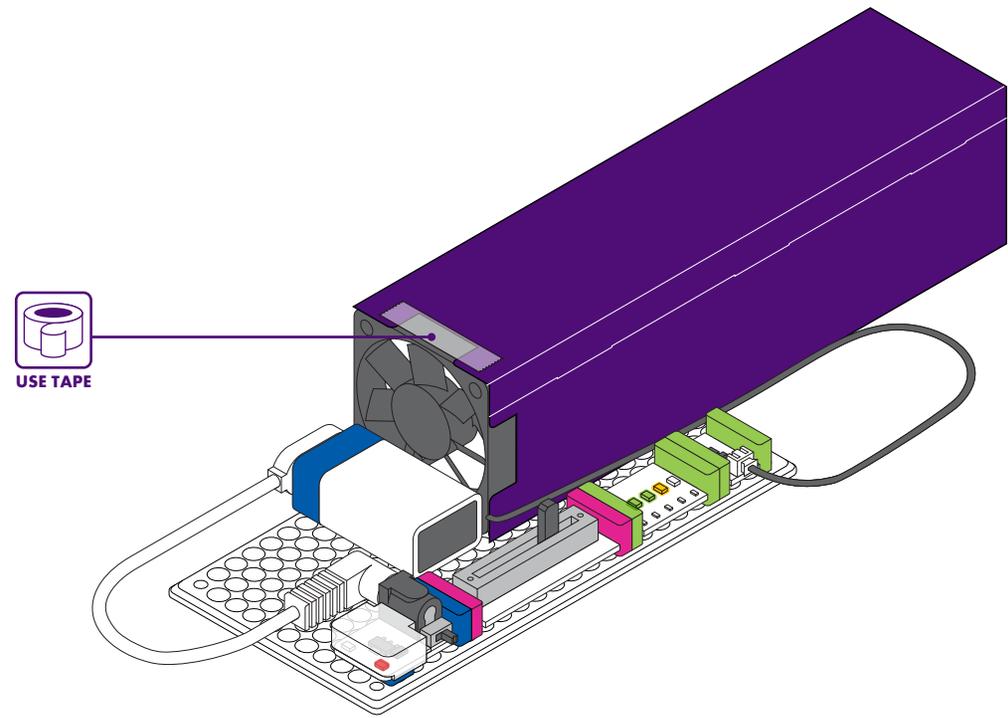


DETAIL VIEW.

**7** SLIDE THE TEMPLATE ONTO THE FAN.



**8** TAPE THE TEMPLATE ONTO THE FAN.



9

**POUR BUBBLE SOLUTION INTO A SMALL PLATE OR BOWL.**

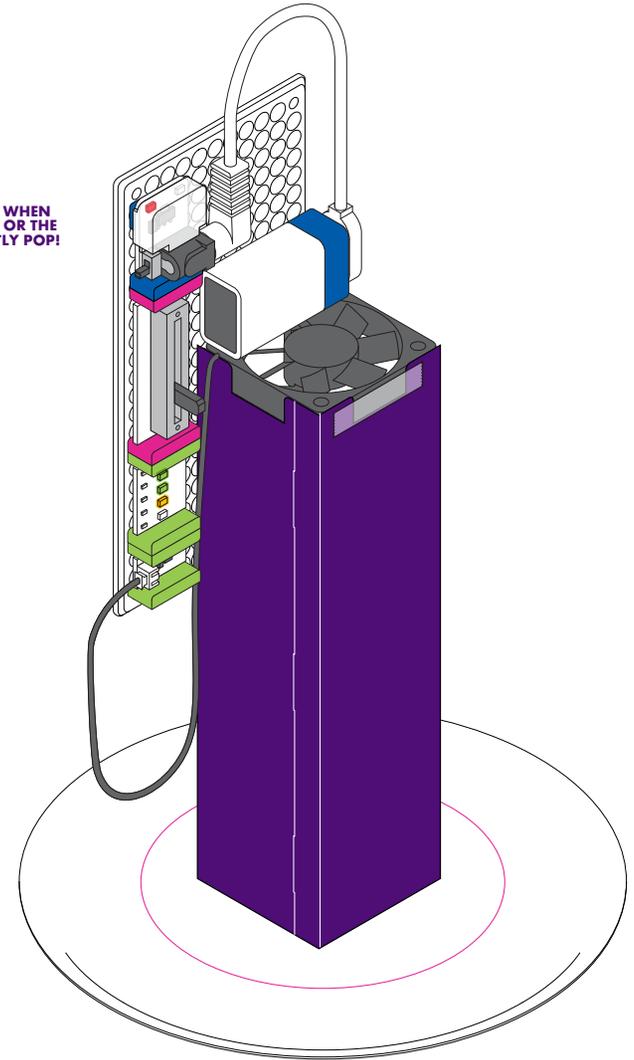


10

**WITH THE FAN COMPLETELY OFF,** dip the tip of the Bubble Bot template into the bubble solution. When you lift the tip of the bubble tube, you should see a thin film of bubble solution covering the opening.



**THE FAN MUST BE OFF WHEN  
DIPPED IN SOLUTION, OR THE  
BUBBLE WILL INSTANTLY POP!**

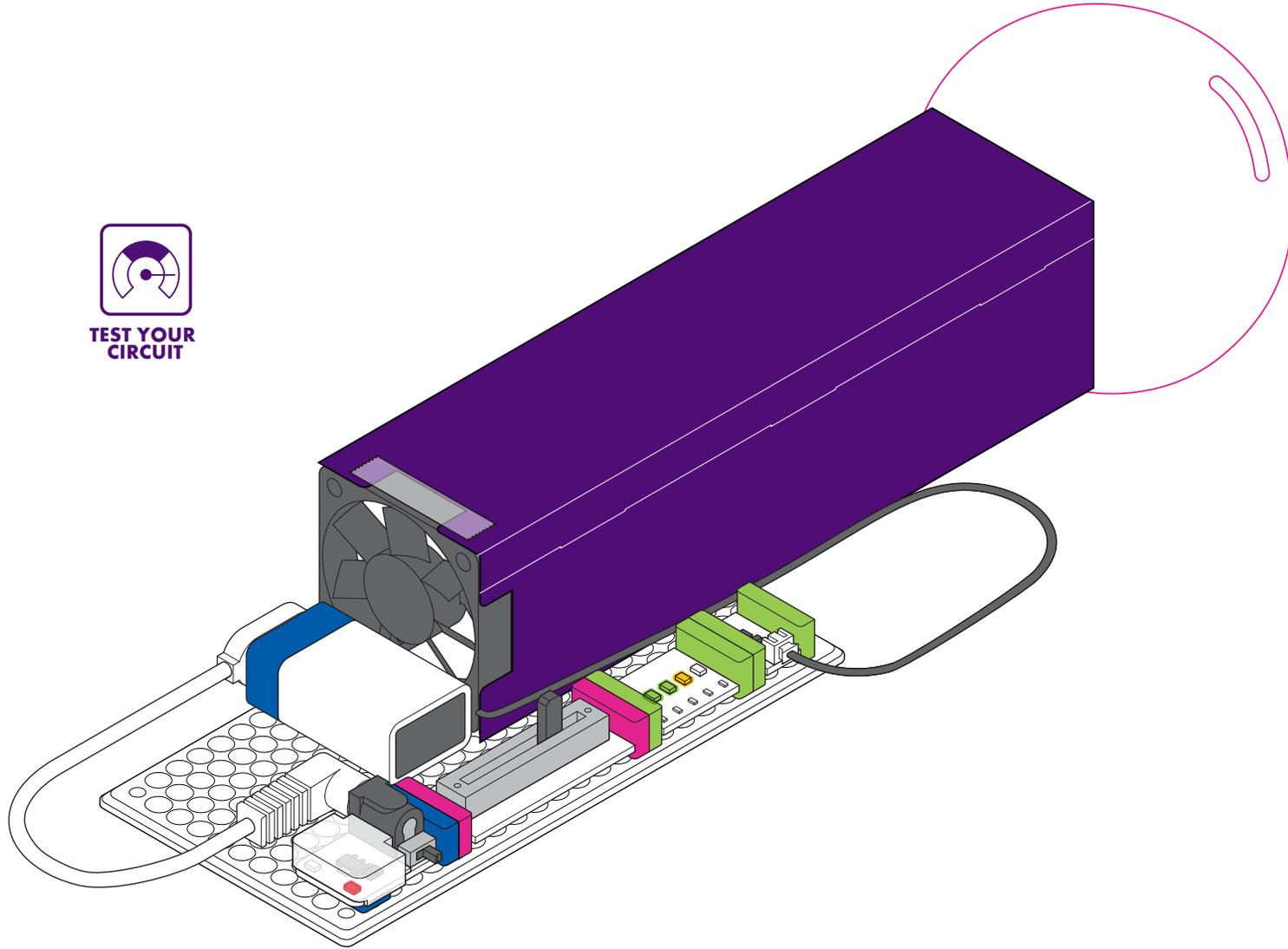


11

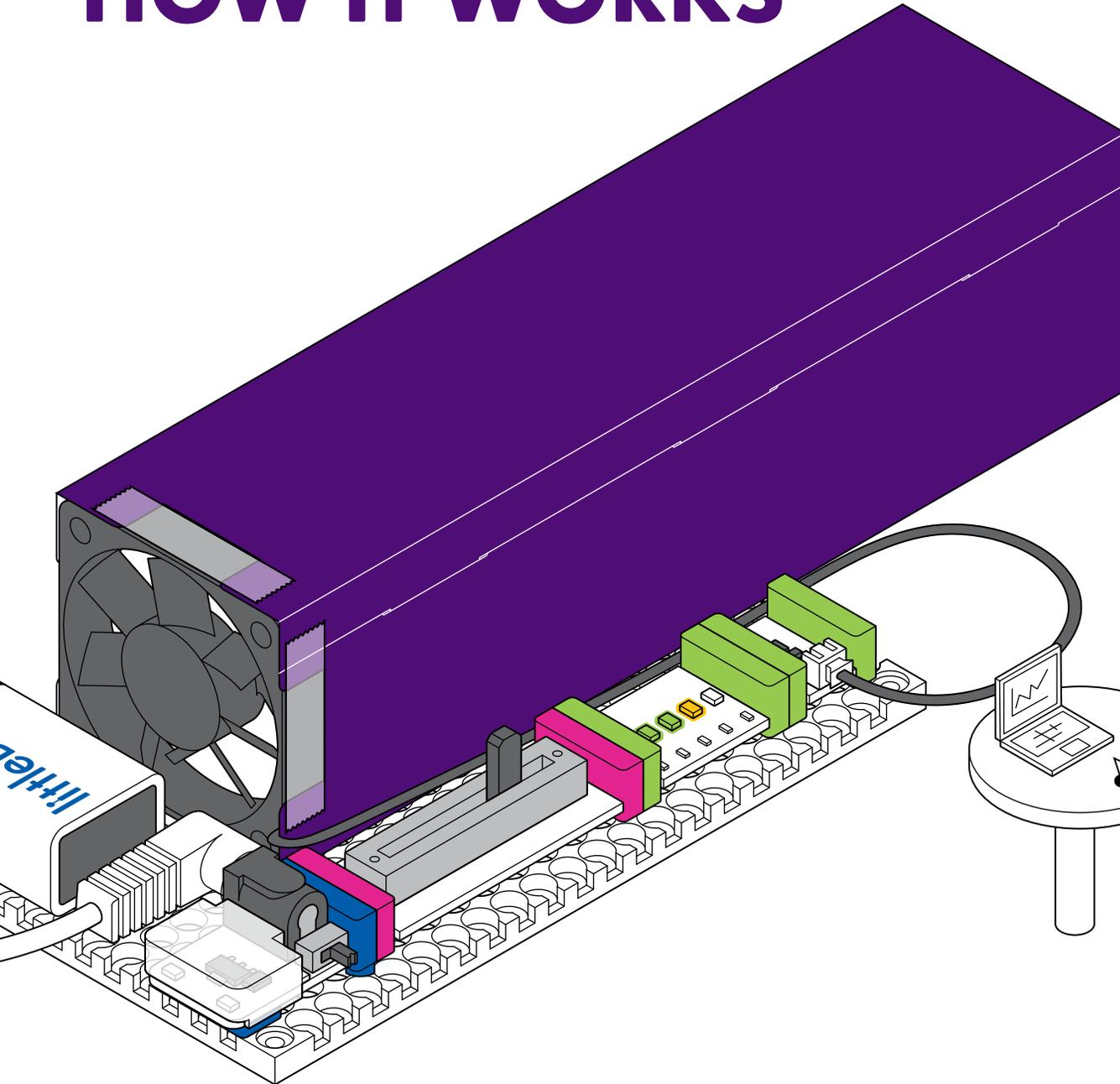
**TEST YOUR CIRCUIT.** Slowly use the slide dimmer to turn the fan on and start blowing bubbles.



**TEST YOUR  
CIRCUIT**



# HOW IT WORKS



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

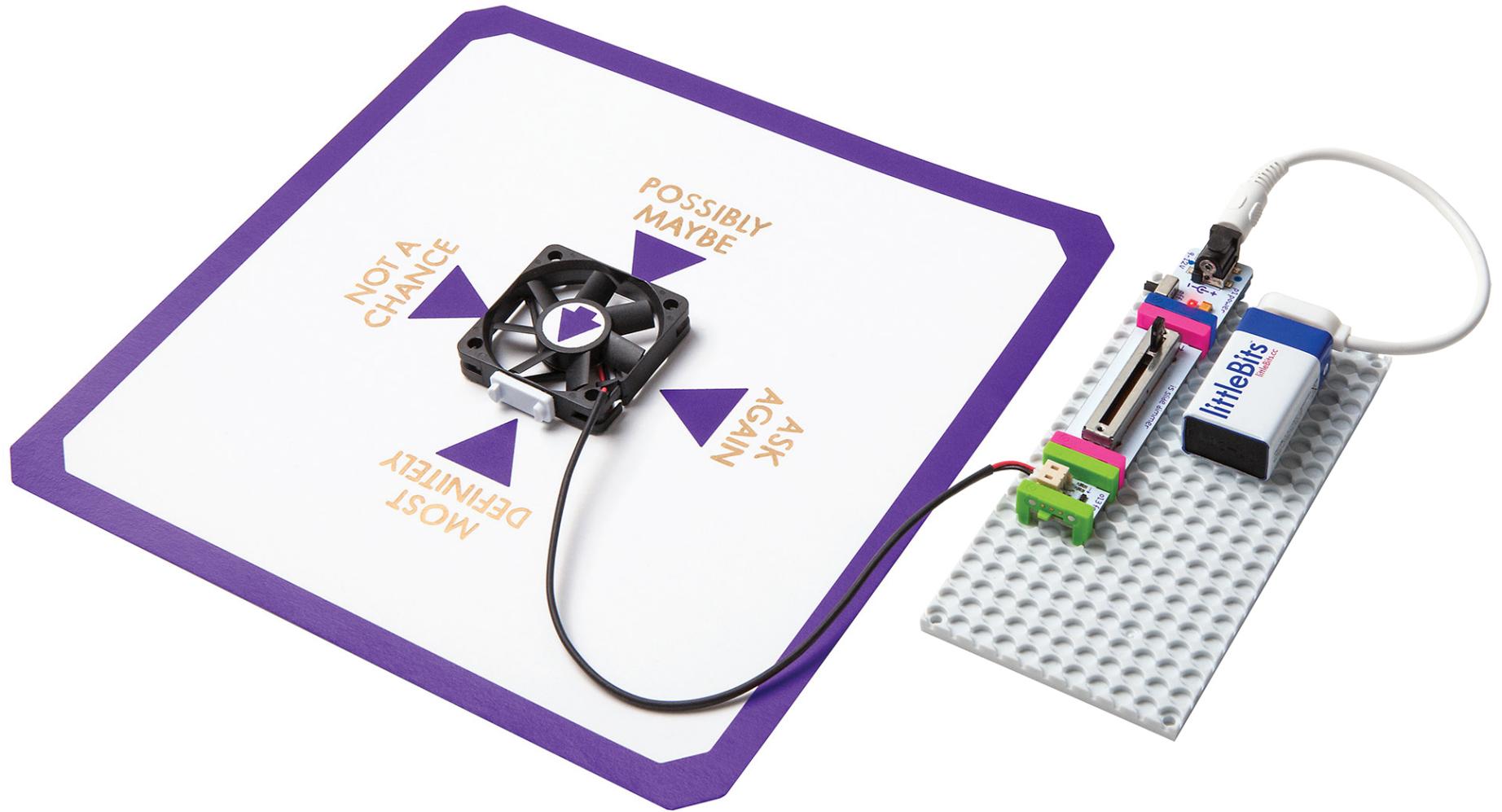
The **i5 SLIDE DIMMER** controls how much signal moves through to the bargraph and fan.

More LEDs on the **o9 BARGRAPH** light up as more signal passes through.

The **o13 FAN** receives signal from the bargraph. The more signal it receives, the faster it spins, pushing more air into the bubble.

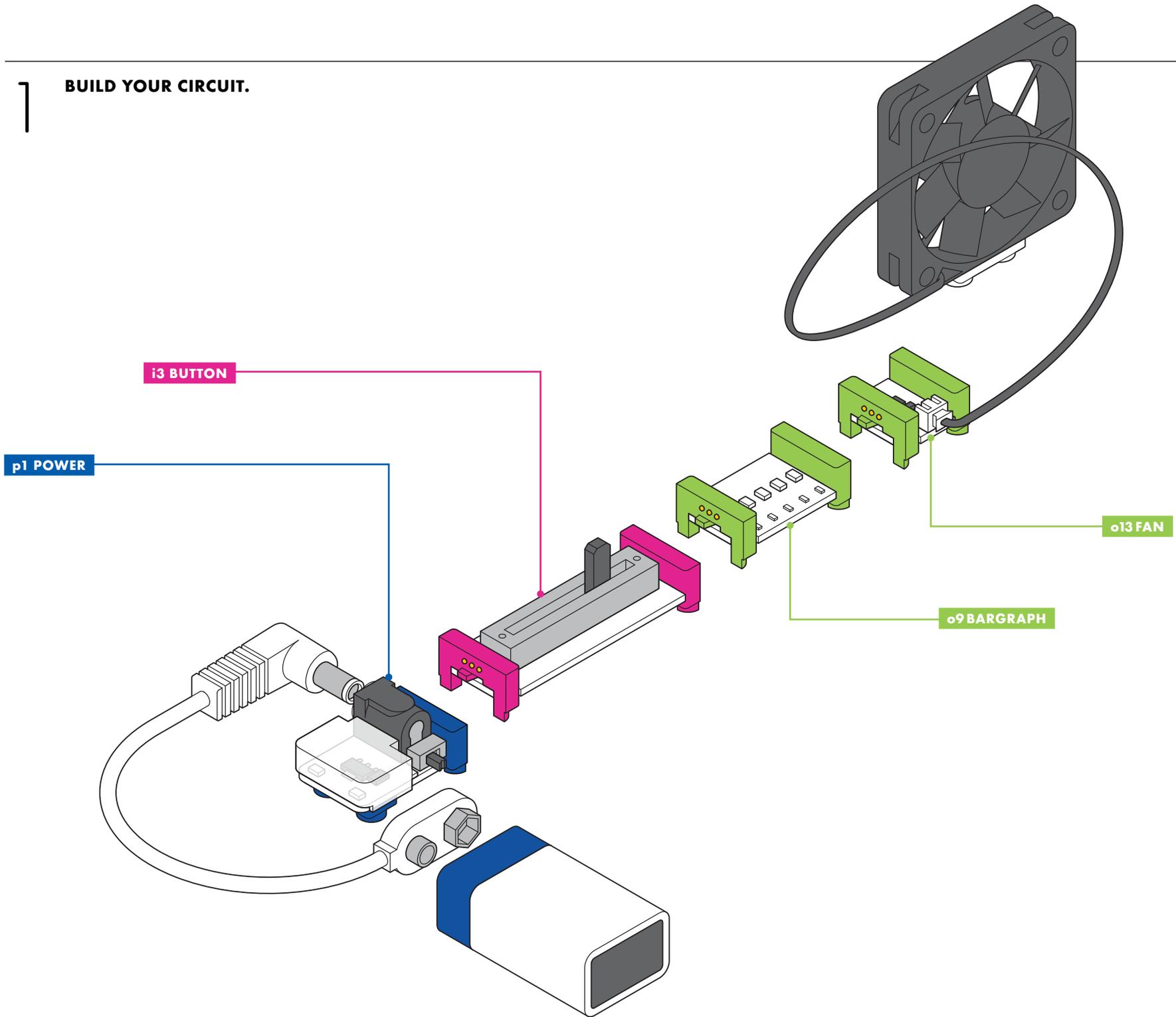
INVENTION #2

# FAN OF FORTUNE



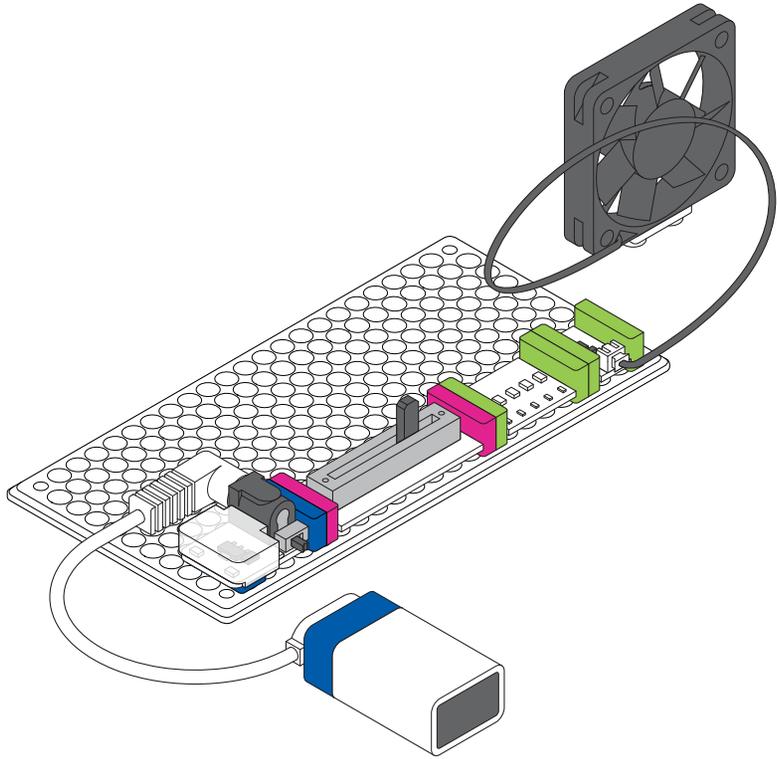
1

**BUILD YOUR CIRCUIT.**



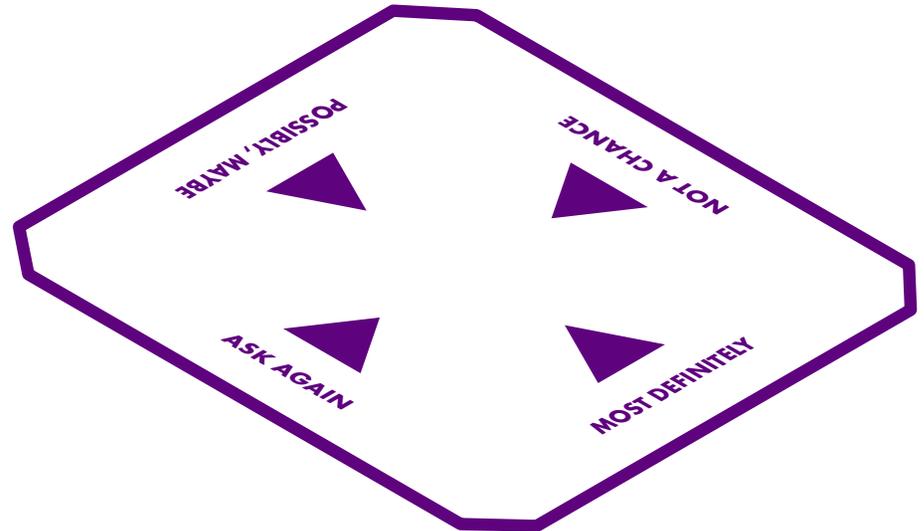
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**2 PRESS YOUR CIRCUIT ONTO THE MOUNTING BOARD.**



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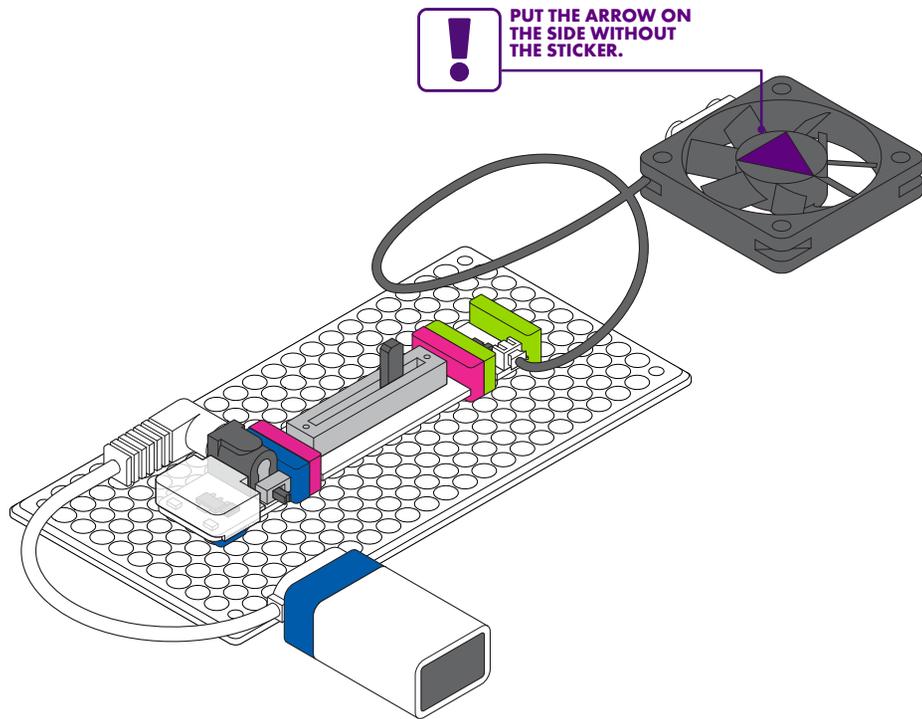
**3 MAKE A MAT WITH FOUR OPTIONS FOR YOUR FAN OF FORTUNE.**  
Put one option on each edge of the paper.



4

**MAKE AN ARROW FOR THE CENTER OF THE FAN.**

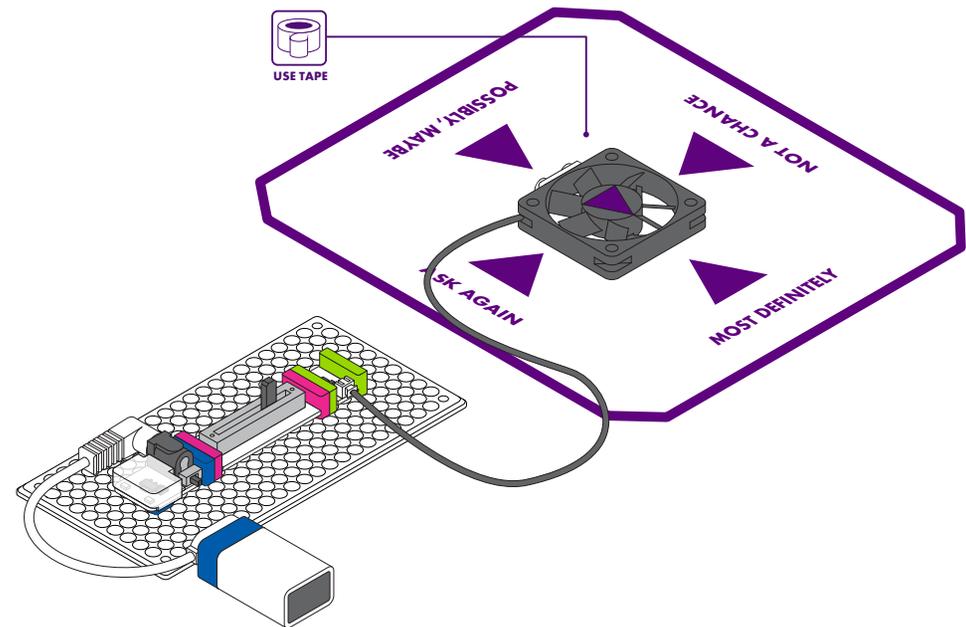
Make sure it points to an edge of the fan.



5

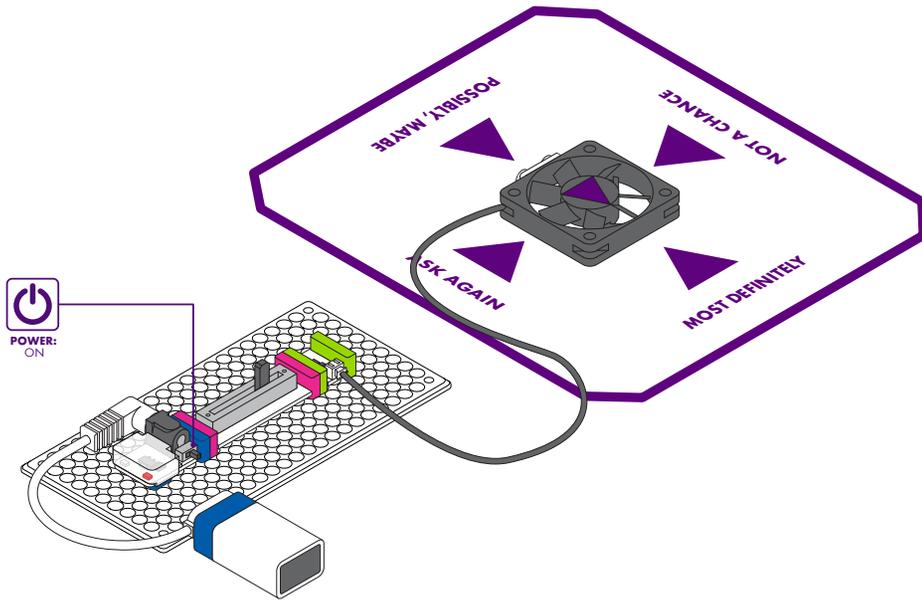
**ATTACH THE FAN TO THE CENTER OF THE MAT.**

The edges of the fan should be parallel to the edges of the mat.



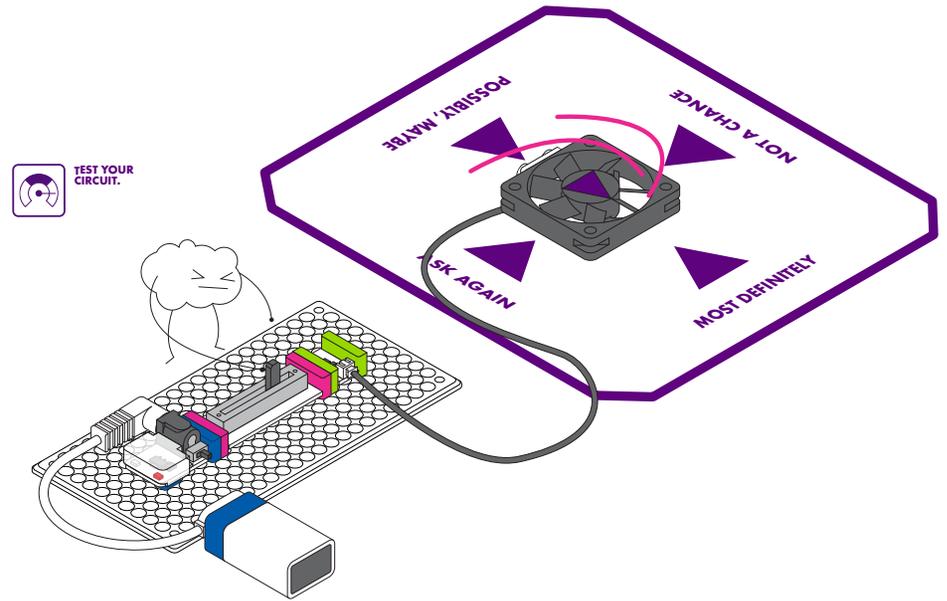
6

**POWER ON YOUR CIRCUIT.**



7

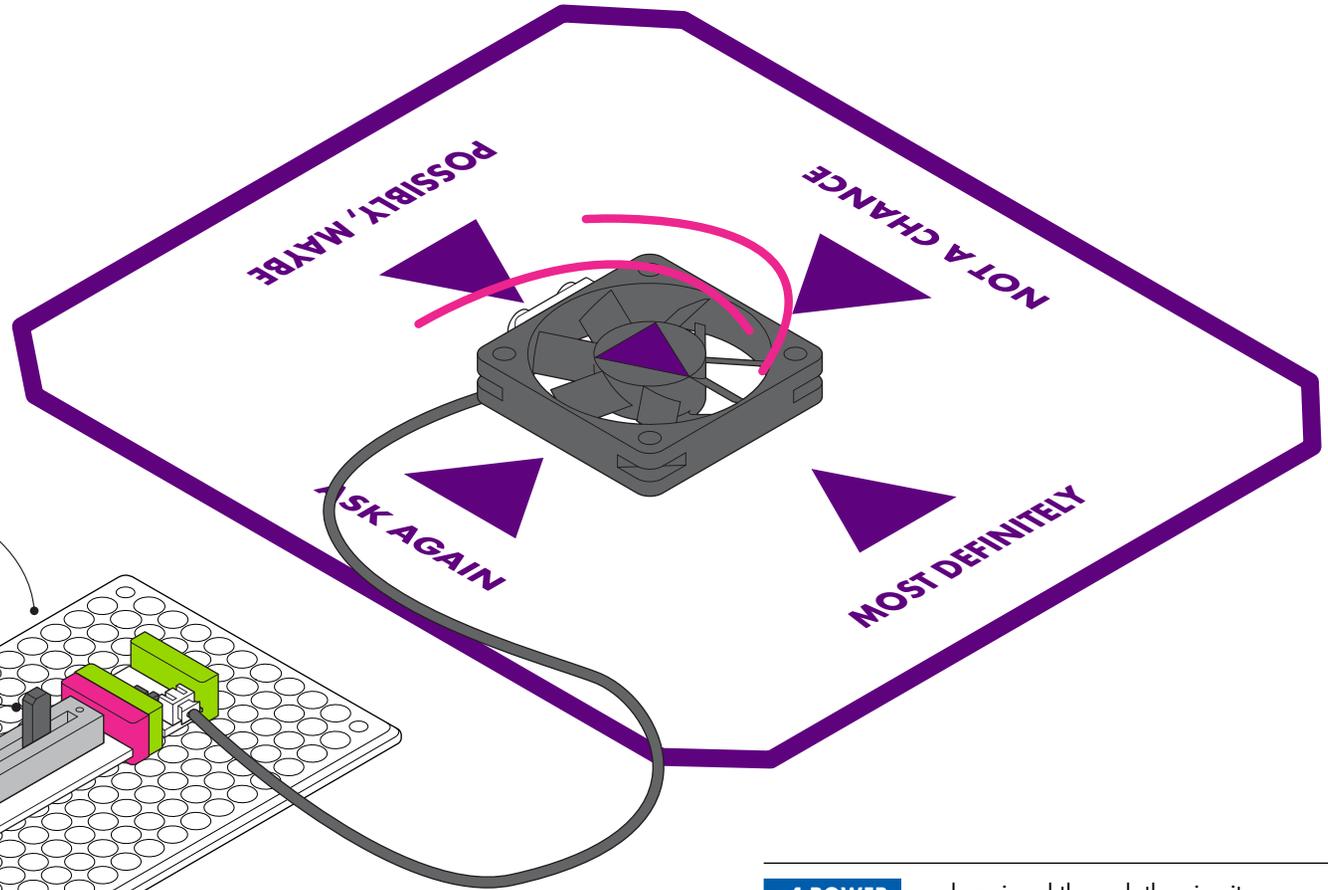
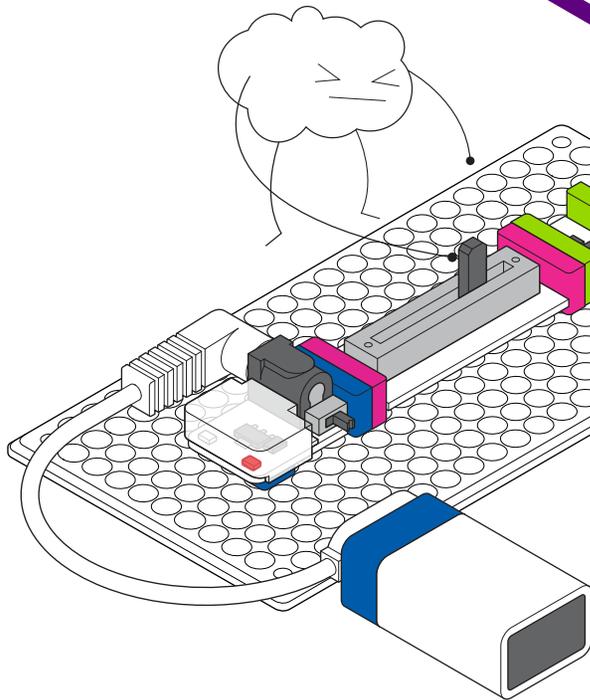
**TRY YOUR LUCK!** Move the slide dimmer to get the fan going. Slide it back to the left to stop it, and see what the future has in store for you!



# HOW IT WORKS



TEST YOUR  
CIRCUIT.



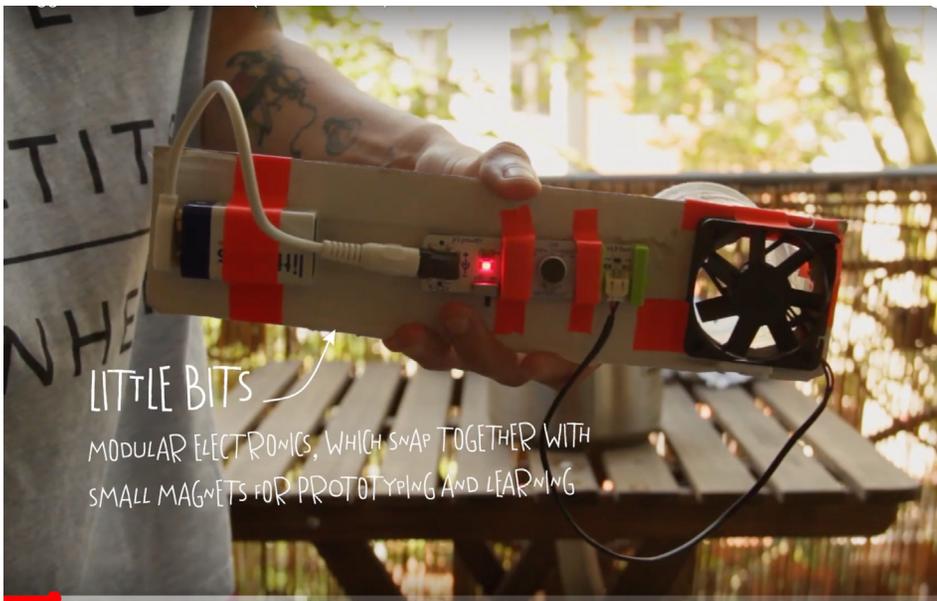
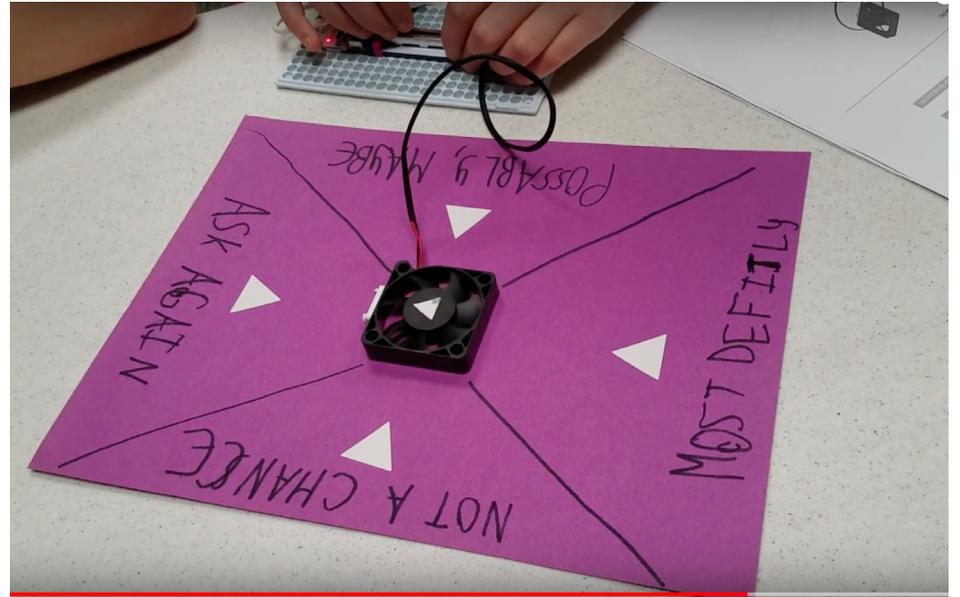
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# VIDEO LINKS

click to explore!



LITTLE BITS

MODULAR ELECTRONICS, WHICH SNAP TOGETHER WITH SMALL MAGNETS FOR PROTOTYPING AND LEARNING

