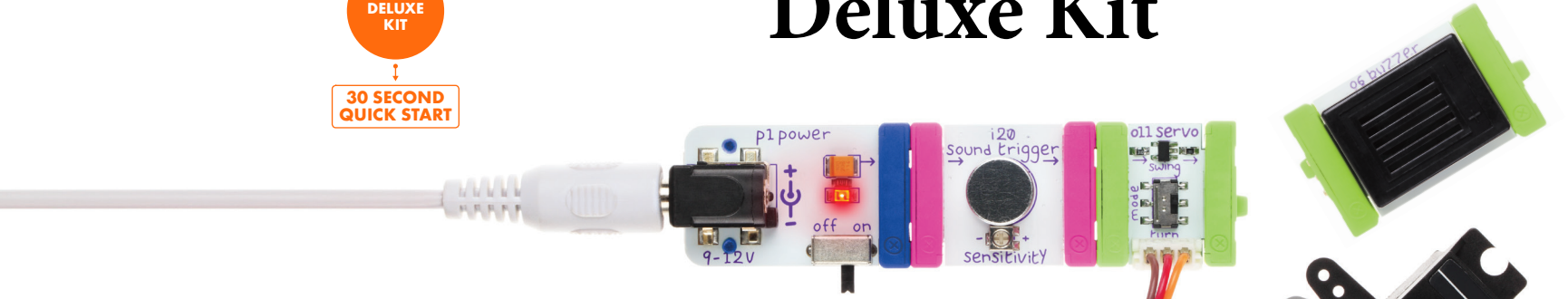
DELUXE KIT

30 SECOND QUICK START

Deluxe Kit



1 CONNECT BATTERY AND CABLE TO BLUE MODULE.

2 TURN IT ON.

3 PINK MODULES AFFECT MODULES AFTER THEM.

4 GREEN MODULES DO SOMETHING.

let's go!

⚠ WARNING

• This product contains small magnets. Swallowed magnets can stick together across intestines causing serious infections and death. Seek immediate medical attention if magnets are swallowed or inhaled.
• Most littleBits are small parts. DO NOT allow children under 3 years old to play with or near this product.
• NEVER connect any littleBits or circuits to any AC electrical outlet.
• Do not touch or hold any moving parts of littleBits while they are operating.
• Keep conductive materials (such as aluminum foil, staples, paper clips, etc.) away from the circuit and the connector terminals.
• Always turn off circuits when not in use or when left unattended.
• Never use littleBits in or near any liquid.
• Never use in any extreme environments such as extreme hot or cold, high humidity, dust or sand.
• littleBits are subject to damage by static electricity. Handle with care.
• Some littleBits may become warm to the touch when used in certain circuit designs. This is normal. Rearrange modules or discontinue using if they become excessively hot.
• Discontinue use of any littleBits that malfunction, become damaged or broken.

VERY IMPORTANT NOTE

• Several projects in this kit involve the use of a box cutter, grill skewers and/or a hot glue gun.
• These tools should be used ONLY under direct adult supervision and ONLY by children capable of using them safely.

INSTRUCTIONS

We recommend using littleBits brand 9-volt batteries, but standard alkaline or standard rechargeable batteries may also be used. Properly discard and replace exhausted battery. Do not connect the two battery terminals with any conducting material.

CARE AND CLEANING

Clean Bits modules ONLY by wiping with a dry cloth. If necessary, isopropyl alcohol on a cloth may be used sparingly, and then wipe with a dry cloth.

DO NOT use any other cleaning products on Bits modules. Congratulations for reading this fine print. Your dedication and persistence will serve you well.

FC RADIO AND TELEVISION INTERFERENCE

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
• Reorient or relocate the receiving antenna.
• Increase the separation between the equipment and the receiver.
• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
• Consult the dealer or an experienced radio/TV technician for help.

Changes and Modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commissions rules.

SEND US YOUR LOVE

Contact support@littleBits.cc with any questions or comments.

www.littleBits.cc

littleBits Electronics Inc.
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NY, NY 10003
(917)464-4577

You are a proud owner of the **Deluxe Kit v1** from the Exploration Series. Over 5 million combinations?! Are you serious? Yep, www.littleBits.cc/mathmagic

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littleBits Electronics, Inc.
Made in Dongguan City, China

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MAKE SOMETHING THAT DOES SOMETHING™

THE LITTLEBITS™ BASICS

1 CIRCUITS IN SECONDS™

littleBits™ is an expanding library of modular electronics that snap together with magnets.

You always need a Blue and a Green, Pink and Orange are optional, in between

2 COLOR CODED

littleBits™ are grouped into 4 different categories, which are color coded:

POWER needed in every circuit and the start of all your creations.

INPUT these Bits modules accept input from you and the environment and send signals to the modules that follow.

OUTPUT these Bits modules DO something–light, buzz, move...

WIRES these Bits modules expand your reach and change direction–great for helping to incorporate littleBits into your projects.

3 ORDER IS IMPORTANT

Power Modules always come first and **Input Modules** only affect the **Output Modules** that come after them.

4 MAGNET MAGIC

littleBits™ snap together with magnets. The magnets are always right, you can't put modules together the wrong way.

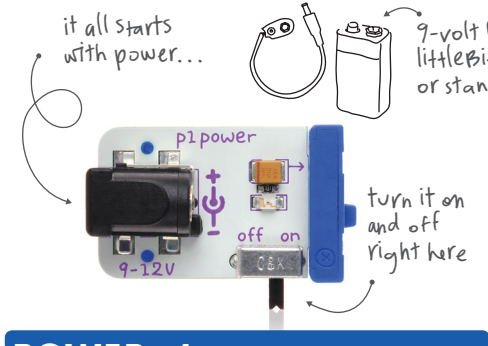
5 littleBits™ + anything

littleBits are just the beginning. Combine them with craft materials, building sets, and other toys to electrify your life. We'll show you how!

no soldering
no programming
no wiring

KNOW YOUR BITS™ MODULES

This is the Deluxe Kit, Version 1
Learn more and shop for individual
Bits Modules at littleBits.cc/Bits



POWER p1

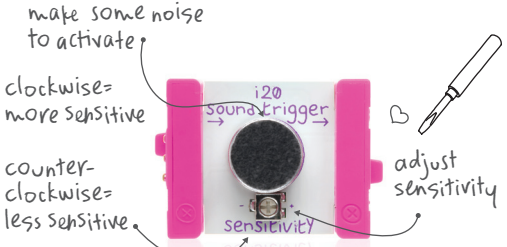
This power module lets you use a 9-volt battery to supply electricity to your littleBits. Snap in the battery + cable (both included) and flip the switch to turn it on.

BUTTON i3

It's a classic: big, round, and springy for comfortable pressing! Push to turn on and release to turn it off – just like a button on a keyboard or elevator.

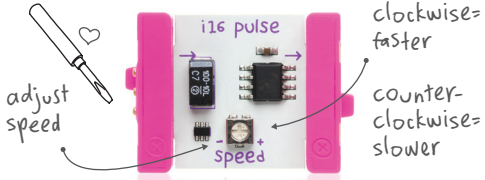
SLIDE DIMMER i5

Move the slider from one end to the other. It functions just like a light dimmer you might find at home or a volume fader in a recording studio. Experiment with how it affects output modules that follow.



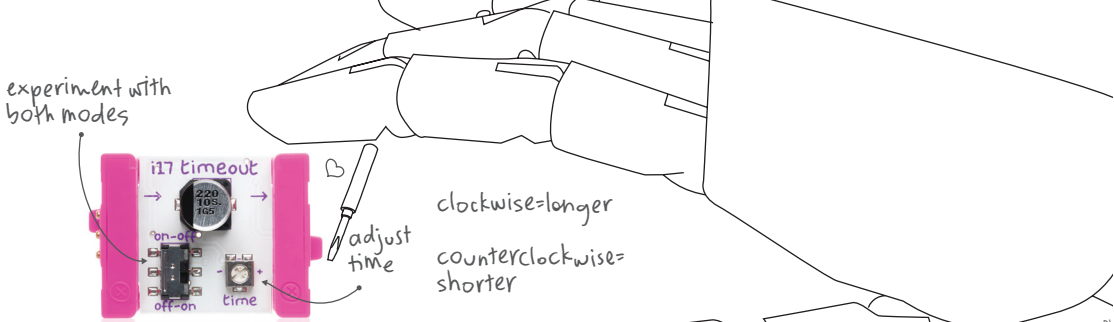
SOUND TRIGGER i20

This module senses the noise level in your room, and sends an ON signal when it gets over a certain level. You can make that threshold louder or softer using the included screwdriver.



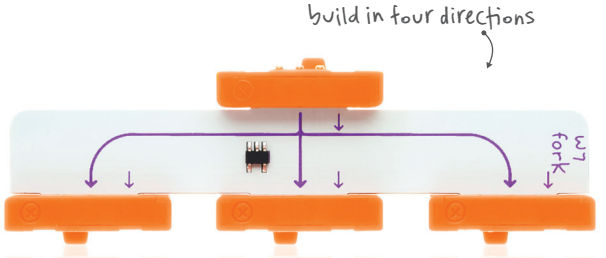
PULSE i16

The pulse is like an electronic heartbeat. It sends out a stream of short ON signals and you can make the speed of the pulses faster or slower using the included screwdriver. It's great for making lights blink!



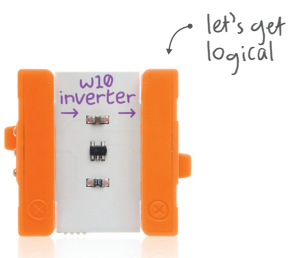
TIMEOUT i17

This module is like a settable timer. Try it after a button and follow it with a light. Press and release the button to start the countdown. In "on-off" mode, the light will go on and the timer will start counting down to turn-off time. In "off-on" mode, the light will go out when you release the button and will turn back on after the timer reaches the allotted time. The time ranges from approximately 1 second to 5 minutes.



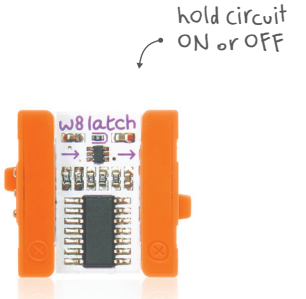
FORK w7

The fork gives you more options for connecting your littleBits: it lets you connect the output of a single module to as many as three others. Use it when you want to trigger light, sound, and motion at the same time.



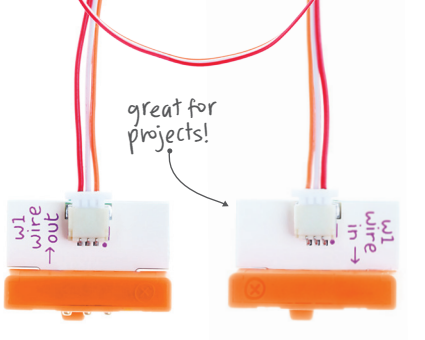
INVERTER w10

It sends out the opposite of whatever it receives: send it an ON signal, and the inverter changes it to an OFF signal, or vice versa.



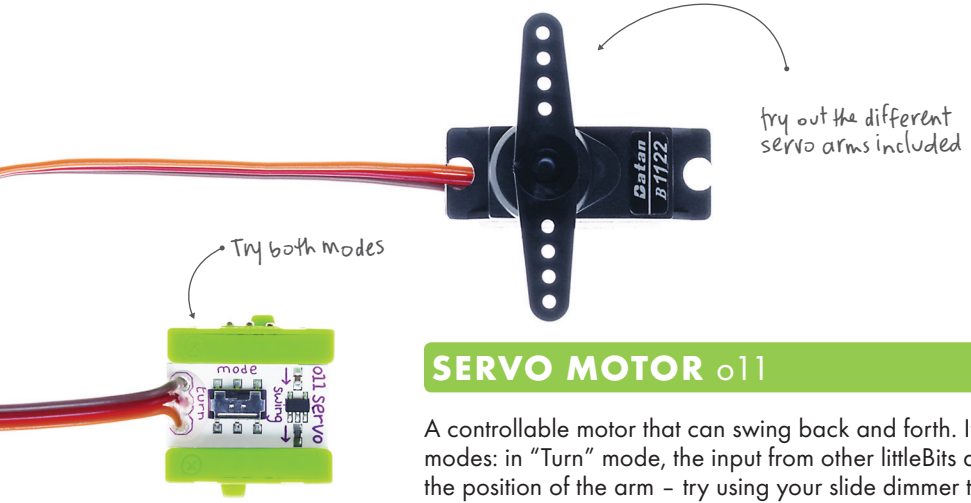
LATCH w8

Use the latch to turn any momentary input, like a button, into an ON/OFF switch. If you place a button in front of the latch, and a light after, pressing the button once will turn it ON and keep it on. Pressing it again will turn it OFF.



WIRE w1

The wire allows you to physically separate your Bits modules. Try it whenever you need to break up your chain of littleBits, like when you need to put a light at the top of a model building.

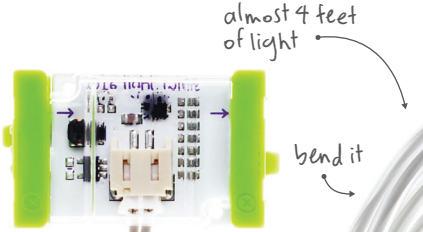


SERVO MOTOR o11

A controllable motor that can swing back and forth. It has two modes: in “Turn” mode, the input from other littleBits determines the position of the arm – try using your slide dimmer to set the angle you want. In “Swing” mode, the servo will move back and forth on its own – the input controls how fast it goes.

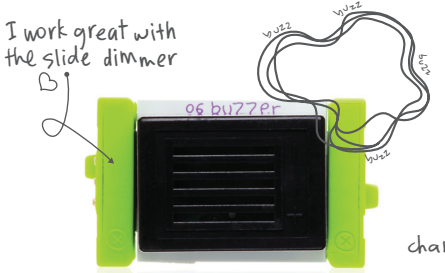
RGB LED o3

The RGB LED is a special light whose color you can adjust. Use the included screwdriver to adjust each of the color channels to get almost any color. RGB light is what produces every color from your computer monitor.



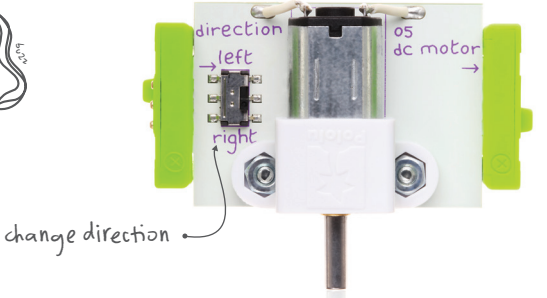
LIGHT WIRE o16

The light wire’s entire length glows a soft blue. It’s made of special stuff called “electroluminescent wire,” which is great to form into glowing shapes. Like safe neon, it’s best to use in the dark.



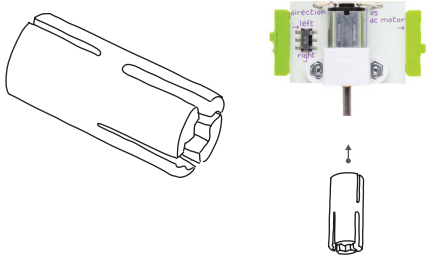
BUZZER o6

The buzzer is like the sound in an alarm clock: it makes a noise that you just can't ignore. It buzzes whenever it gets an ON signal. Try using it to make your own doorbell or alarm!



DC MOTOR o5

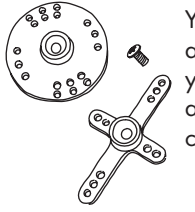
The DC (or "Direct Current") motor rotates a shaft when you send it an ON signal. The left/right switch controls the direction of rotation. Try attaching various things to make windmills, cars, helicopters and more.



MOTORMATE™ a10

motorMate works with the DC motor. This makes it easy to attach wheels, paper, cardboard, and lots of other materials to the DC motor. Simply slide it on the "D" shape of the shaft. A LEGO™ axle also fits in the end.

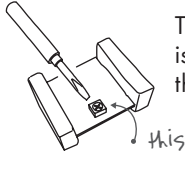
SERVO ACCESSORIES



Your servo motor comes with a couple great arms to help you in your projects. Use a Phillips screwdriver* to change the arms.

*not included

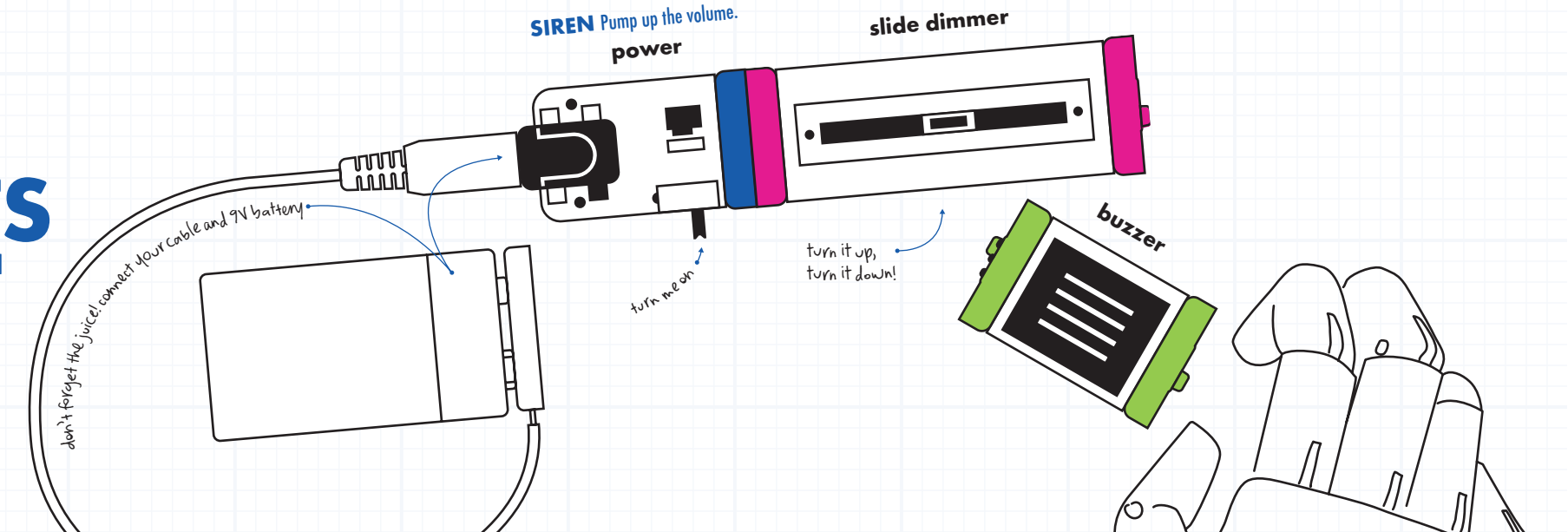
SCREWDRIVER a4



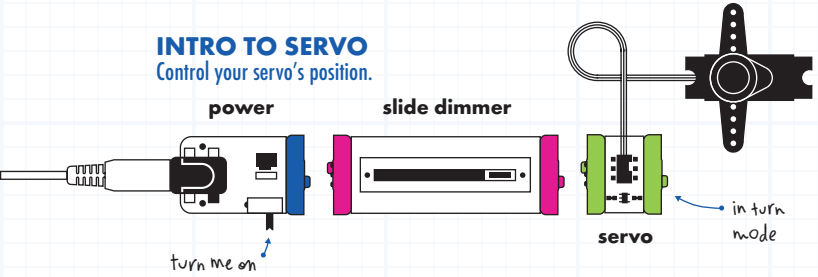
This little purple screwdriver is used to modify any module that has a micro adjuster.

TRY THESE CIRCUITS

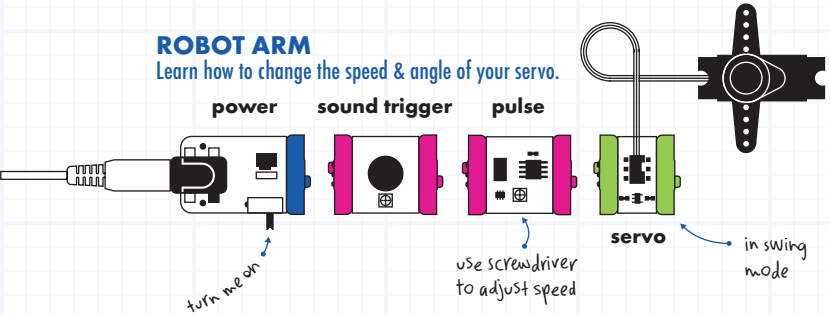
Get started with these, but don't let us hold you back – every module fits with every other module – feel free to experiment.



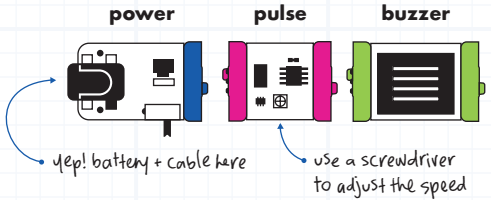
INTRO TO SERVO
Control your servo's position.



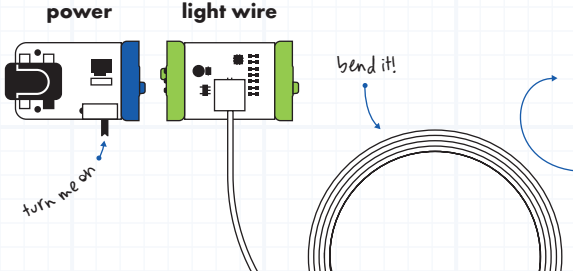
ROBOT ARM
Learn how to change the speed & angle of your servo.



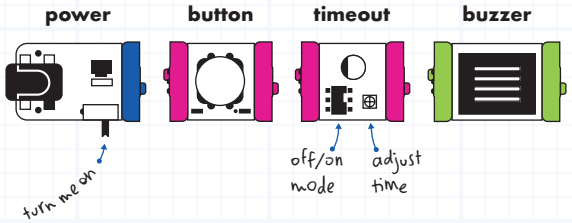
NOISE MAKER Have fun making your own rhythm.



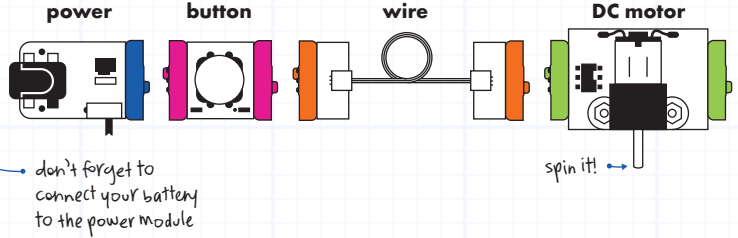
NEON SIGN Make a bright statement.



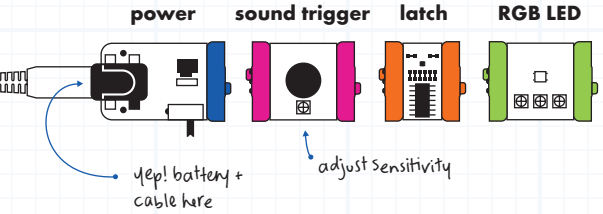
TIMER Learn how to make an alarm clock.



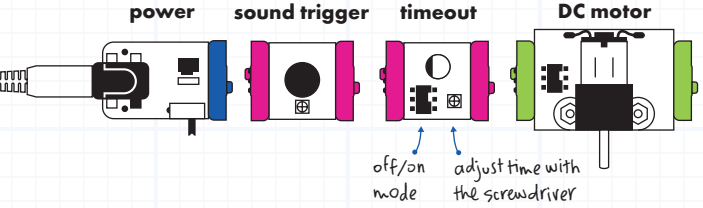
INTRO TO DC MOTOR Get to know the motor.



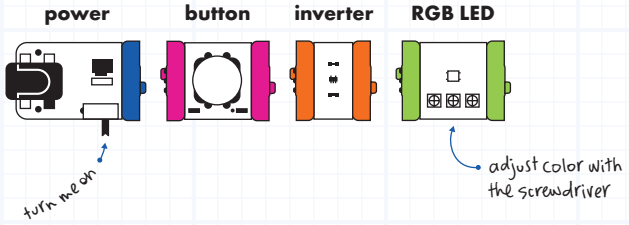
CLAP IT Clap your lights on and off.



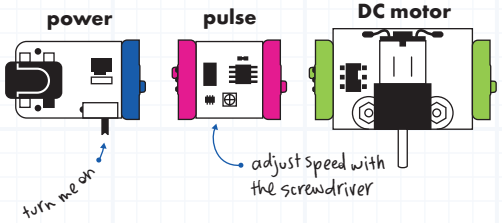
TIMED MOTION Set how long your DC motor spins for.



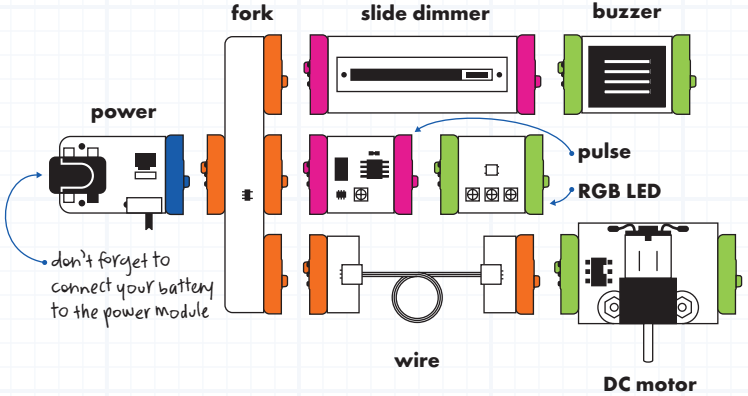
DO THE OPPOSITE Discover the magic of the inverter.



CLOCK Learn how to make the DC motor tick.



TO THE RESCUE Create sirens, light and motion!



PROJECTS

TRY THESE AND INVENT YOUR OWN

1 **Tickle Machine**
2 **Prank Handshake**
3 **Auto Greeter**
4 **Truck Crane**
5 **Art Bot**
6 **Dancing Signs**
7 **Glowing Handlebars**
8 **Birthday Candle**
9 **Stomping Shoes**
10 **Surprise Party**
11 **Flickering Lantern**
12 **Cat Nap**
13 **Unihorn Helmet**
14 **Honking Tricycle**
15 **Robot**

Enhanced instructions plus tons more projects online, littleBits.cc/deluxe

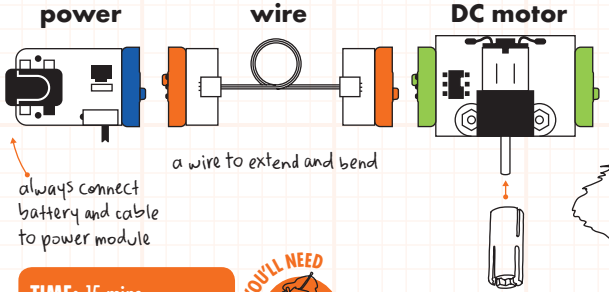
PROJECT 1: How can electronics help spread laughs?

TICKLE MACHINE

TIME: 15 mins
DIFFICULTY: ●○○○○

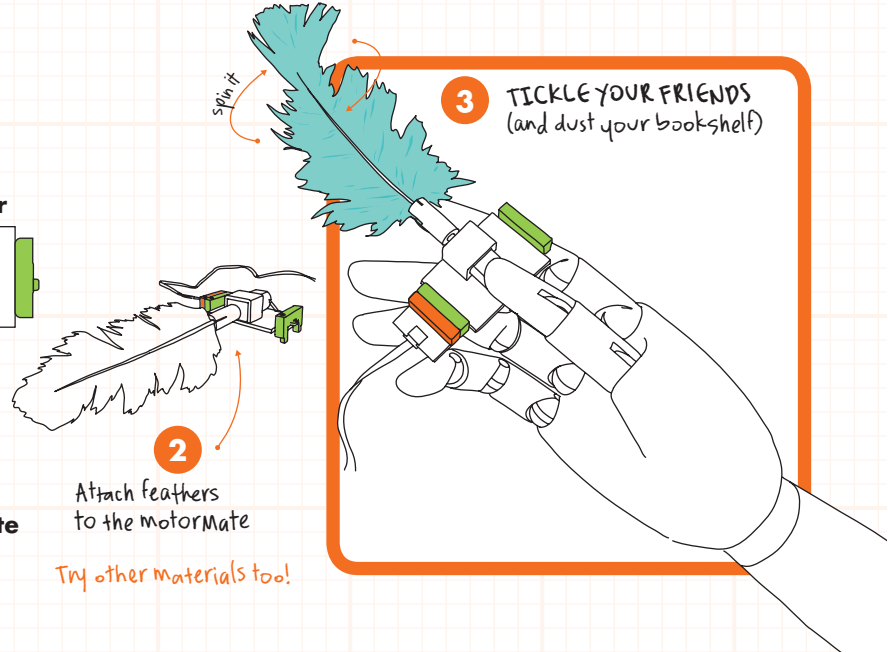
YOU'LL NEED
feathers

1 Start with this circuit



2 Attach feathers to the motorMate

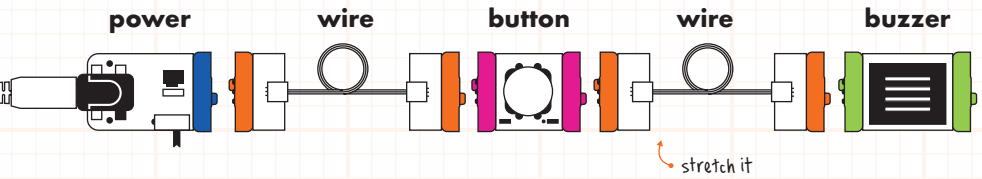
Try other materials too!



PROJECT 2: Want to trick a friend? We'll show you how!

PRANK HANDSHAKE

1 Start with this circuit



TIME: 15 mins
DIFFICULTY: ●○○○○

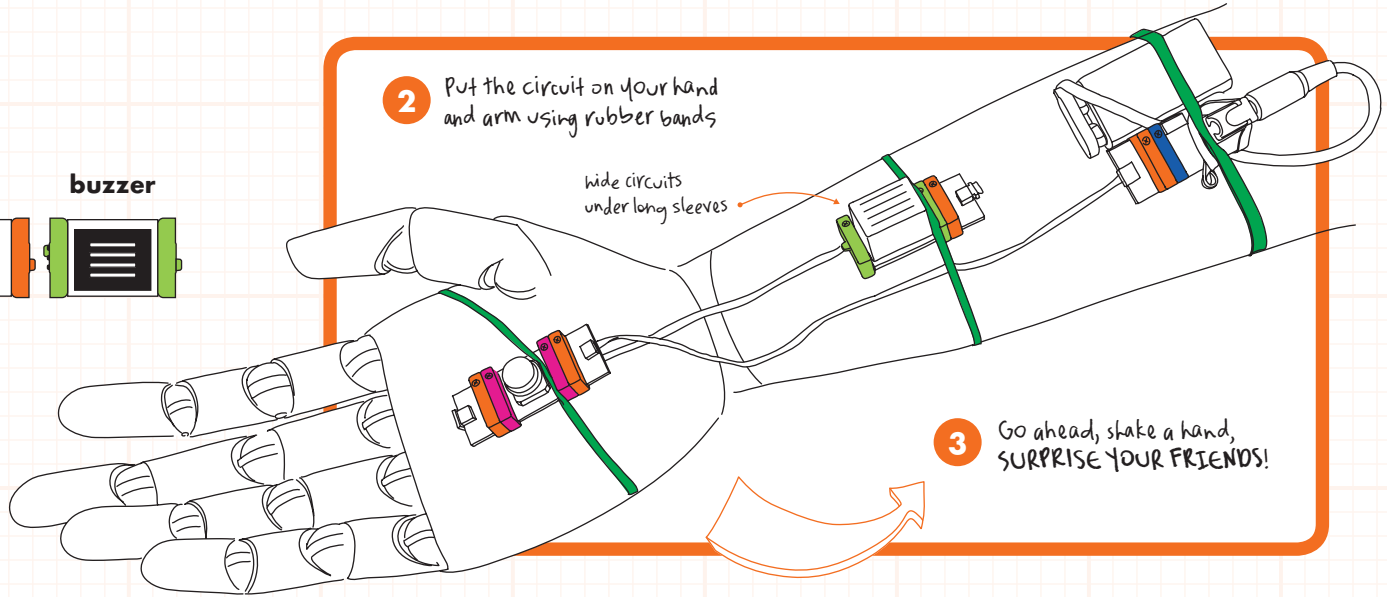
YOU'LL NEED

rubber bands

How else can you surprise your friends using littleBits?

2 Put the circuit on your hand and arm using rubber bands

hide circuits under long sleeves



3 Go ahead, shake a hand, SURPRISE YOUR FRIENDS!

PROJECT 3: How can you use a servo to imitate a human wave?

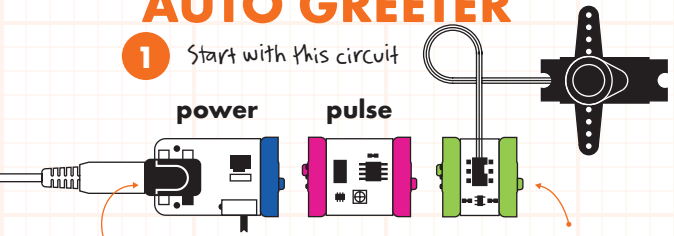
AUTO GREETER

TIME: 15 mins
DIFFICULTY: ●○○○○

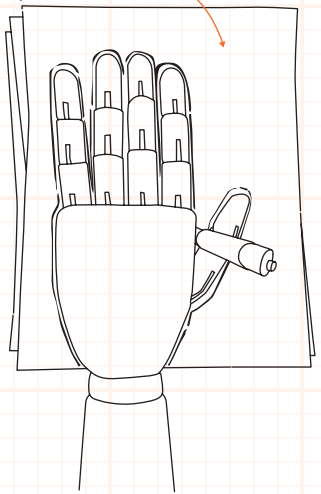
YOU'LL NEED

marker, scissors, tape, construction paper

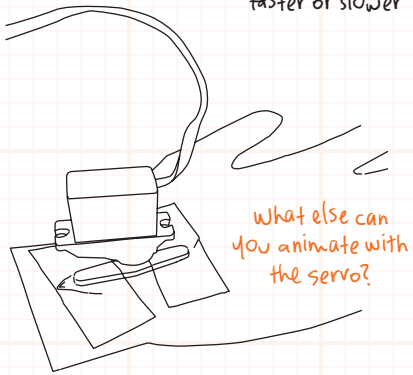
1 Start with this circuit



2 Trace hand on paper and cut it out



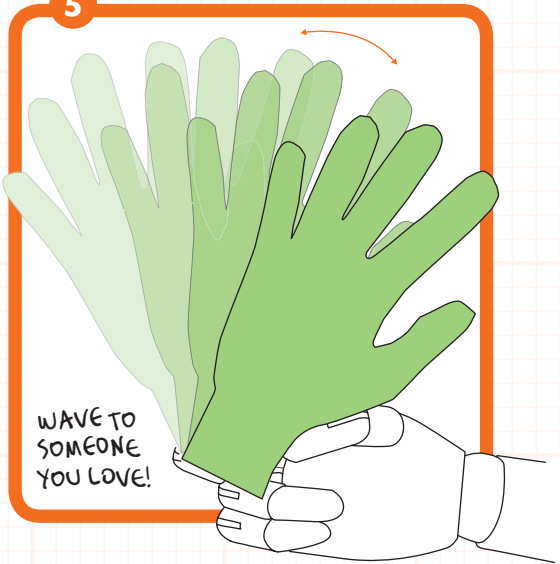
3 Tape paper hand to servo



4 Use a screwdriver to adjust pulse if you want to wave faster or slower

What else can you animate with the servo?

5



PROJECT 4: How can you use a servo to pick things up?

TRUCK CRANE

TIME: 30 mins
DIFFICULTY: ●●○○○

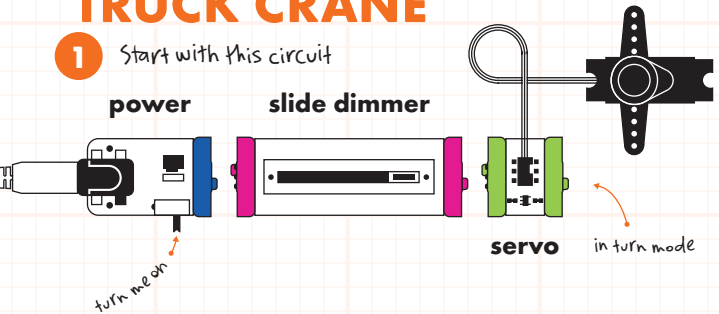
YOU'LL NEED


rubber bands


paper clip


popsicle stick

1 Start with this circuit



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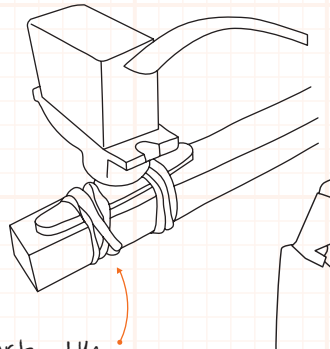
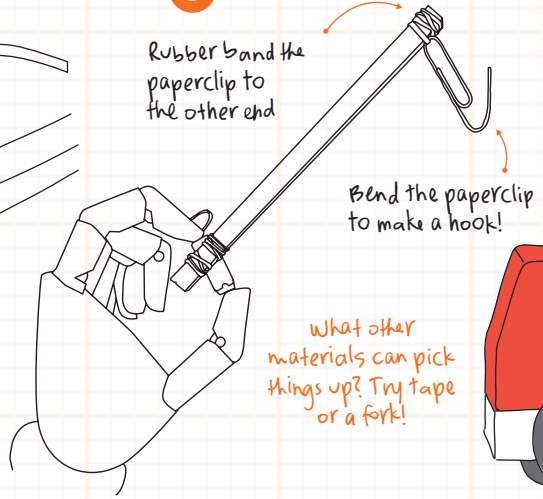


3

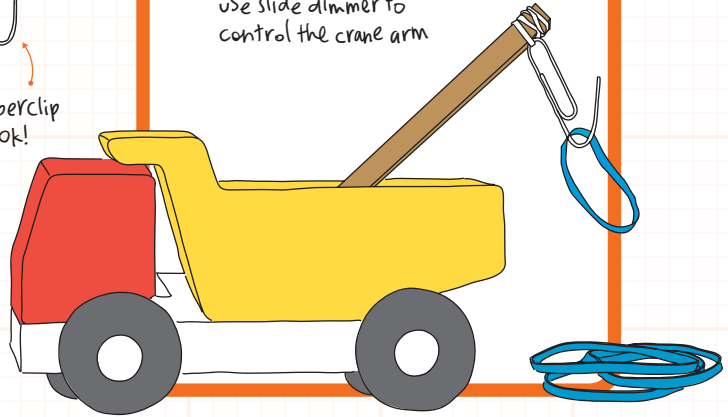


What other materials can pick things up? Try tape or a fork!

4

PICK THINGS UP!

use slide dimmer to control the crane arm



PROJECT 5: How can you build a device to draw for you?

ART BOT

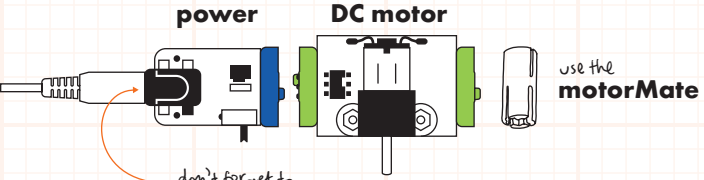
TIME: 30 mins
DIFFICULTY: ●●○○○

YOU'LL NEED

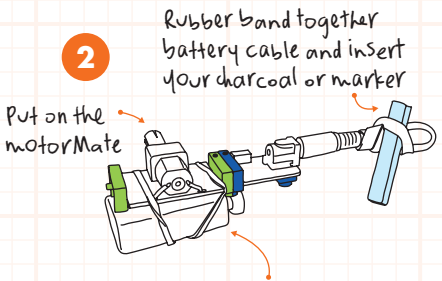
any kind of marking device is fine

marker · charcoal · rubber bands · LEGO™ axle · wheel

1 Start with this circuit

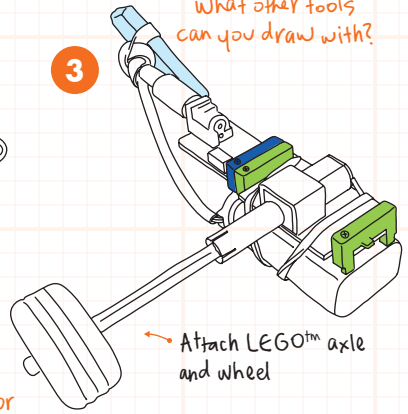


2

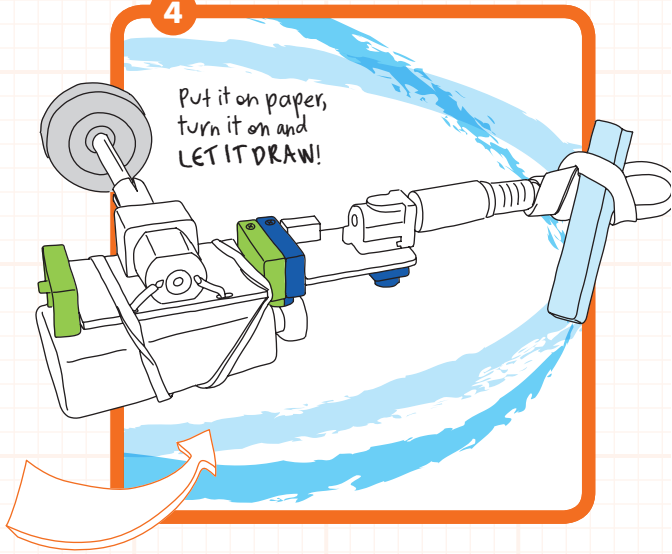


Don't have an axle or wheel? Make one!

3 What other tools can you draw with?



4



PROJECT 6: How can you use the inverter to activate two different and opposite motions?

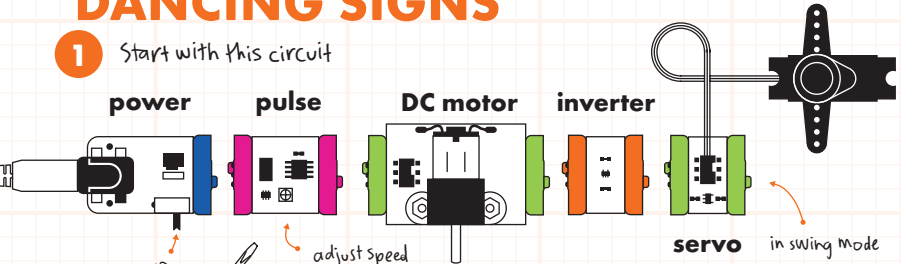
DANCING SIGNS

TIME: 30 mins
DIFFICULTY: ●●○○○

YOU'LL NEED

marker, scissors, tape, construction paper

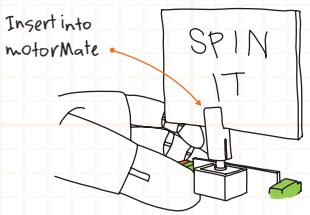
1 Start with this circuit

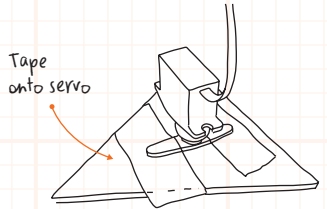


2 Make 2 signs out of paper

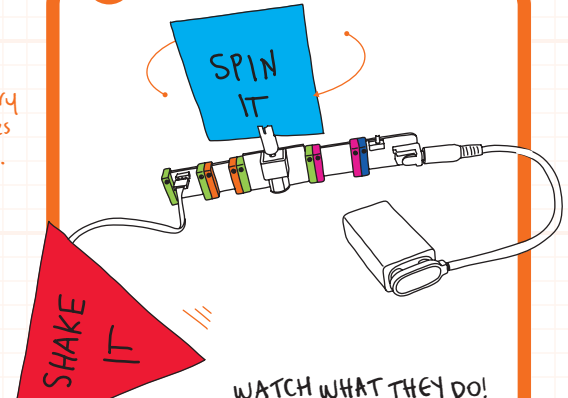
Get creative! Try different shapes or characters.

3 Attach the signs to the Bits modules





4



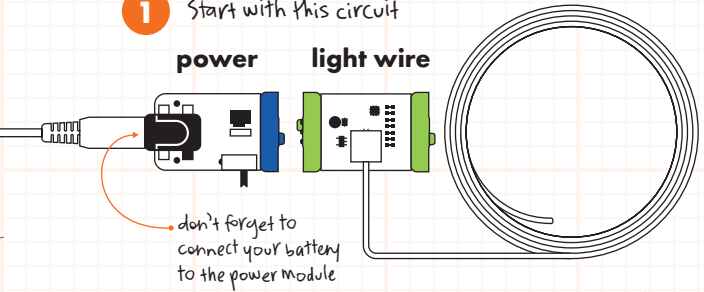
PROJECT 7: How can you brighten up your bike for night rides?

GLOWING HANDLEBARS

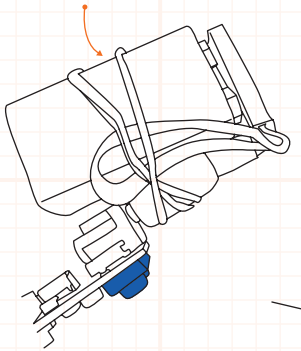
TIME: 30 mins
DIFFICULTY: ●●○○○

YOU'LL NEED

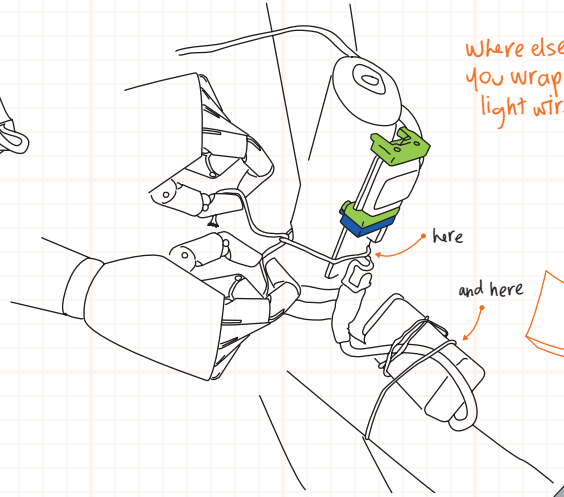
1 Start with this circuit



2 Rubber band battery cable around the battery

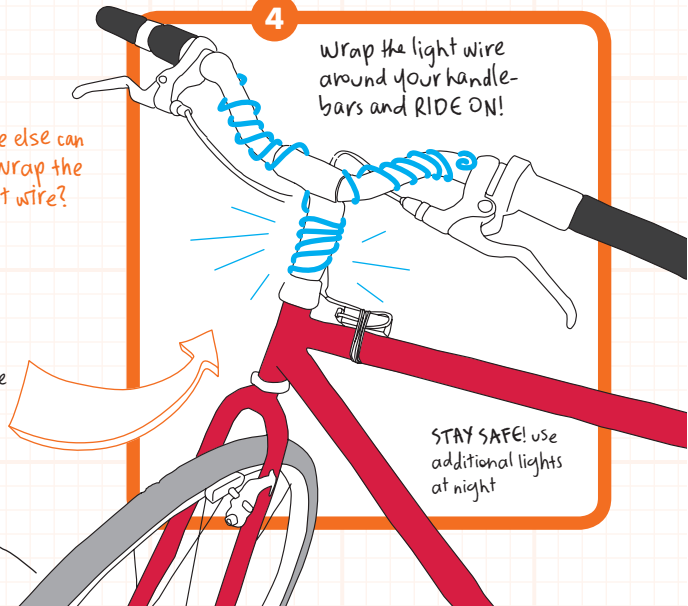


3 Tie the battery and circuit to your front handlebar post with string



Where else can you wrap the light wire?

4 Wrap the light wire around your handlebars and RIDE ON!

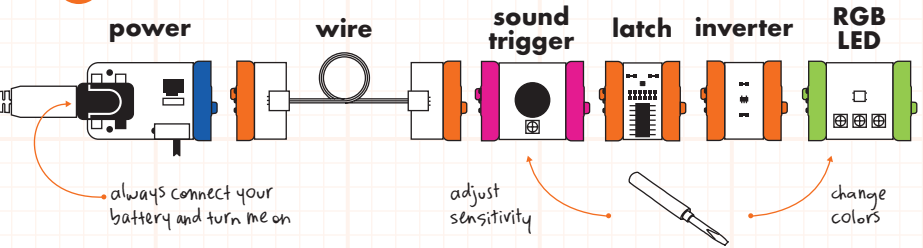


STAY SAFE! use additional lights at night

PROJECT 8: Create an electronic alternative to the classic birthday candle.

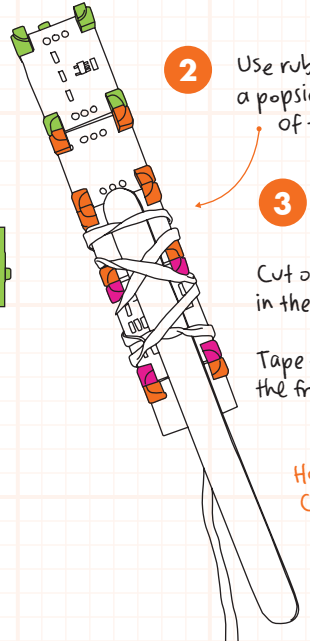
BIRTHDAY CANDLE

1 Start with this circuit



TIME: 30 mins
DIFFICULTY: ●●○○○

YOU'LL NEED

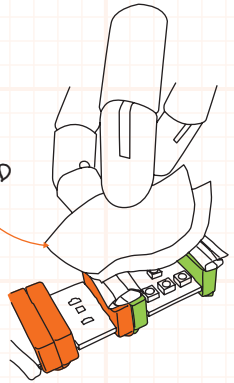


2 Use rubber bands to connect a popsicle stick to the back of the littleBits

3 Cut out tissue paper in the shape of a flame

Tape the flame to the front of the RGB LED

How old are you? Create a custom candle shape.



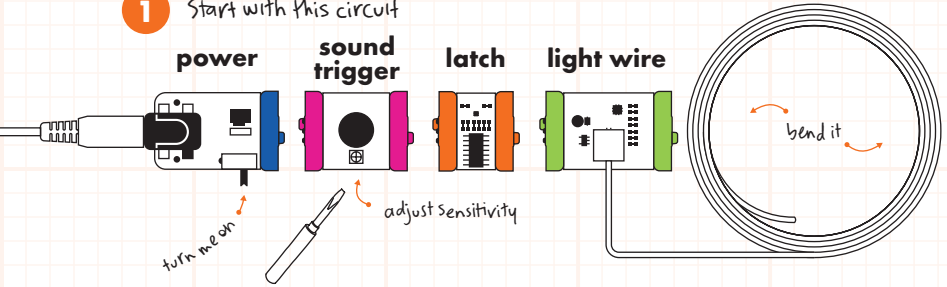
4 Stick the popsicle stick in a cake...

Blow on the flame to turn it on and off!

PROJECT 9: Going to a dance party? Create a fun accessory!

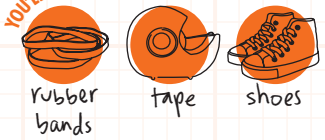
STOMPING SHOES

1 Start with this circuit

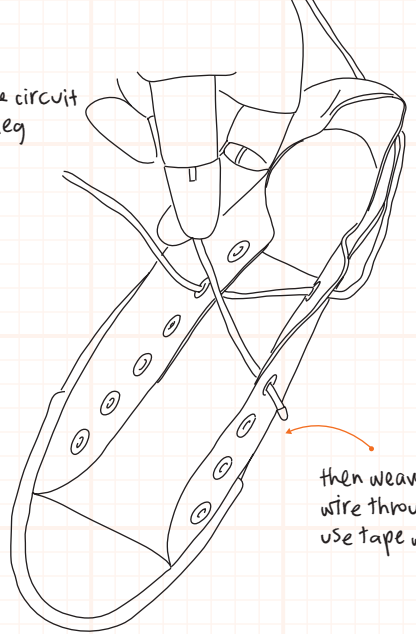


TIME: 60 mins
DIFFICULTY: ●●○○○

YOU'LL NEED



2 Rubber band the circuit to your lower leg



then weave the light wire through the holes, use tape when needed

What other clothing can you attach the light wire to?

3

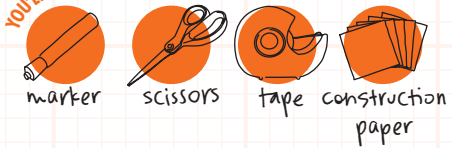
START DANCING!

PROJECT 10: Throwing a surprise party? Use the timeout!

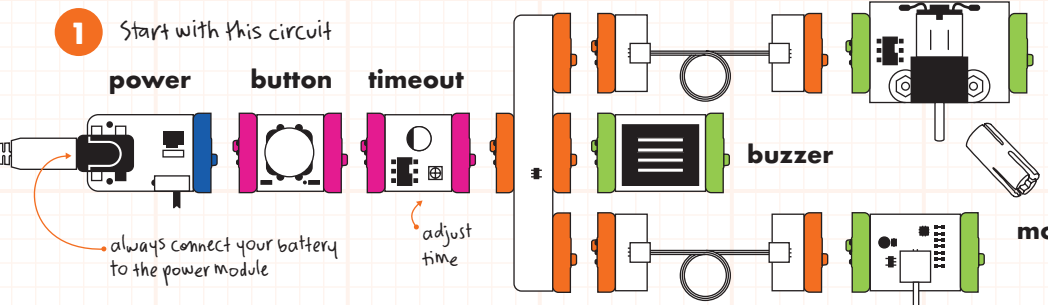
SURPRISE PARTY

TIME: 60 mins
DIFFICULTY: ●●○○○

YOU'LL NEED

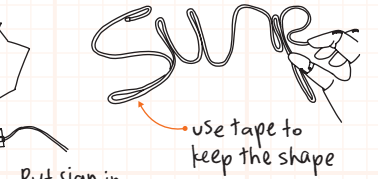


1 Start with this circuit



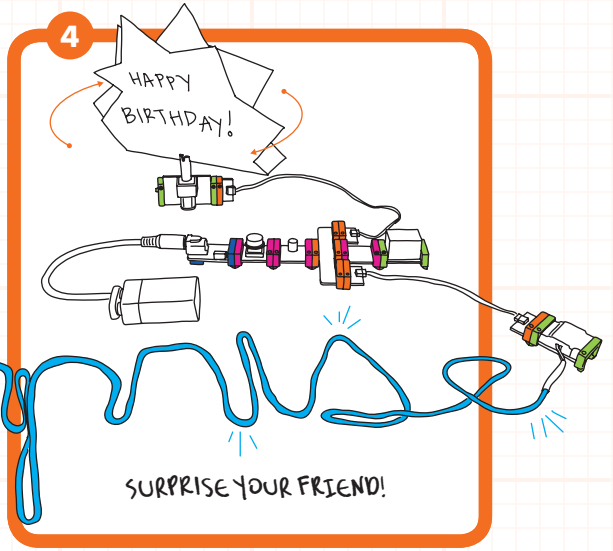
2 Decorate and cut out a sign

3 Bend light wire into the shape of the message



Create a custom message. Try writing a friend's name with the light wire.

4



And now a brief intermission from the projects.

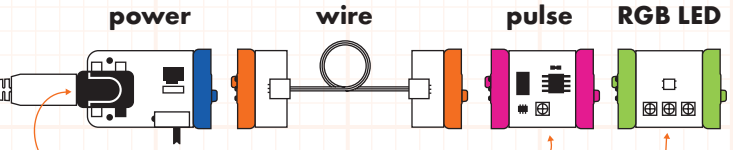
VISIT US AT LITTLEBITS.CC/TIPS FOR SOME AMAZING TIPS & TRICKS

10 coolest ways to wear the light wire … Find out why the pulse is the life of the party … 5 ways to attach materials to the servo motor … 10 techniques for creating the goofiest eyeballs … 6 things you didn't know about the button … Find out why the wire is the second most important littleBit … You are a musician! Learn the mystical art of playing the buzzer … bitFeet™ + cardboard – 5 different attachment techniques … Don't throw that away! It could transform your next project … What household item enhances any lighting project? We'll show you … 7 fun ways to set off the sound trigger … Play with your food by attaching it to the DC motor … How many wires would it take to circle the globe? Find out! …

PROJECT 11: How can you use littleBits to imitate a flame?

FLICKERING LANTERN

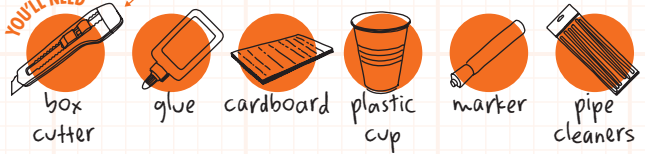
1 Start with this circuit



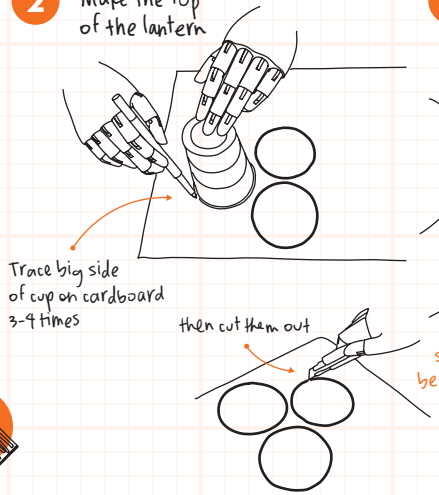
TIME: 60 mins
DIFFICULTY: ●●●○○

STAY SAFE! Always use with an adult.

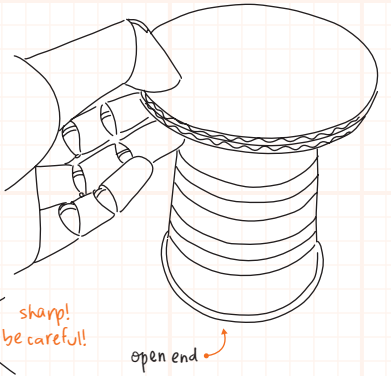
YOU'LL NEED



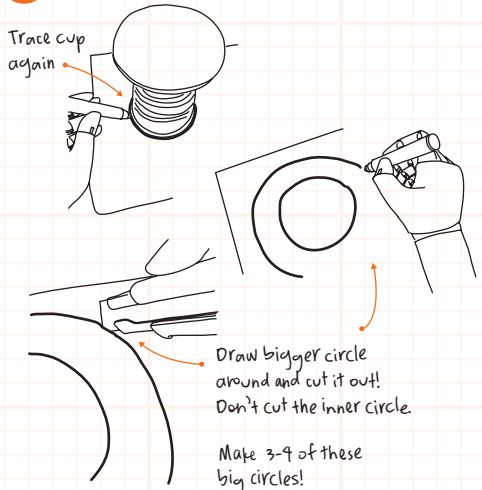
2 Make the top of the lantern



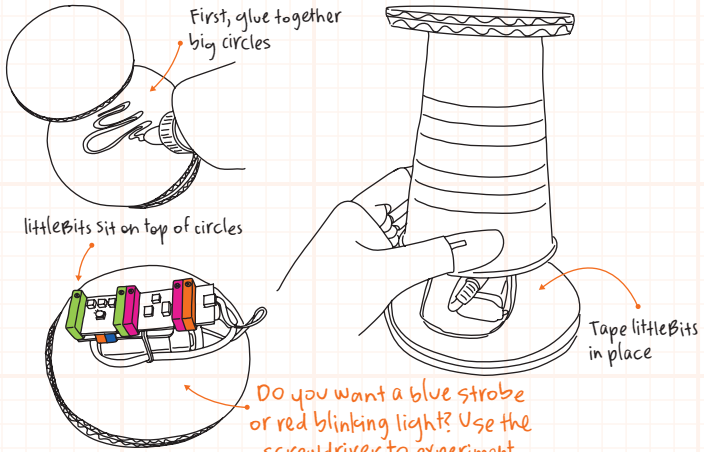
3 Glue circles on top of cup



4 Make bottom of lantern

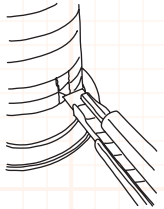


5 Put littleBits in lantern

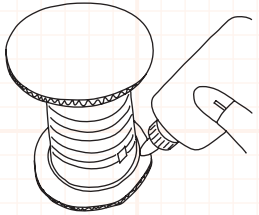


6 Put top of lantern on cardboard base

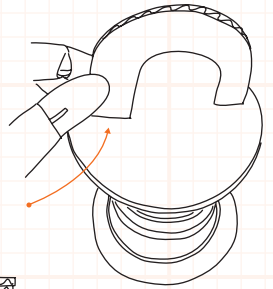
7 Cut hole to reach the power switch

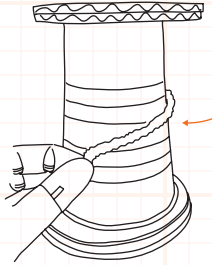


8 Glue or tape cup to base

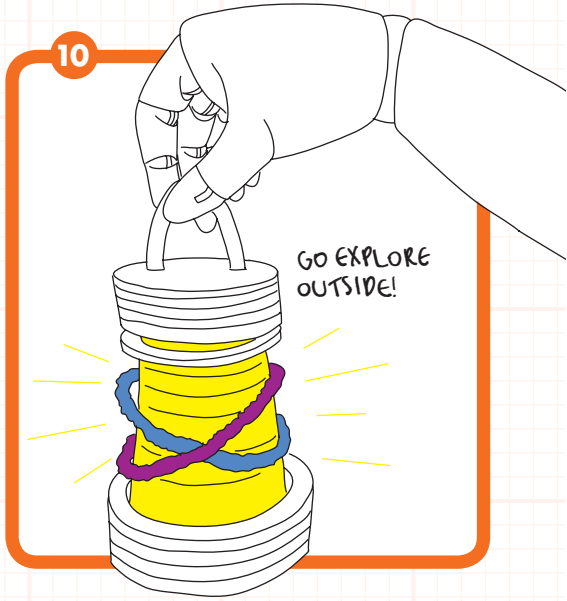


9 Decorate!





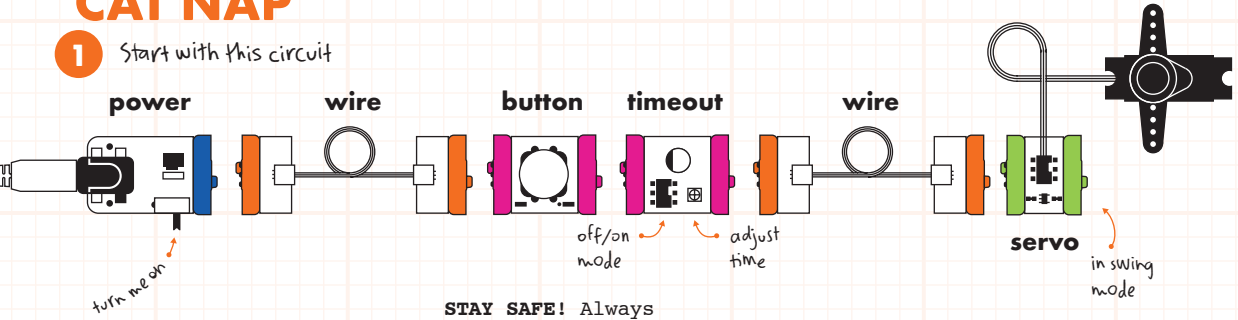
10



PROJECT 12: How can you use littleBits to create an alarm without sound?

CAT NAP

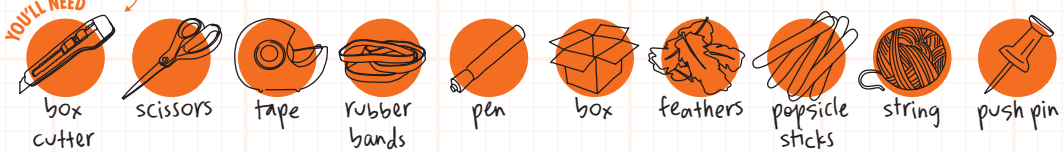
1 Start with this circuit



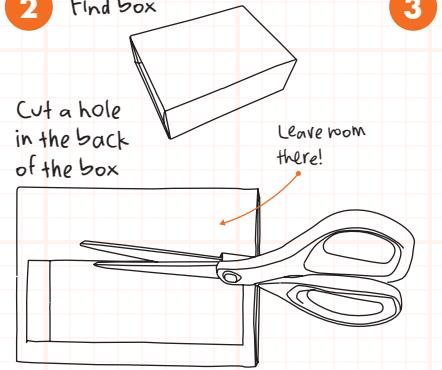
TIME: 60 mins
DIFFICULTY: ●●●○○

YOU'LL NEED

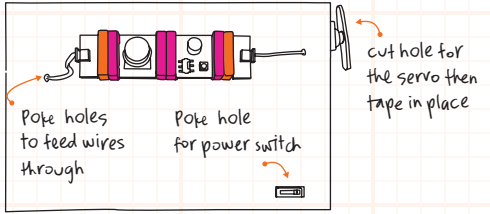
STAY SAFE! Always use with an adult.



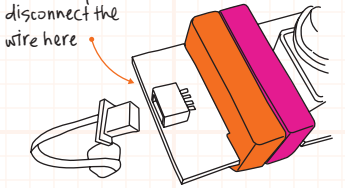
2 Find box



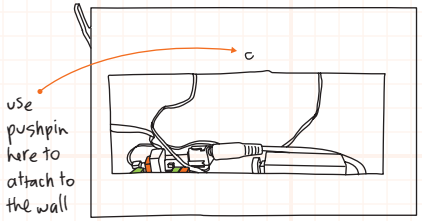
3 Place these littleBits on the front of the box



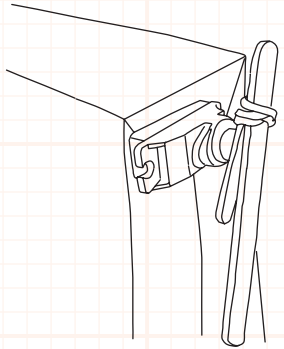
PRO TIP: you can disconnect the wire here



4 Place the other littleBits inside the back of the box



5 Rubber band the servo to the popsicle stick



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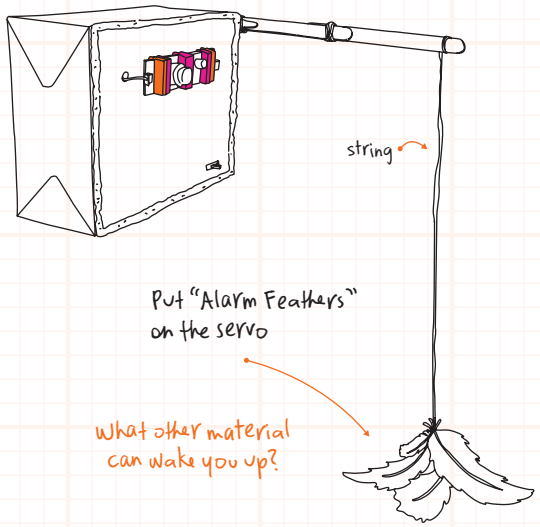
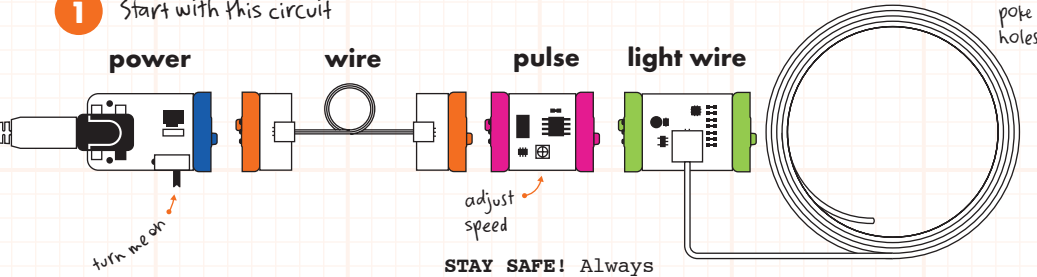


7

PROJECT 13: Invent a magical accessory for nighttime bike riding.

UNIHORN HELMET

1 Start with this circuit

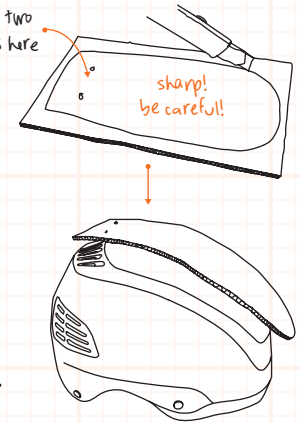


STAY SAFE! Always use with an adult.

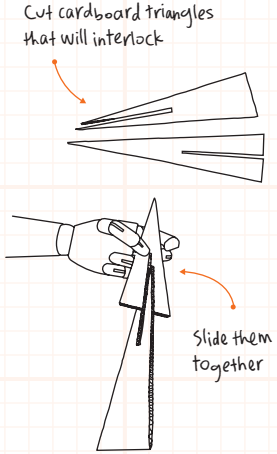
TIME: 2.5 hrs
DIFFICULTY: ●●●●○

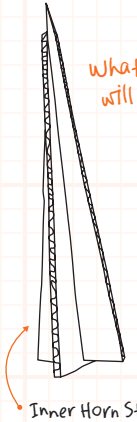
YOU'LL NEED

2 Measure and cut a piece of cardboard to fit along the top of your helmet

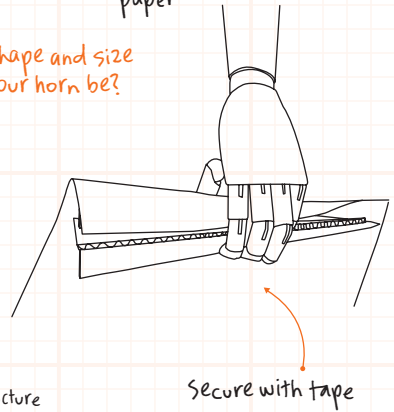


3 Make the inner horn structure

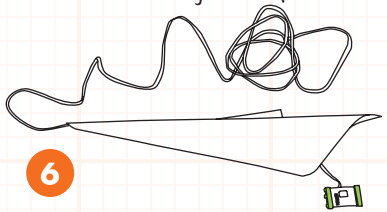




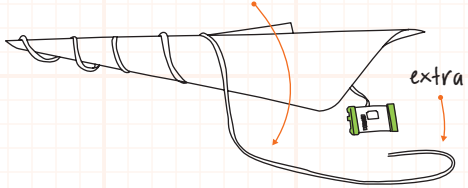
4 Roll the inner horn structure in colored paper



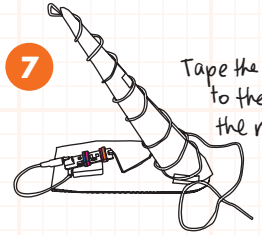
5 Feed light wire up through the base of the horn and out through the top



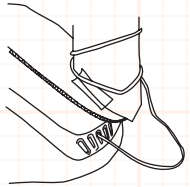
6 Wrap the light wire down and around the horn, leave some extra at the end

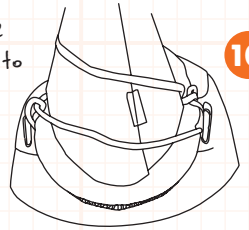


7 Tape the base of the horn to the cardboard and tape the rest of the Bits modules as well



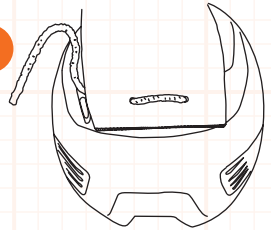
8 Use the excess light wire to secure the cardboard to the helmet at the front





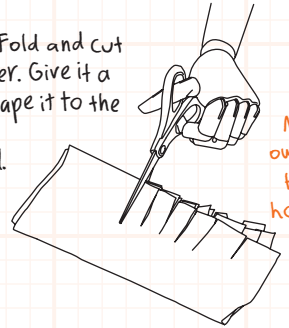
Tie down the cardboard base with the light wire

9



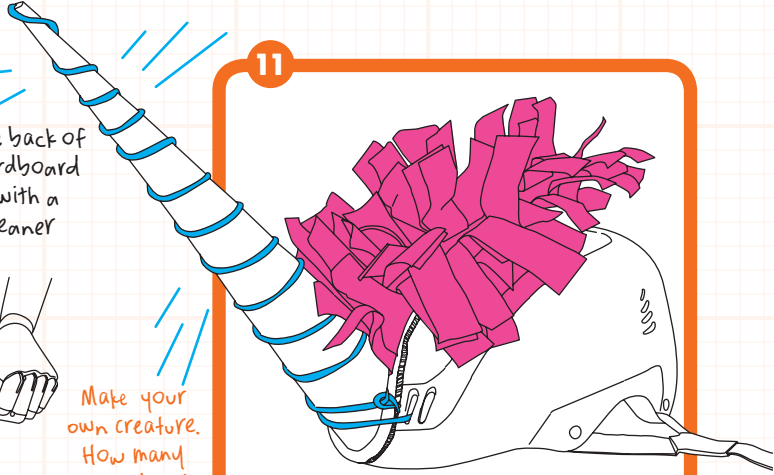
Tie the back of the cardboard down with a pipe cleaner

10 Add hair! Fold and cut tissue paper. Give it a fluff and tape it to the top of the cardboard.



Make your own creature. How many horns does it have?

11



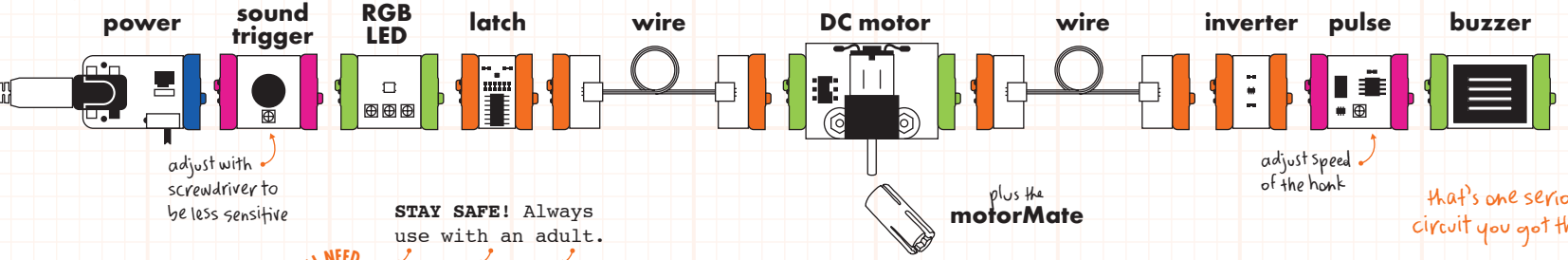
RIDE OFF INTO THE SUNSET!

PROJECT 14: Build an intelligent vehicle with multiple functions.

HONKING TRICYCLE

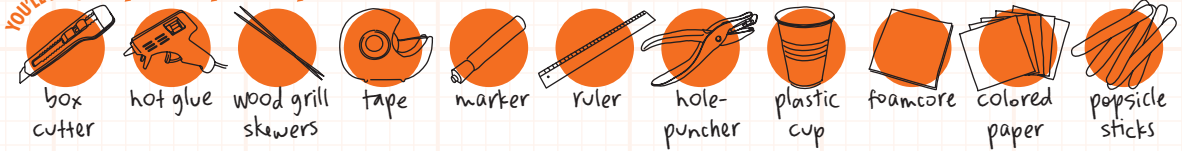
TIME: 2 hrs
DIFFICULTY: ●●●●○

1 Start with this circuit



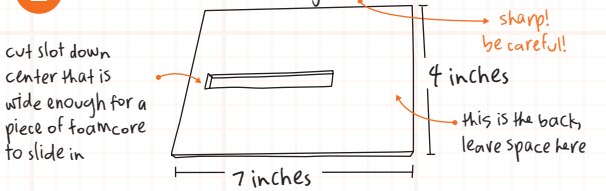
STAY SAFE! Always use with an adult.

YOU'LL NEED

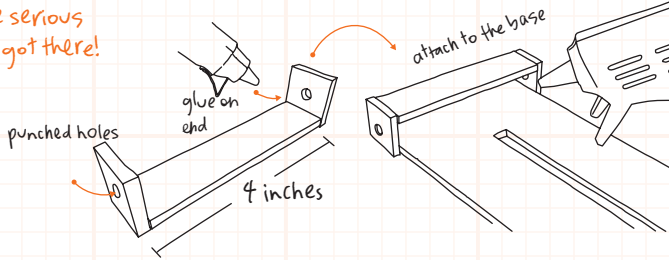


that's one serious circuit you got there!

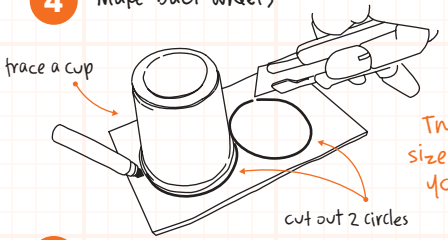
2 Cut foamcore base using cutter and ruler



3 Make axle holder with foamcore and glue to the back of the base

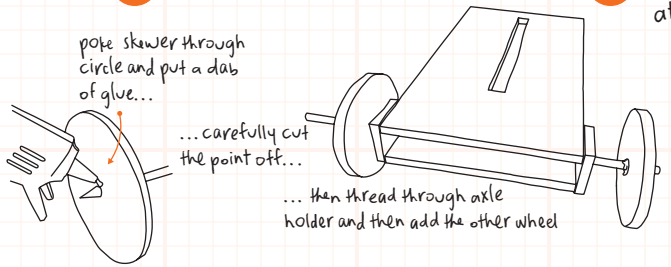


4 Make back wheels



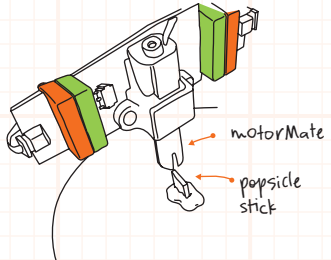
Try different sized circles for your wheels

5 Make the back axle

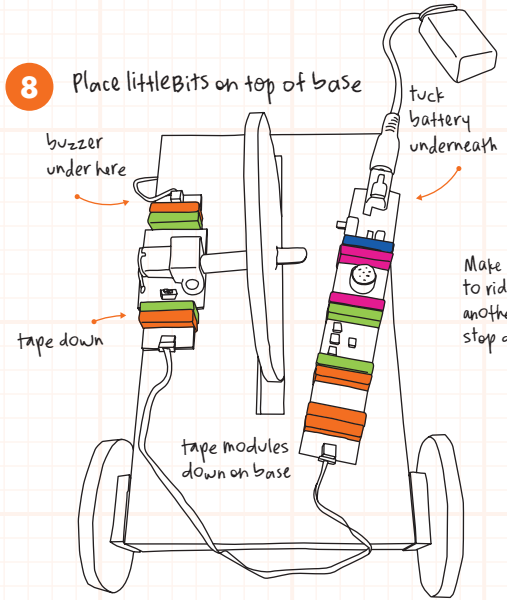


6 Make and mount the front wheel

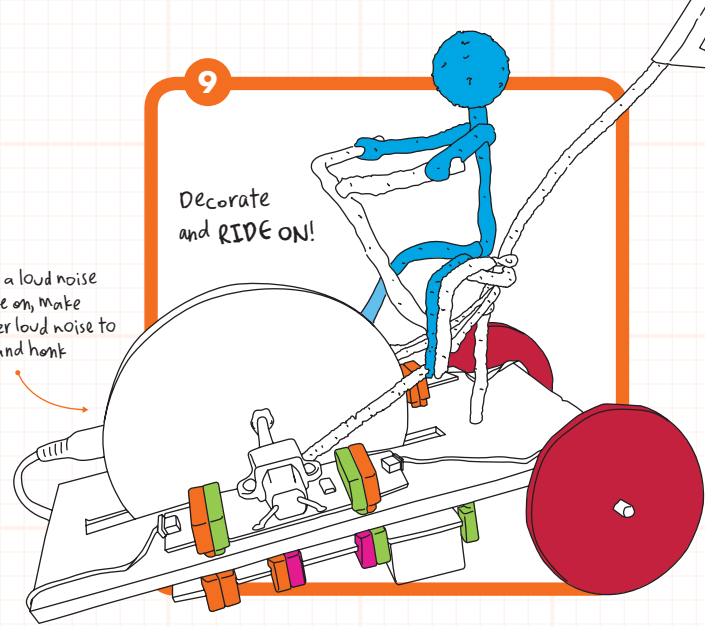
7 Cut off end of popsicle stick, then attach wheel to motorMate



8 Place littleBits on top of base



9

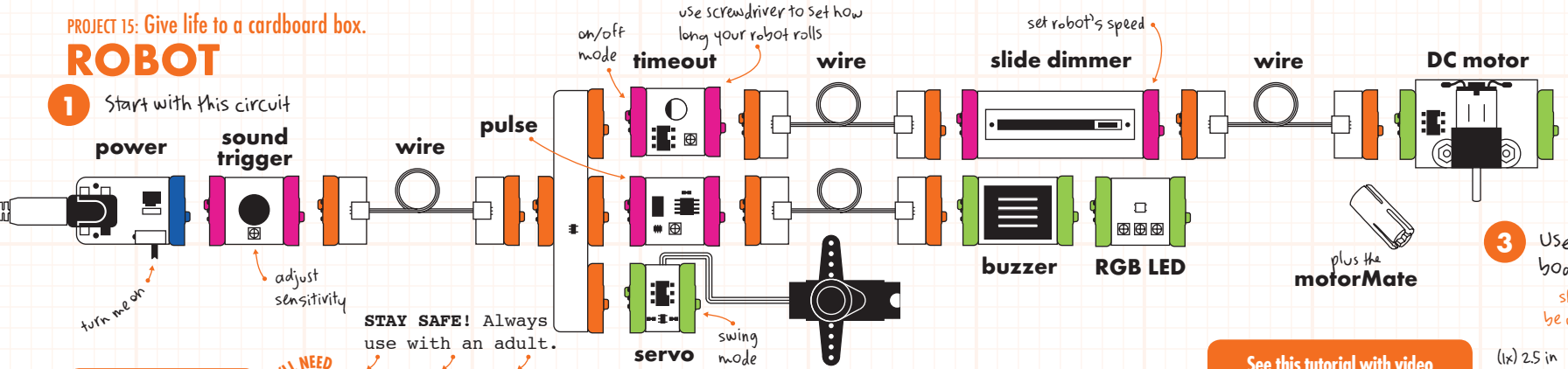


PROJECT 15: Give life to a cardboard box.

ROBOT

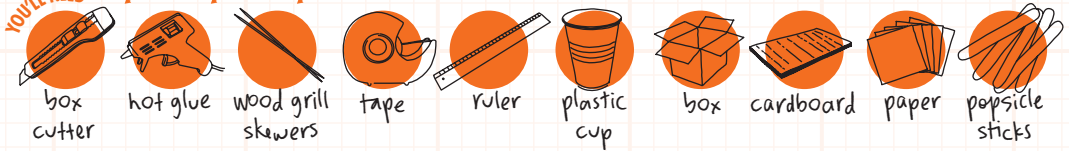
TIME: 2 hrs
DIFFICULTY: ●●●●○

1 Start with this circuit



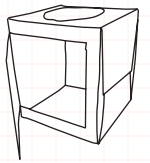
STAY SAFE! Always use with an adult.

YOU'LL NEED



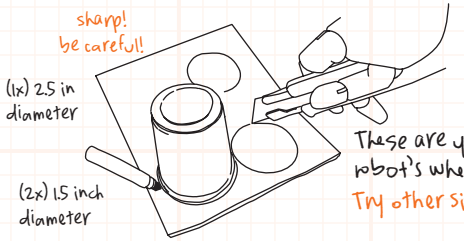
See this tutorial with video extras at littleBits.cc/deluxe

2 Cut a flap in the back of a box.

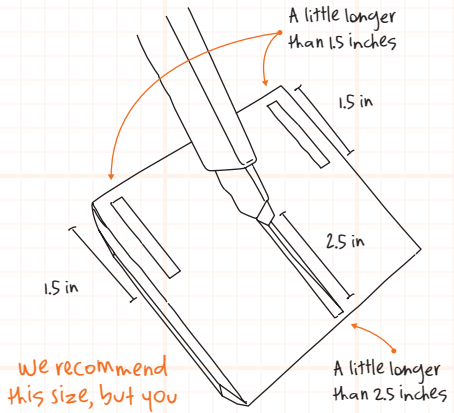


We used a tissue box. What do you have at home?

3 Use a small cup to trace 3 circles on cardboard. Mark the center and cut them out.

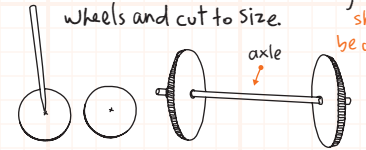


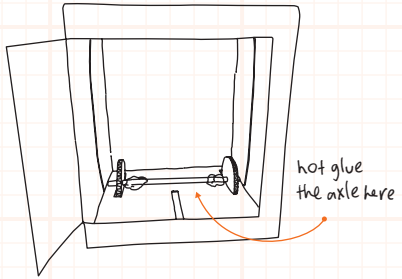
4 Cut slots for cardboard wheels in base of the box



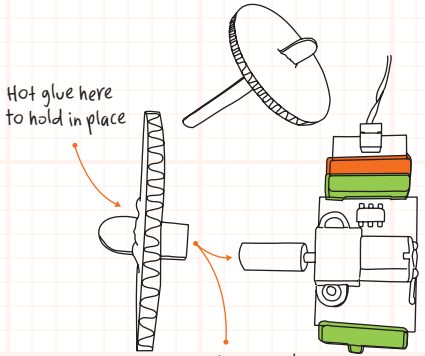
We recommend this size, but you can try others!

5 Poke holes in center of smaller wheels. Stick the skewer through wheels and cut to size.

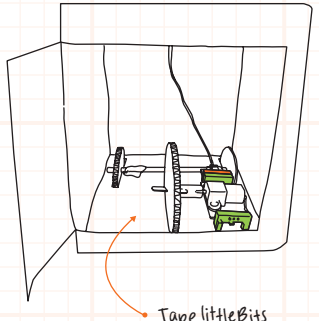




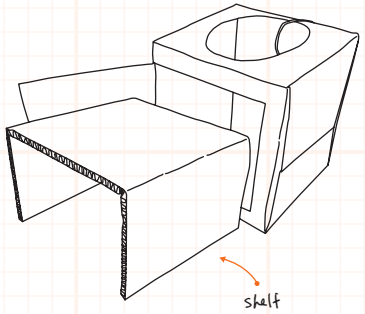
6 Stick a popsicle stick through the center of the 2.5 inch cardboard wheel



7 Place motor with motor-Mate and wheel in the center slot of the box base

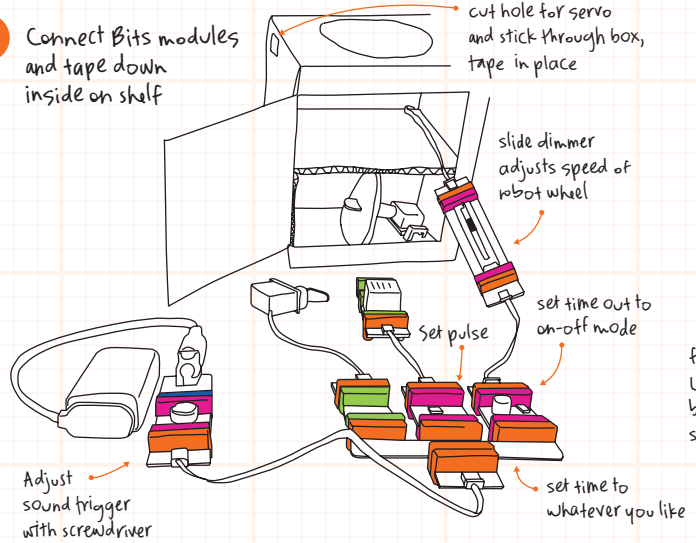


8 Place a cardboard shelf inside box.

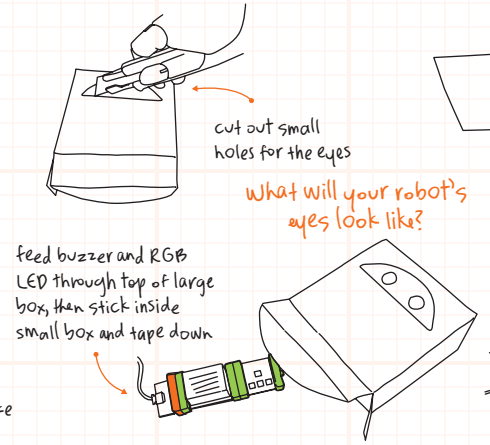


You can bend a piece of cardboard to make the shelf!

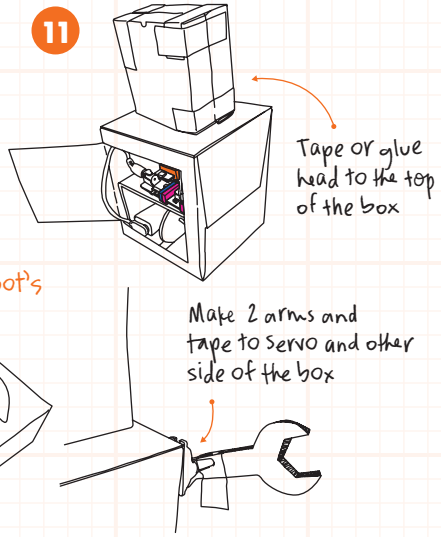
9 Connect Bits modules and tape down inside on shelf



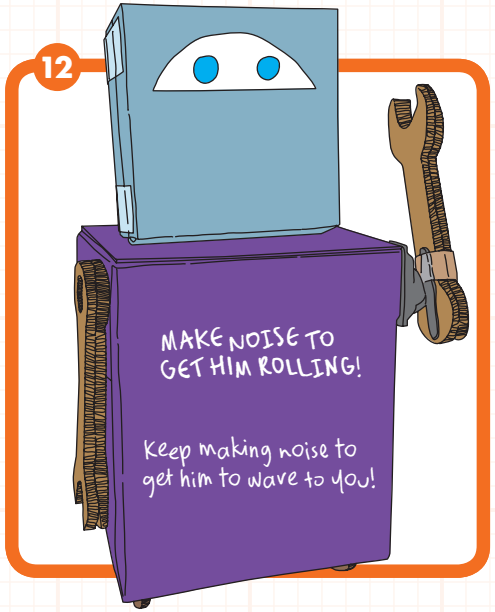
10 Use a smaller box to make the robot head



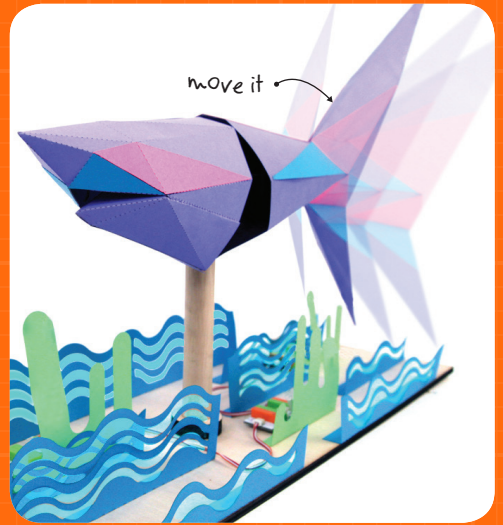
11



12




MAKE SOMETHING THAT DOES SOMETHING™



This booklet's over but the fun's not done.

LITTLEBITS.CC/UPLOAD

Upload your project and you may be handsomely rewarded. We regularly feature awesome community projects and send out exclusive gifts.

Visit us online where we've got tons more projects and tips and tricks for every Bits module. Check out other littleBits in the expanding library.

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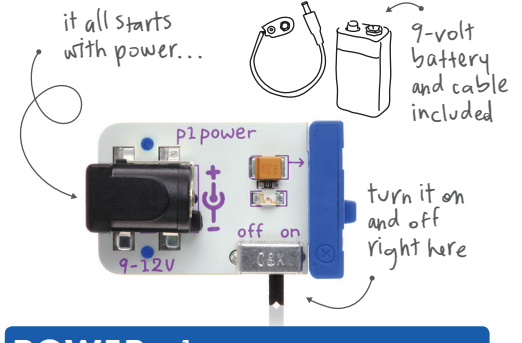
Premium Kit

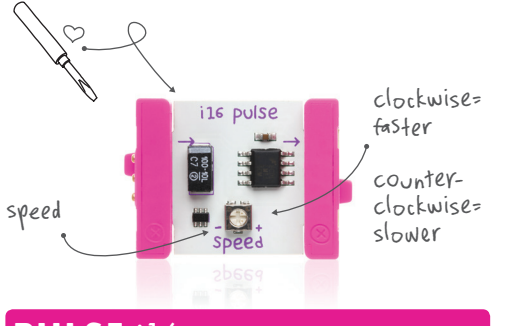


POWER p1

This power module lets you use a 9-volt battery to supply electricity to your littleBits. Snap in the battery + cable (both included) and flip the switch to turn it on.

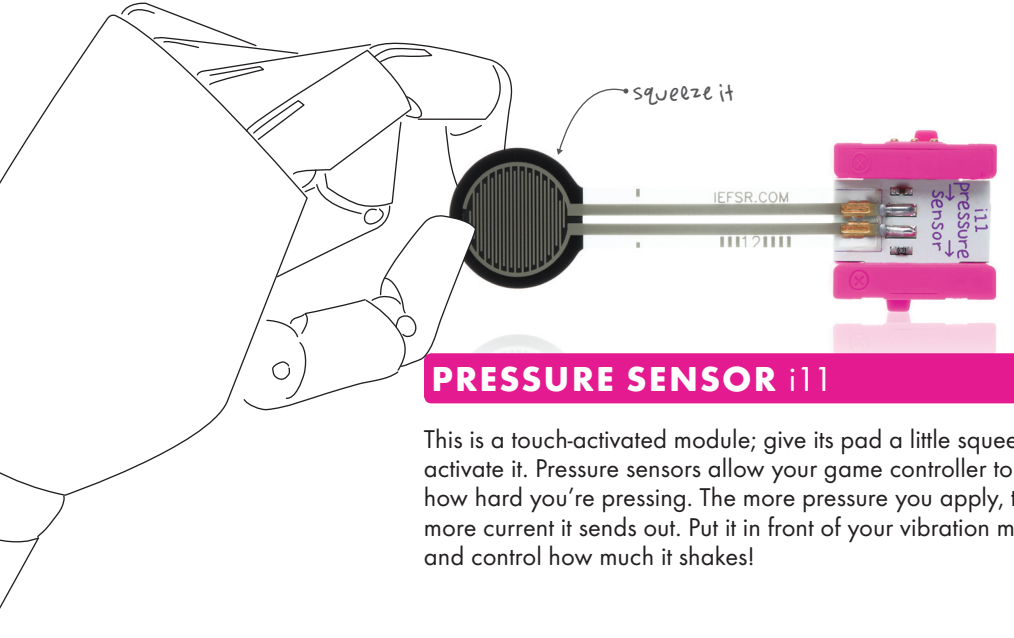
SLIDE DIMMER i5

Move the slider from one end to the other. It functions just like a light dimmer you might find at home or a volume fader in a recording studio. Experiment with how it affects output Bits modules that follow.



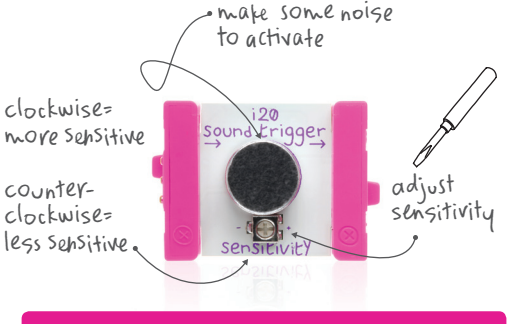
PULSE i16

The pulse is like an electronic heartbeat. It sends out a stream of short ON signals. You can make the speed of the pulses faster or slower using the included screwdriver. It's great for making LEDs blink!



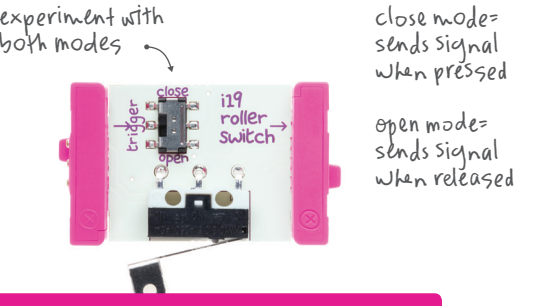
PRESSURE SENSOR i11

This is a touch-activated module; give its pad a little squeeze to activate it. Pressure sensors allow your game controller to know how hard you're pressing. The more pressure you apply, the more current it sends out. Put it in front of your vibration motor and control how much it shakes!



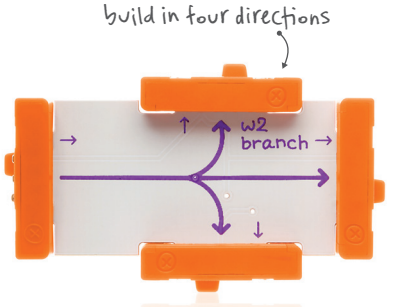
SOUND TRIGGER i20

This module senses the noise level in your room, and sends an ON signal when it gets over a certain level. You can make that threshold louder or softer using the included screwdriver.



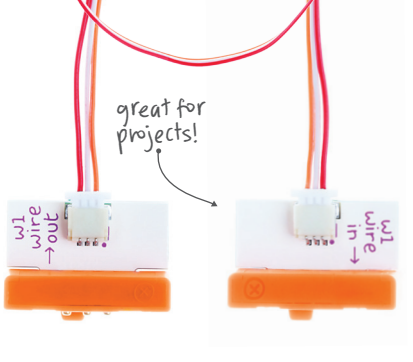
ROLLER SWITCH i19

The roller switch is handy – it has a little lever with a wheel and activates when something presses it – just like inside your fridge. You can also flip the mode switch to make it turn off when the lever is pushed in.



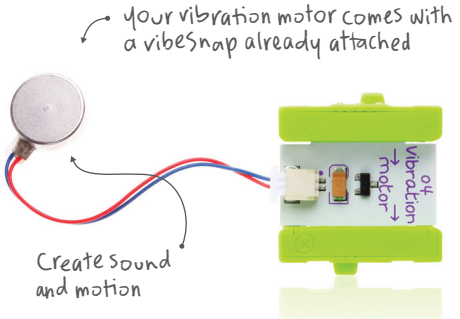
BRANCH w2

The branch gives you more options for connecting your littleBits: it lets you connect the output of a single module to as many as three others, oriented in different directions. It's just like a power strip.



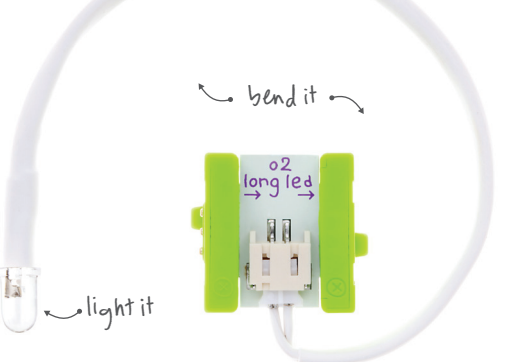
WIRE w1

The wire allows you to physically separate your littleBits. Try it whenever you need to break up your chain of littleBits, like when you need to put a light at the top of a model building.



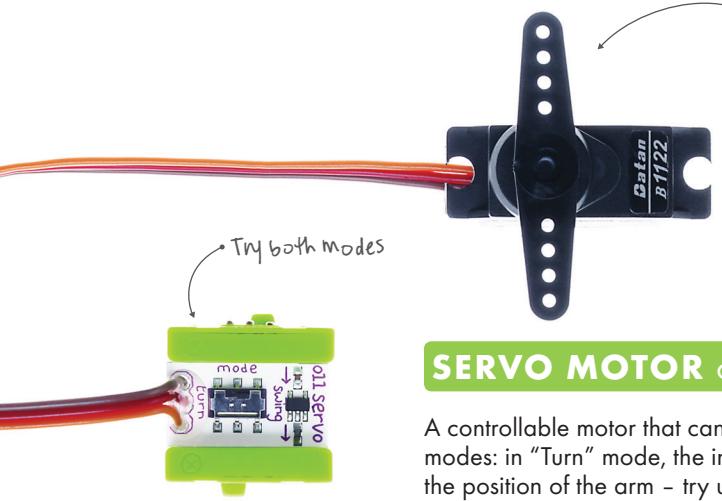
VIBRATION MOTOR o4

The vibration motor is very similar to the device that makes your cellphone shake when you get a text. You can make anything vibrate and buzz. The vibeSnap helps you connect to paper, tin foil, a pipecleaner...



LONG LED o2

The long LED (or "Light-Emitting Diode") is another lighting option. We call it the "long" LED because the light is tethered to the board by a cable. This lets you put the light in some interesting places.

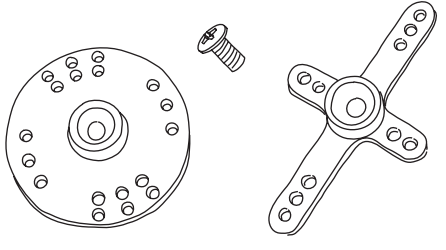


SERVO MOTOR o11

A controllable motor that can swing back and forth. It has two modes: in “Turn” mode, the input from other littleBits determines the position of the arm – try using your slide dimmer to set the angle you want. In “Swing” mode, the servo will move back and forth on its own – the input controls how fast it goes.

FAN o13

Yep, just what you’d think: a small electric fan tethered to a littleBits module. Use your little fan to create fluttering movement in your creations or just to keep yourself cool.



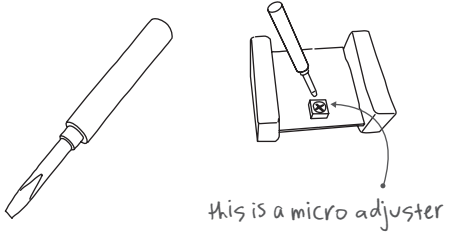
SERVO ACCESSORIES

Your servo motor comes with a couple great arms to help you in your projects. Use a Phillips screwdriver* to change the arms.

*not included

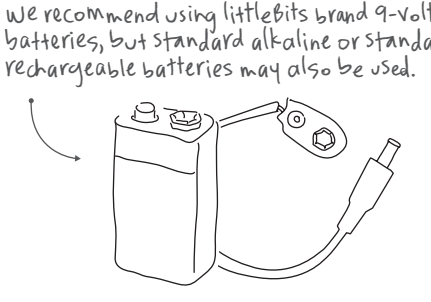
VIBESNAP™ a17

You'll find this little guy attached to your vibration motor. The vibeSnap helps you attach stuff – like paper or tin foil – to your vibration motor. Remember to keep it light!



SCREWDRIVER a4

This little purple screwdriver is used to modify any littleBit that has a micro adjuster.

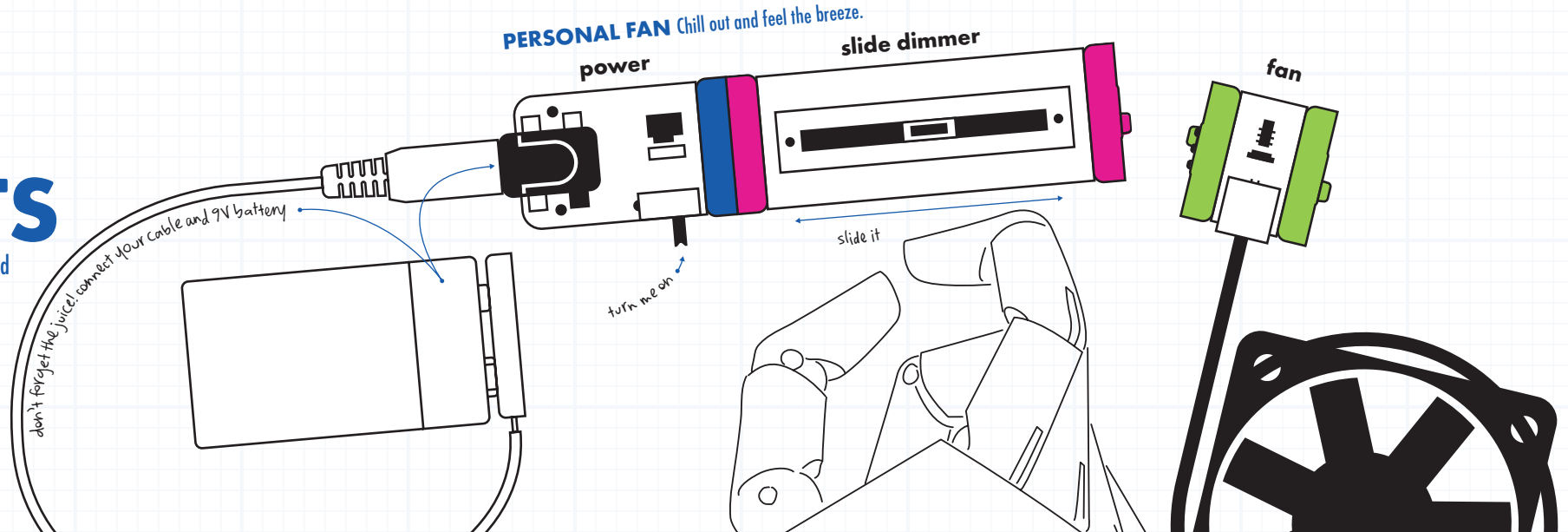


BATTERY AND CABLE a1

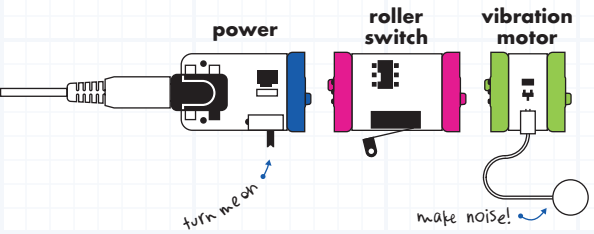
This Kit contains a 9-volt alkaline battery and a cable to connect it to the power module. Connect it and then flip the switch to power all of your creations!

TRY THESE CIRCUITS

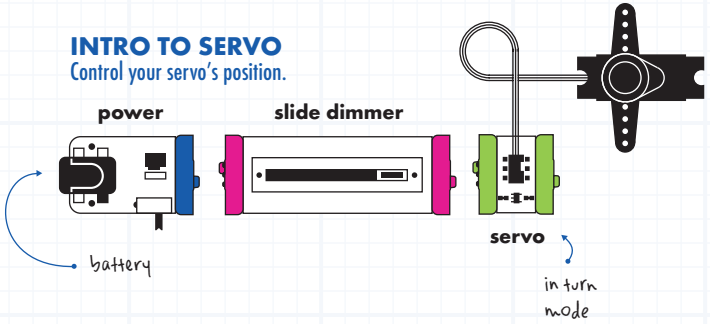
Get started with these, but don't let us hold you back – every module fits with every other module – feel free to experiment.



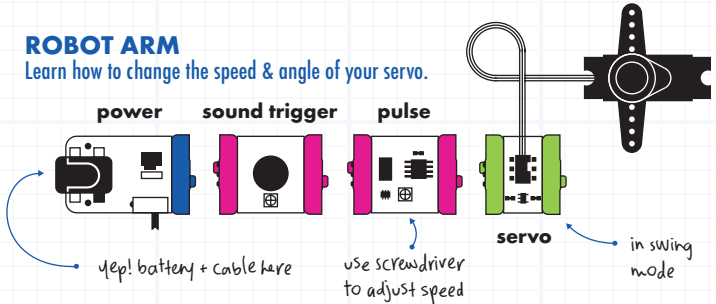
INTRUDER ALERT Create your own security system.



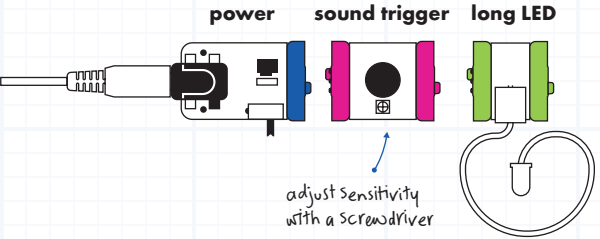
INTRO TO SERVO
Control your servo's position.



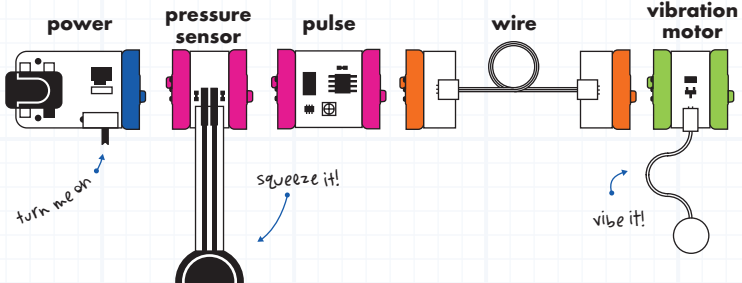
ROBOT ARM
Learn how to change the speed & angle of your servo.



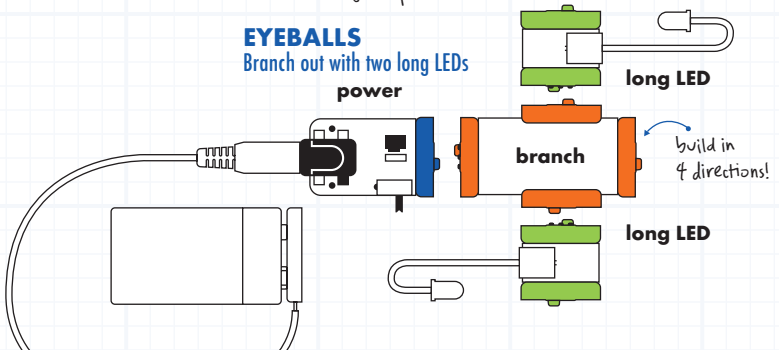
MAKE SOME NOISE Transform sound into light.



BACK MASSAGER Keep calm and vibe on.



EYEBALLS
Branch out with two long LEDs



PROJECTS

TRY THESE AND INVENT YOUR OWN

1 **Cooling Campfire**
2 **Hypnotizing Wheel**
3 **Auto Greeter**
4 **Truck Crane**
5 **Funny Face**
6 **Drawer Alarm**
7 **Box Monster**
8 **Bristle Bot**
9 **Bubble Flute**
10 **Playful Pet**

Plus tons more projects online littleBits.cc/premium

PROJECT 1: Cool down and camp out.

COOLING CAMPFIRE

TIME: 30 mins
DIFFICULTY: ●●○○○

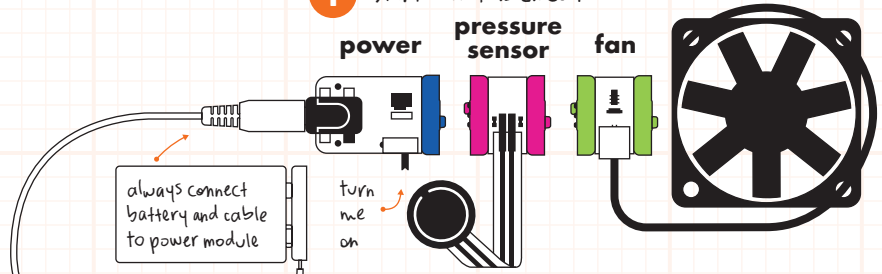
YOU'LL NEED


scissors

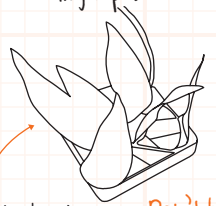

tape


tissue paper

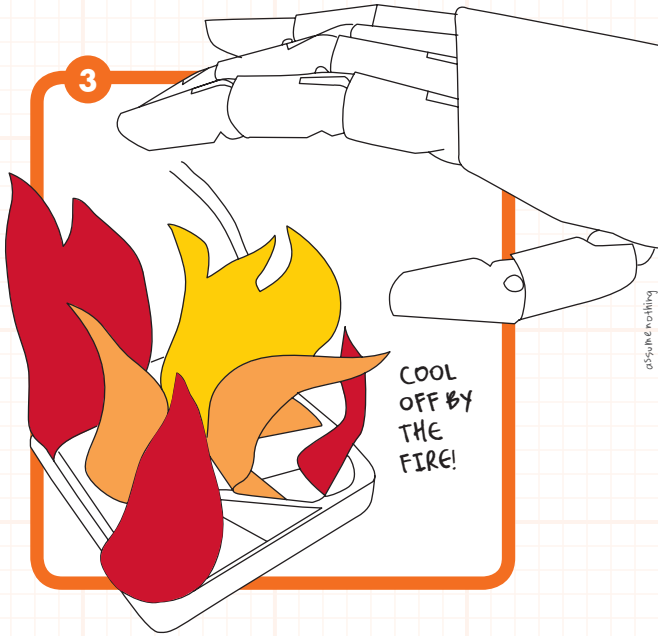
1 Start with this circuit



2 Feel which end air is coming out from, and attach tissue paper to that side using tape!


cut colored tissue paper to look like flames

Don't have any? Try tissues or feathers



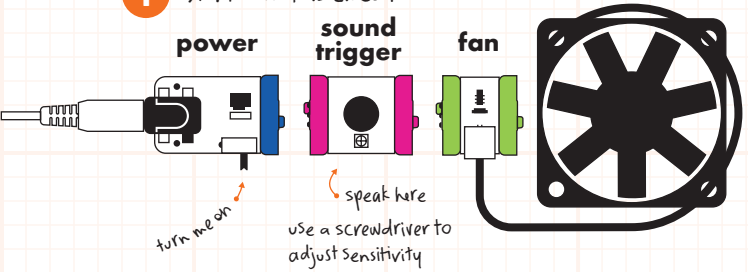
PROJECT 2: Create a simple machine to hypnotize your friends!

HYPNOTIZING WHEEL

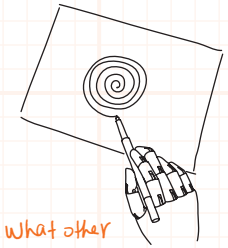
TIME: 15 mins
DIFFICULTY: ●○○○○

YOU'LL NEED

1 Start with this circuit

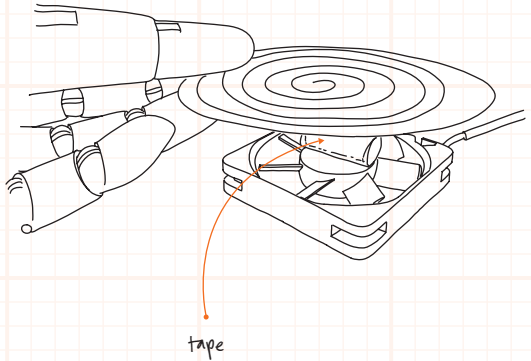


2 Draw a hypno circle on paper and then cut it out

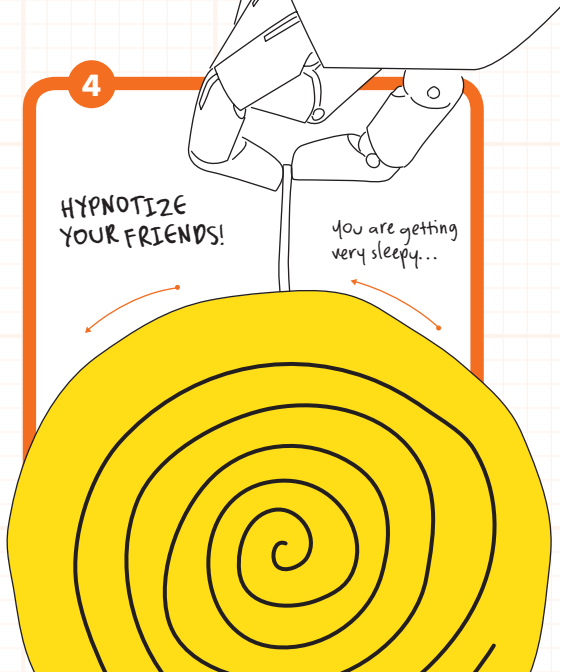


What other patterns do you find mesmerizing?

3 Attach paper wheel to fan with tape (on the fan piece that spins)



4



PROJECT 3: How can you use a servo to imitate a human wave?

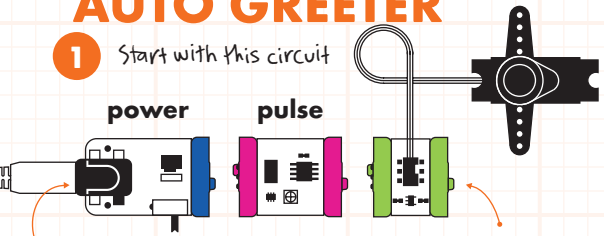
AUTO GREETER

TIME: 15 mins
DIFFICULTY: ●○○○○

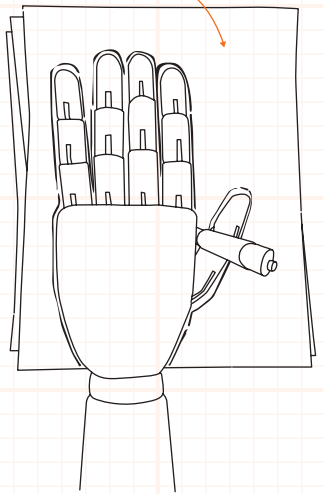
YOU'LL NEED

marker, scissors, tape, construction paper

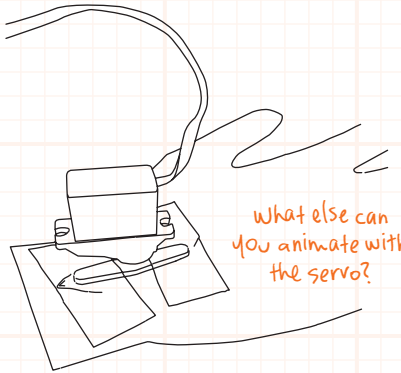
1 Start with this circuit



2 Trace hand on paper and cut it out



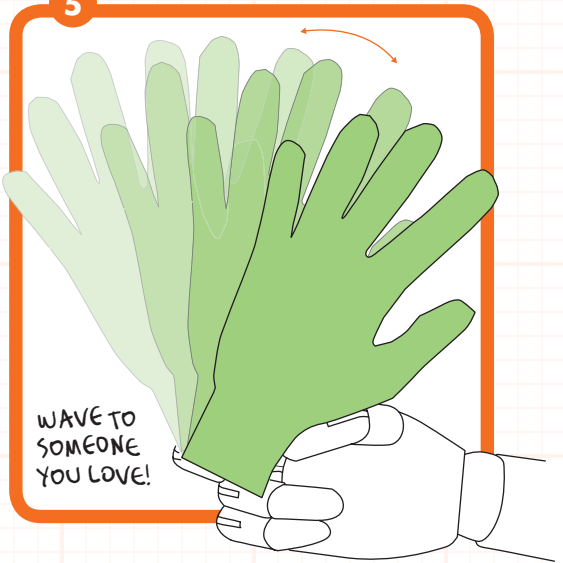
3 Tape paper hand to servo



4 Use a screwdriver to adjust pulse if you want to wave faster or slower

What else can you animate with the servo?

5



PROJECT 4: How can you use a servo to pick things up?

TRUCK CRANE

TIME: 30 mins
DIFFICULTY: ●●○○○

YOU'LL NEED

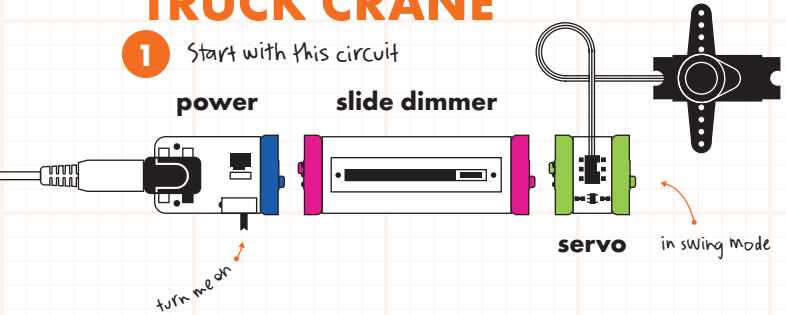

rubber bands


paper clip

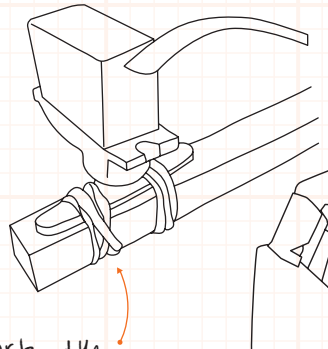

popsicle stick

1

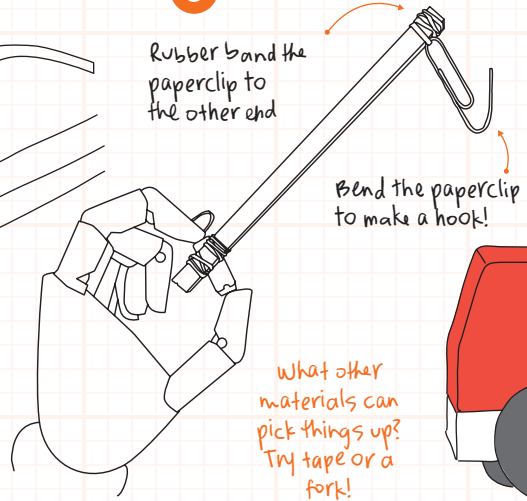
Start with this circuit



2



3

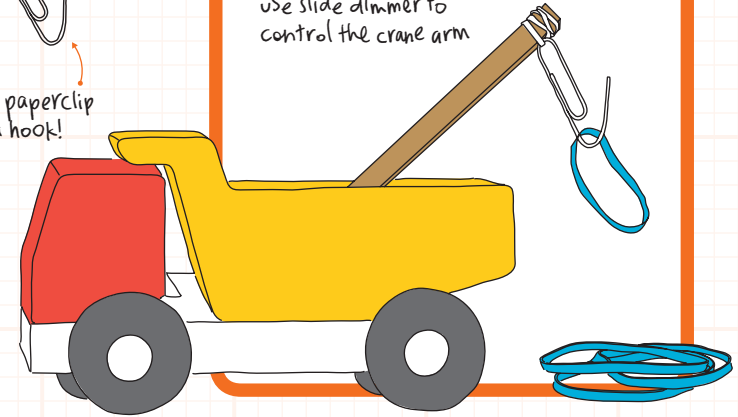


What other materials can pick things up? Try tape or a fork!

4

PICK THINGS UP!

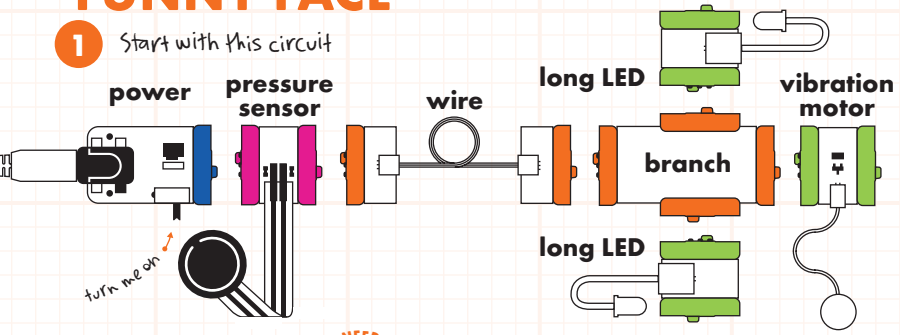
use slide dimmer to control the crane arm



PROJECT 5: Make someone smile with this silly project.

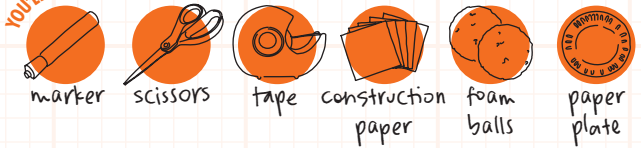
FUNNY FACE

1 Start with this circuit

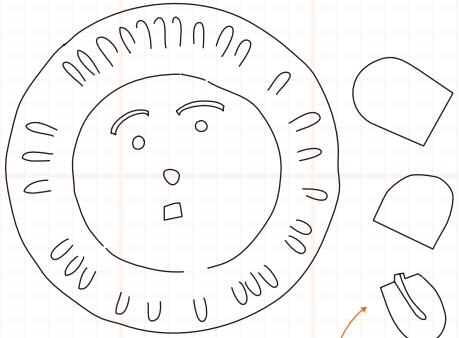


TIME: 30 mins
DIFFICULTY: ●●○○○

YOU'LL NEED

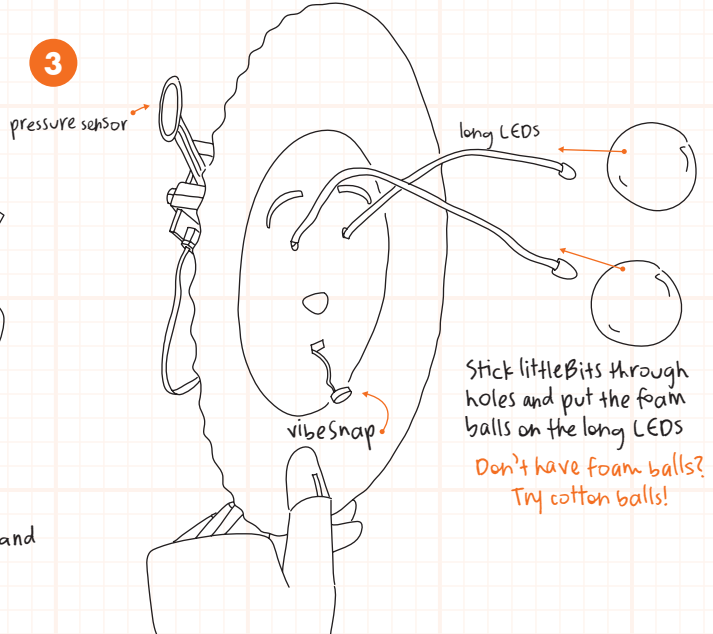


2 Draw a face on the plate and cut out holes for eyes and mouth



Draw ears and tongue on paper and then cut them out

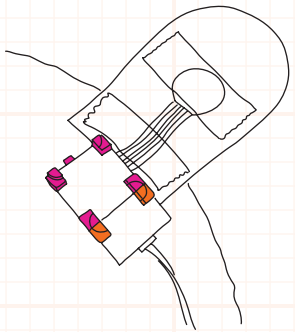
3



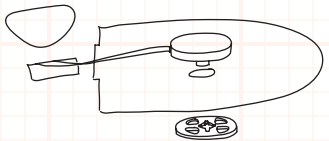
Stick littleBits through holes and put the foam balls on the long LEDs

Don't have foam balls? Try cotton balls!

4 Tape ear to pressure sensor on the back of the plate

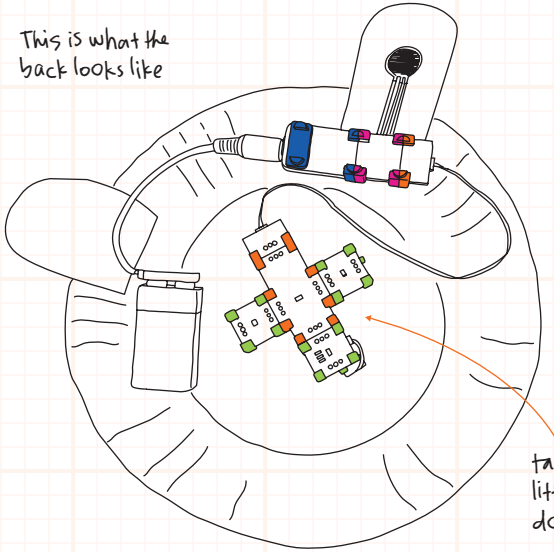


See this tutorial with video extras at littleBits.cc/premium



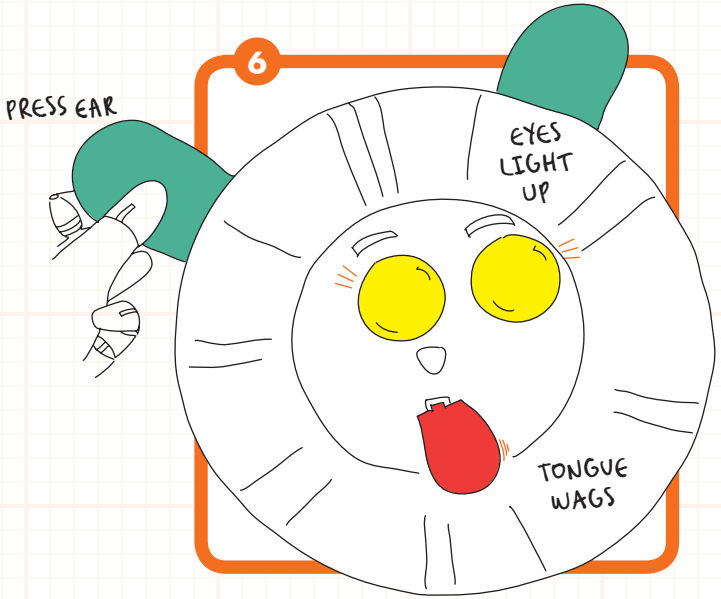
use vibeSnap to attach the tongue

5 This is what the back looks like



tape littleBits down

6

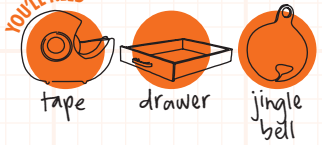


PROJECT 6: How can you design a system to prevent someone from going through your things?

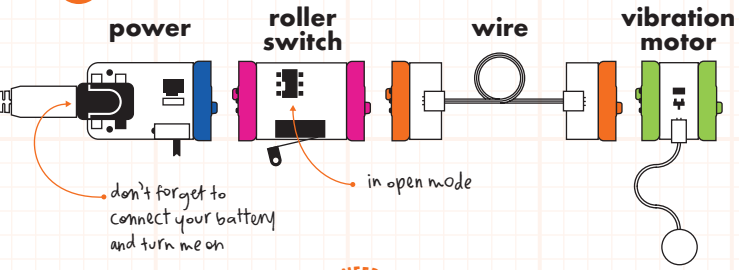
DRAWER ALARM

TIME: 30 mins
DIFFICULTY: ●●○○○

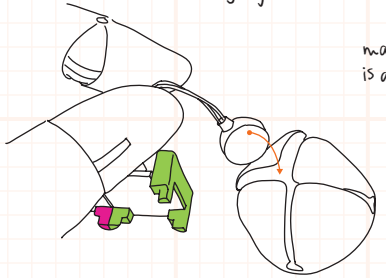
YOU'LL NEED



1 Start with this circuit

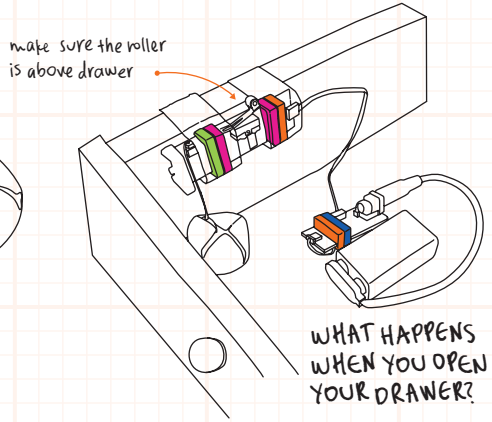


2 Insert the vibration motor into the jingle bell



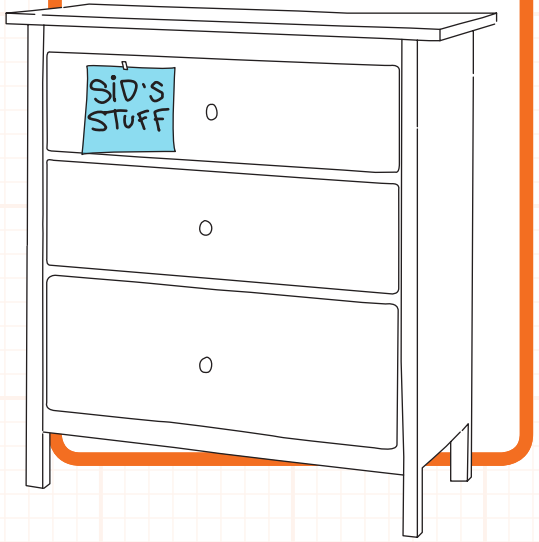
What other material would make a loud noise?

3 Tape the circuit to the inside of your drawer



WHAT HAPPENS WHEN YOU OPEN YOUR DRAWER?

4 PROTECT YOUR THINGS!



And now a brief intermission from the projects.

VISIT US AT LITTLEBITS.CC/TIPS FOR SOME AMAZING TIPS & TRICKS

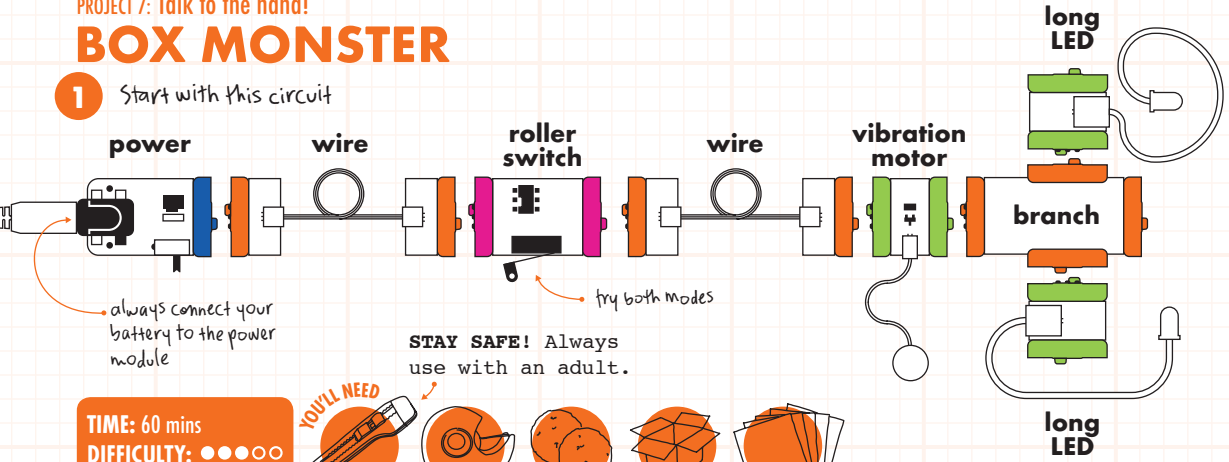
15 ways to make stuff move with the vibration motor ... Find out why the pulse is the life of the party ... 5 ways to attach materials to the servo motor ... 10 techniques for creating the goofiest eyeballs ... Find out why the wire is the second most important littleBit ... Learn how to levitate with the fan ... bitFeet™ + cardboard – 5 different attachment techniques ... Don't throw that away! It could transform your next project ... What household item enhances any lighting project? We'll show you ... 7 fun ways to set off the sound trigger ... 5 ways to make noise with the vibration motor ... How many wires would it take to circle the globe? Find out! ... plus lots more tips for how to use your littleBits!

PROJECT 7: Talk to the hand!

BOX MONSTER

TIME: 60 mins
DIFFICULTY: ●●●○○

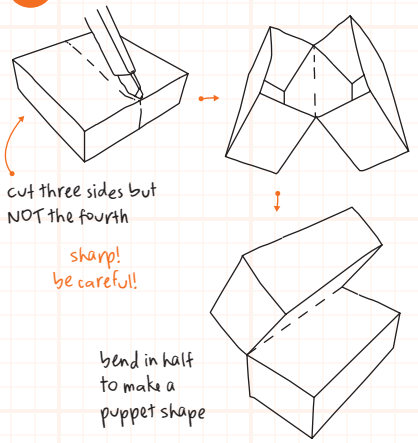
1 Start with this circuit



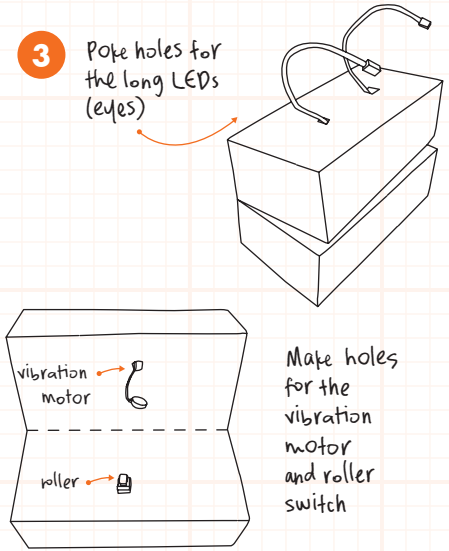
STAY SAFE! Always use with an adult.

YOU'LL NEED

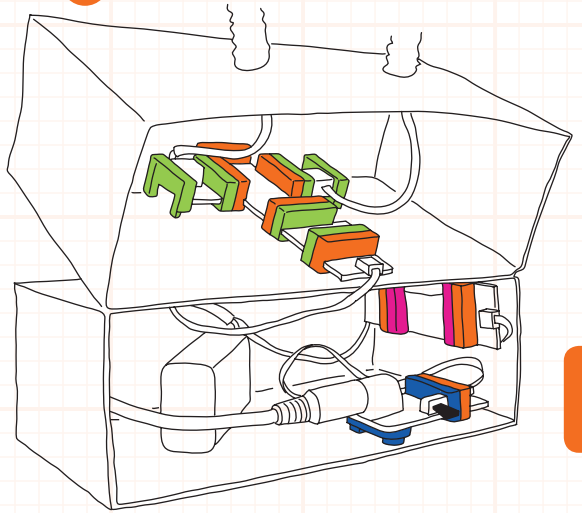
2 Find a box and cut it in half



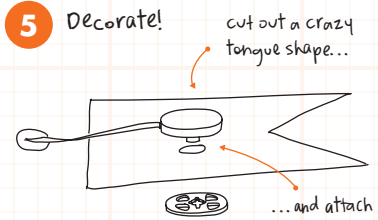
3 Poke holes for the long LEDs (eyes)



4 Tape littleBits in place inside the box

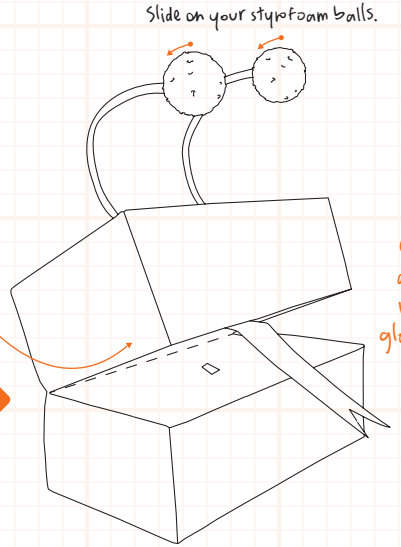


5 Decorate!



use markers, paint, glitter, colored paper and anything else you can think of to make your monster uniquely yours

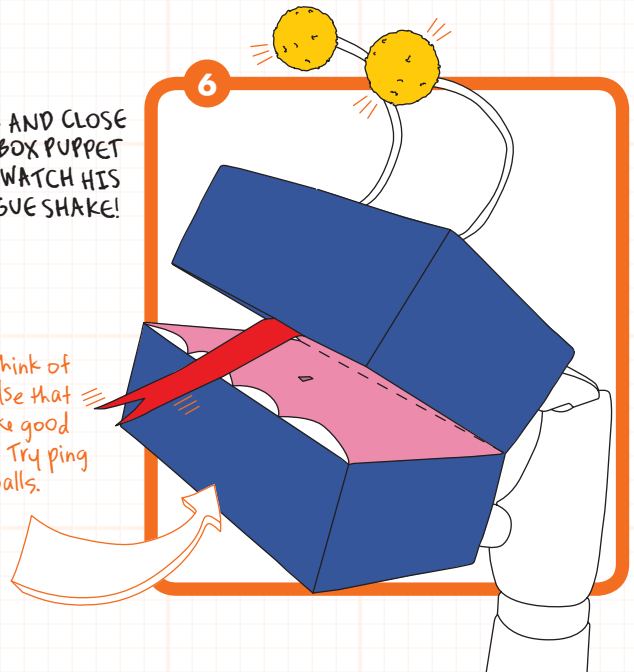
Got some cool colors or decorating techniques? We want to see your Box Monster! Upload it here littleBits.cc/upload



6

OPEN AND CLOSE THE BOX PUPPET AND WATCH HIS TONGUE SHAKE!

Can you think of anything else that would make good glowy eyes? Try ping pong balls.

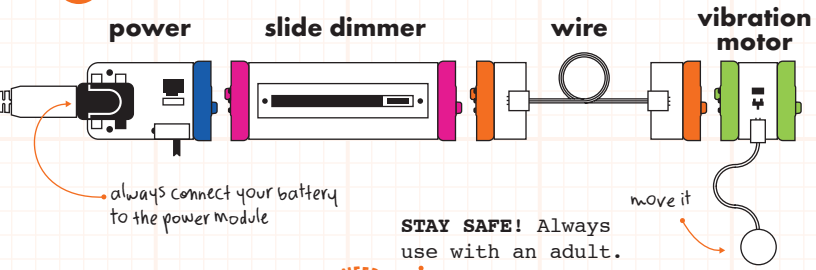


PROJECT 8: How can you make a robot from a toothbrush?

BRISTLE BOT

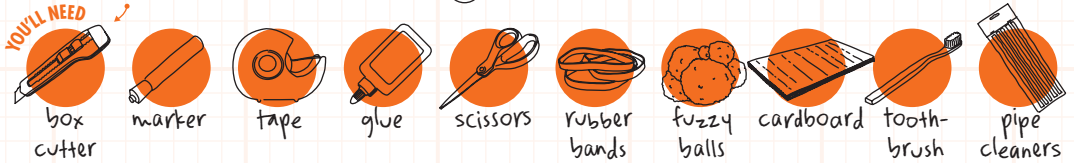
TIME: 60 mins
DIFFICULTY: ●●●○○

1 Start with this circuit

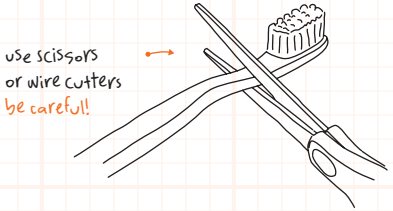


STAY SAFE! Always use with an adult.

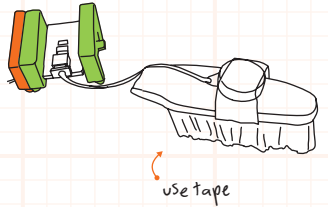
YOU'LL NEED



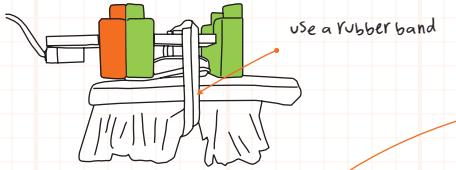
2 Have an adult cut the head off a toothbrush



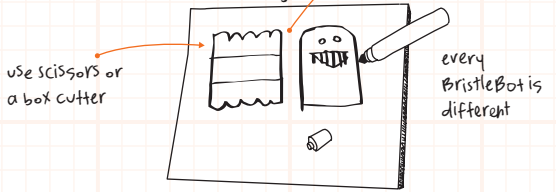
3 Attach the vibration motor to the back side of the bristles



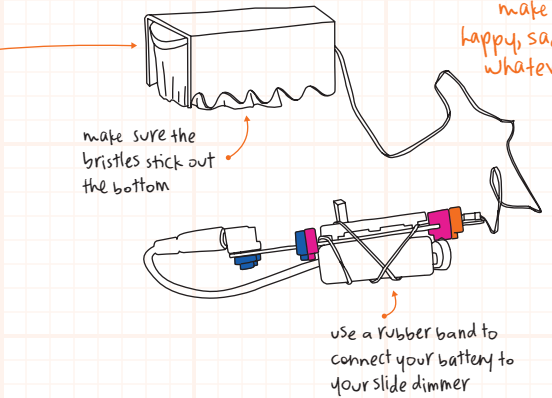
4 Now, attach the bristles to the actual vibration module



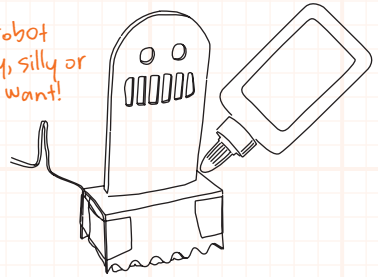
5 Draw and cut out your BristleBot design



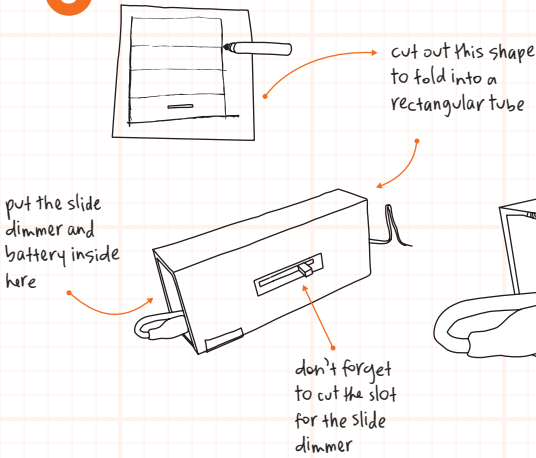
6 Wrap the cardboard base around the bristles and glue or tape in place



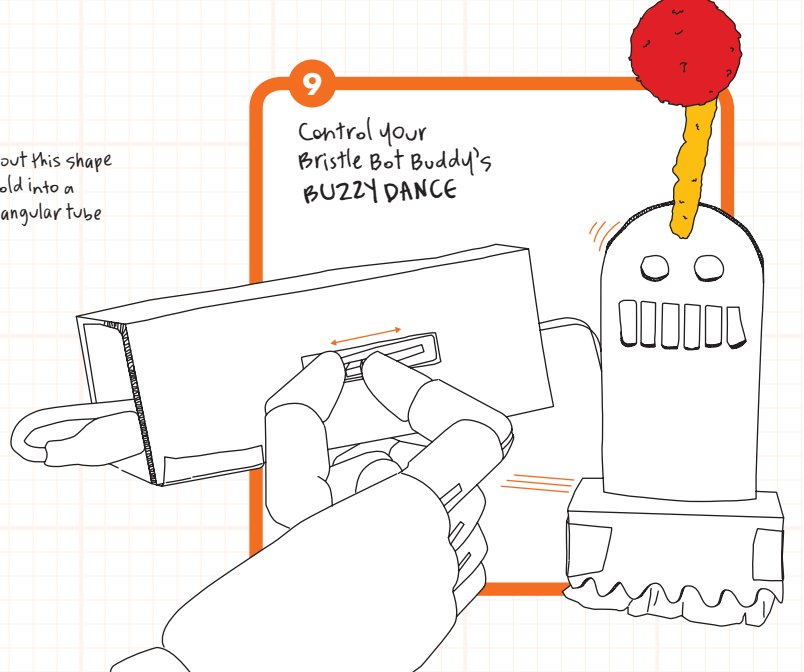
7 Glue the body to the base



8 Make a control box



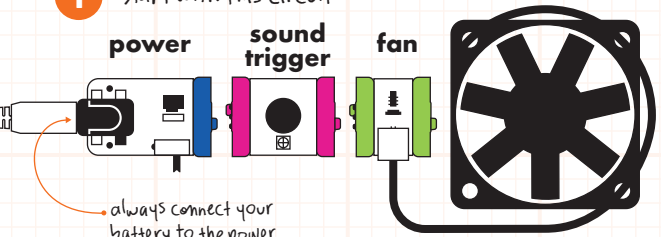
9 Control your Bristle Bot Buddy's BUZZY DANCE



PROJECT 9: Create bubbles with the sound of your voice.

BUBBLE FLUTE

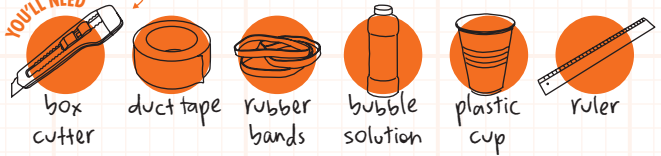
1 Start with this circuit



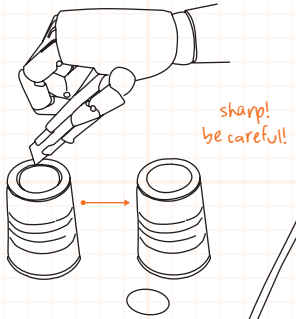
TIME: 60 mins
DIFFICULTY: ●●●○○

STAY SAFE! Always use with an adult.

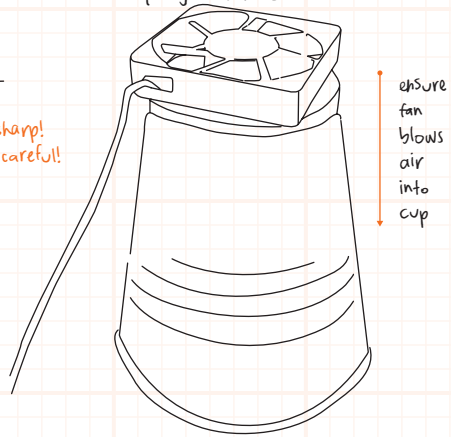
YOU'LL NEED



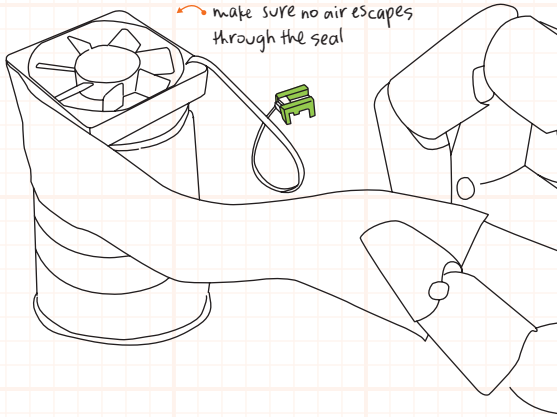
2 Cut a hole in the bottom of the cup



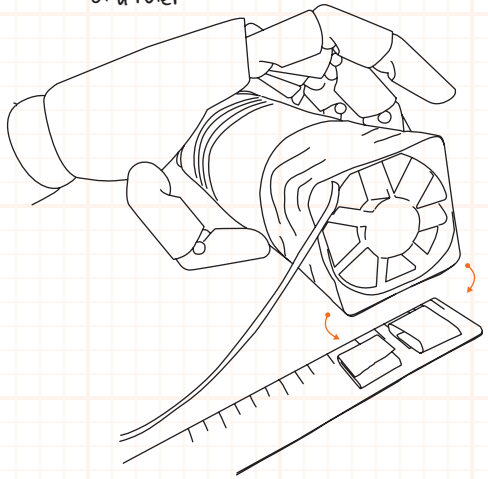
3 Place fan on the hole you just made



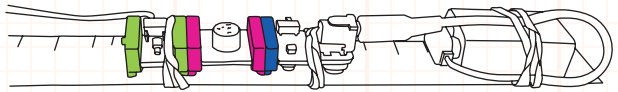
4 Tape in place



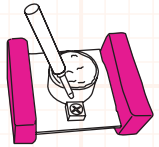
5 Tape to the end of a ruler



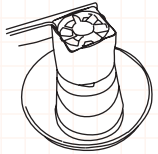
6 Connect Bits modules to other end of the ruler with rubber bands



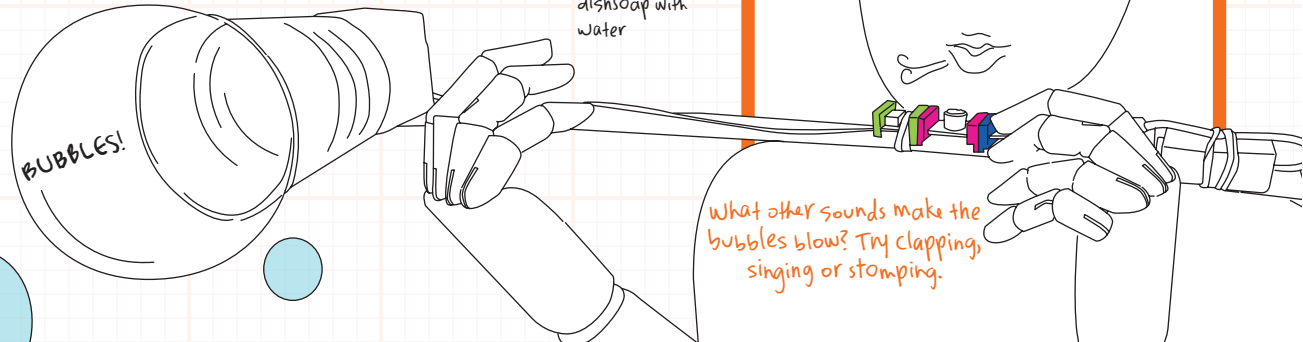
7 Use the screwdriver to adjust the sensitivity of the sound trigger to your liking



8 Dip the rim of the cup in a bowl with bubble solution



PRO TIP: don't have bubble solution? mix dishsoap with water



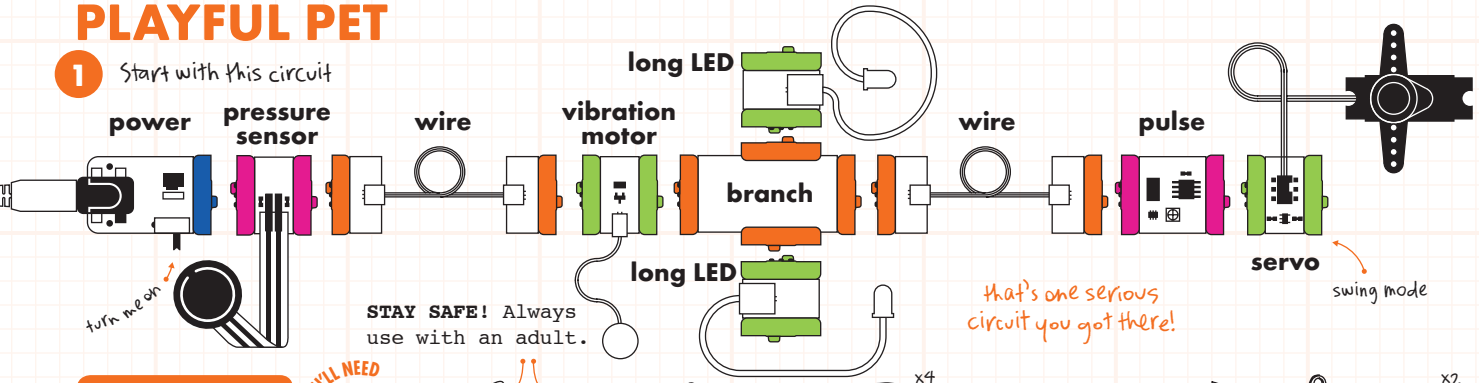
9 Blow into sound trigger and watch the bubbles come out

What other sounds make the bubbles blow? Try clapping, singing or stomping.

PROJECT 10: How can you use littleBits to create your own interactive friend?

PLAYFUL PET

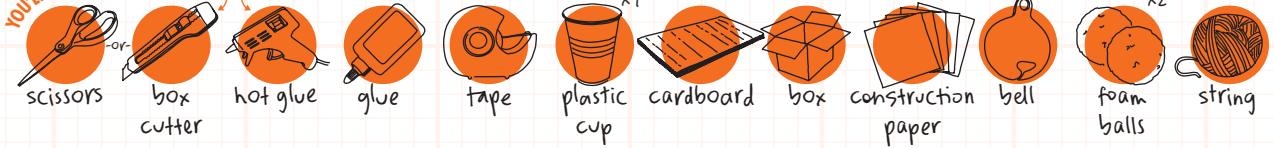
1 Start with this circuit



STAY SAFE! Always use with an adult.

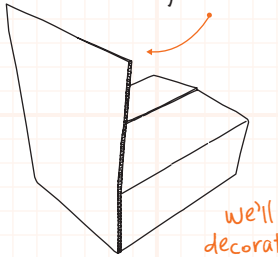
TIME: 2.5 hrs
DIFFICULTY: ●●●●○

YOU'LL NEED

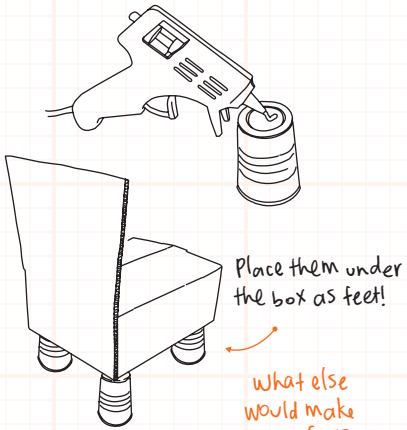


2 Find a box to be the dog's body

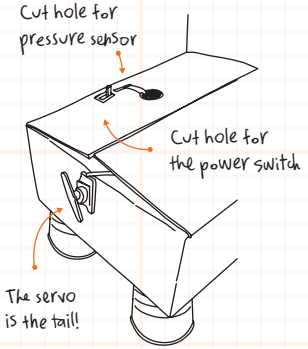
3 Cut piece of cardboard to be the dog's head



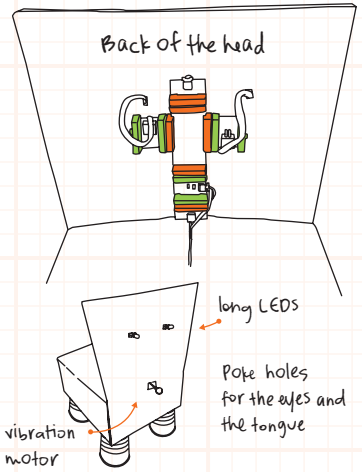
4 Put hot glue on the top of 4 cups



5 Insert littleBits into the dog's body

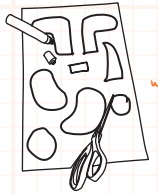


The behind



Front of the head

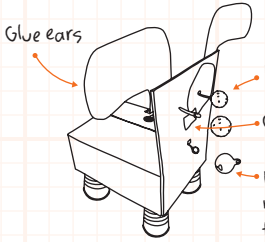
6 Decorate your dog!



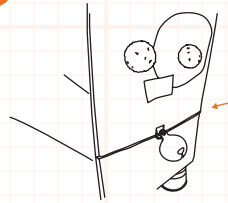
Draw and cut out ears, nose, tail, and spots

sharp! be careful when cutting!

7 Add styrofoam balls and bell

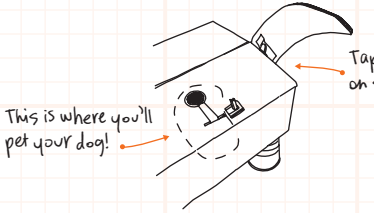


8 Tie string with bell around neck

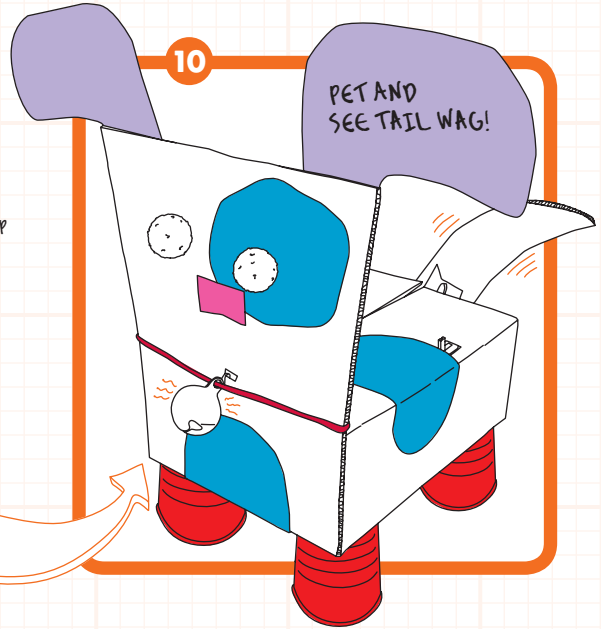


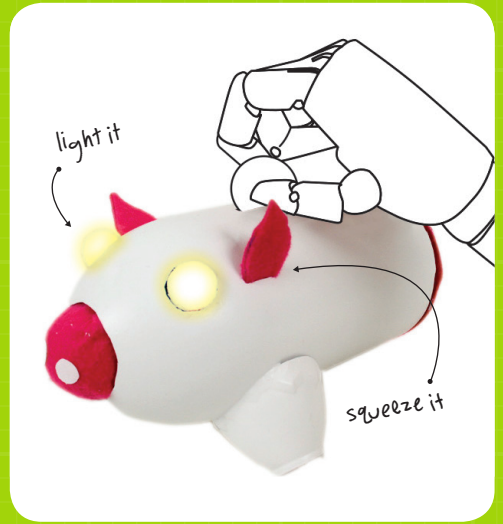
The string will keep the bell in place

9 Add spot of paper over pressure sensor and add tail



10





This booklet's over but the fun's not done.

LITTLEBITS.CC/UPLOAD

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DC motor


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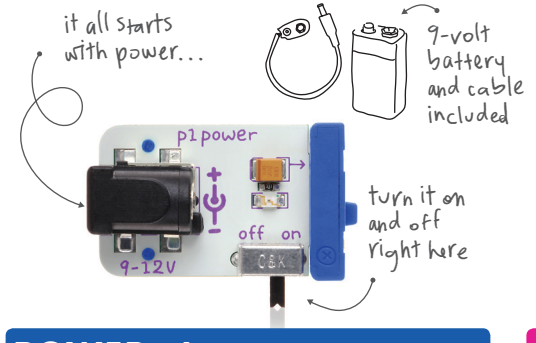
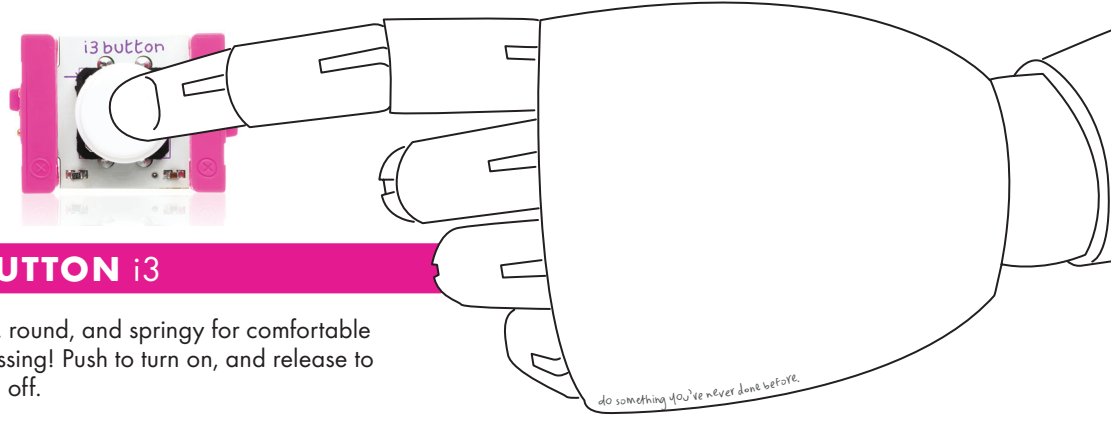
Basic Kit



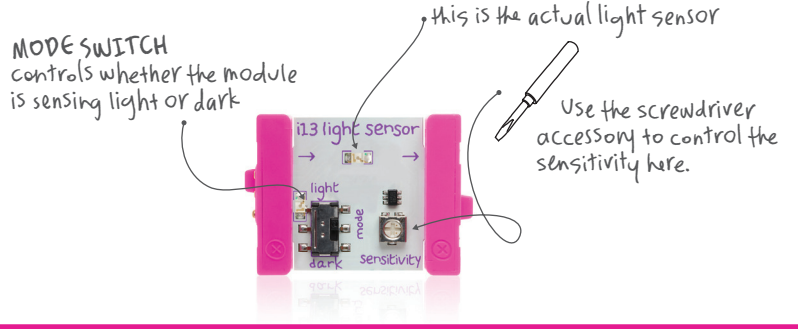
POWER p1

This power module lets you use a 9-volt battery to supply electricity to your littleBits. Snap in the battery + cable (both included) and flip the switch to turn it on.



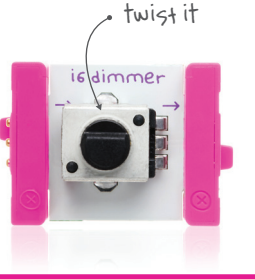
BUTTON i3

Big, round, and springy for comfortable pressing! Push to turn on, and release to turn off.



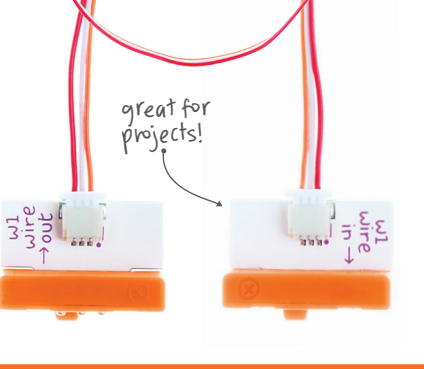
LIGHT SENSOR i13

The light sensor measures how much light is shining on it. In “light” mode, the more light shines on the sensor, the higher the signal it sends out. In “dark” mode, it’s just the opposite – the signal increases the darker it gets.



DIMMER i6

Our dimmer lets you control your creations with a simple knob, just like the volume on your stereo. Turn it clockwise to send more signal to the following Bits modules. Try using it to control the volume of the buzzer or speed of the DC motor.

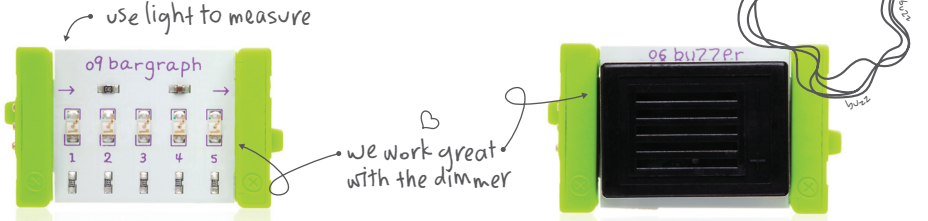


WIRE w1

The wire allows you to physically separate your Bits modules. Try it whenever you need to break up your chain of littleBits, like when you need to put a light at the top of a model building.

BRIGHT LED o14

A small littleBit with a big light, just like a bike light. Like our other LED modules, it's a great way to shed some light on your creations. Choose the bright LED when you want a LOT of bright white light.

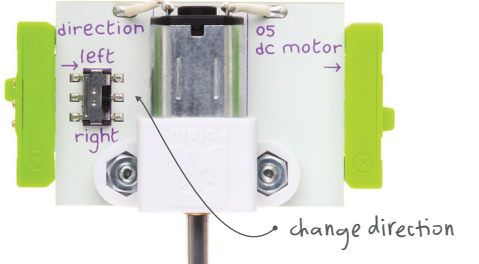


BARGRAPH o9

The bargraph is one of our favorite Bits modules: it has five LEDs in different colors that light up to show you how much signal the module is receiving.

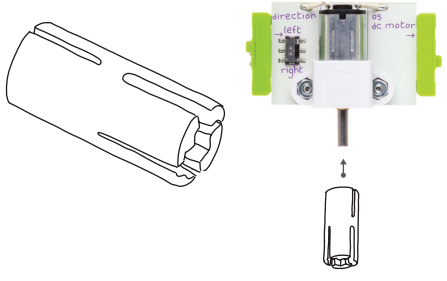
BUZZER o6

The buzzer is like the sound in an alarm clock: it makes a noise that you just can't ignore. It buzzes whenever it gets an ON signal. Try using it to make your own doorbell or alarm!



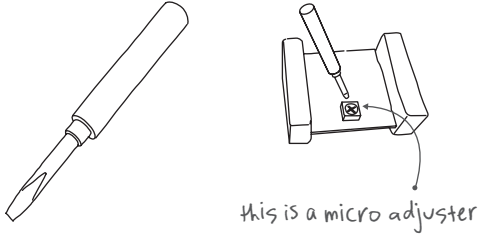
DC MOTOR o5

The DC (or "Direct Current") motor rotates a shaft when you send it an ON signal. The left/right switch controls the direction of rotation. Try attaching various things to make windmills, cars, helicopters, and more.



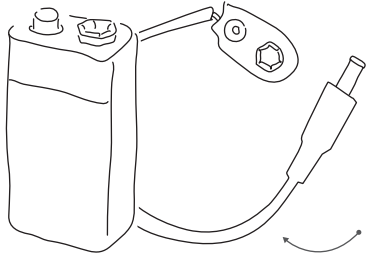
MOTORMATE™ a10

motorMate works with the DC motor. This makes it easy to attach wheels, paper, cardboard, and lots of other materials to the DC motor. Simply slide it on the "D" shape of the shaft. A LEGO™ axle also fits in the end.



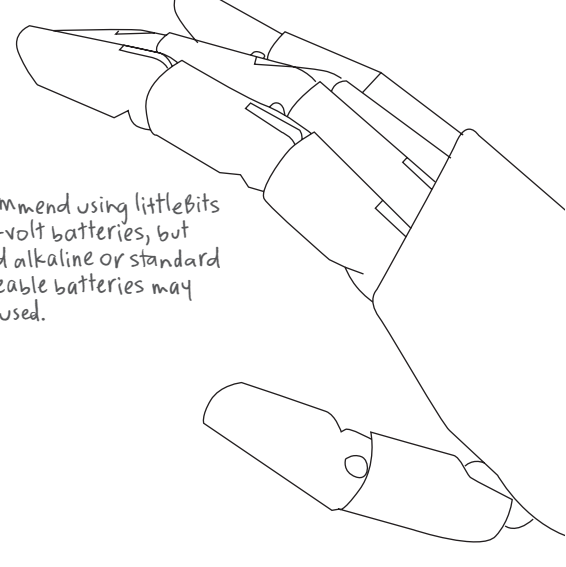
SCREWDRIVER a4

This little purple screwdriver is used to modify any littleBit that has a micro adjuster.



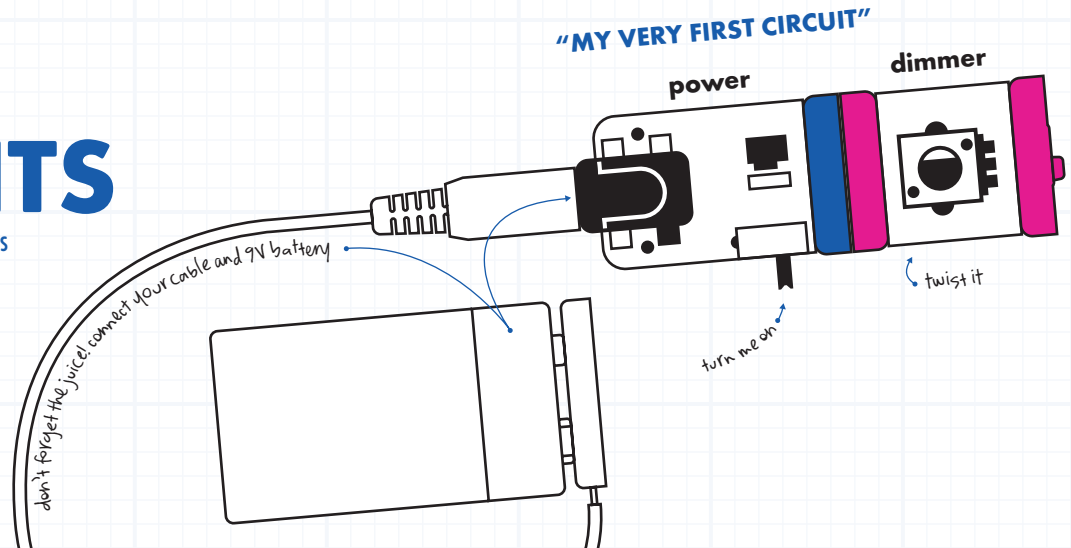
BATTERY AND CABLE a1

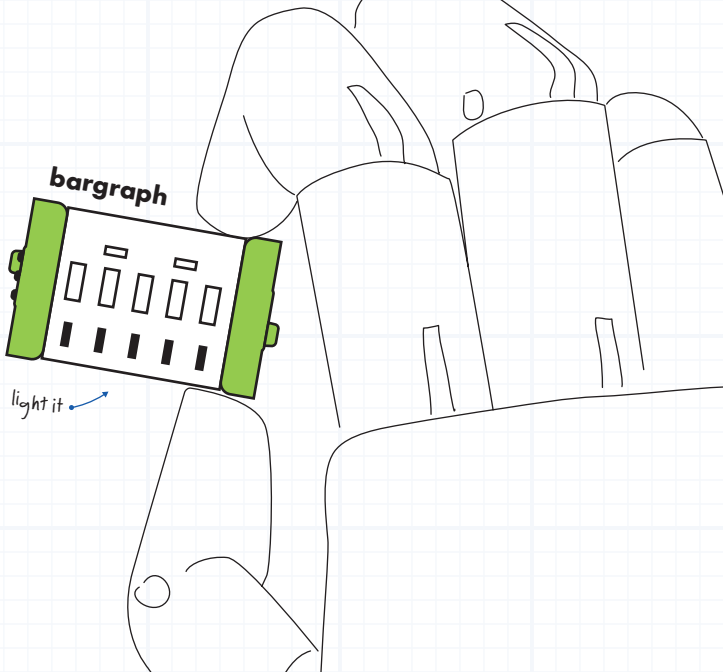
This Kit contains a 9-volt alkaline battery and a cable to connect it to the power module. Connect it and then flip the switch to power all of your creations!



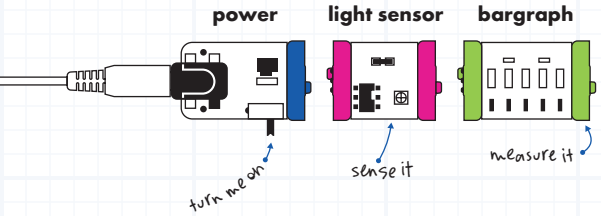
TRY THESE CIRCUITS

Get started with these but don't let us hold you back – every module fits with every other module – feel free to experiment.

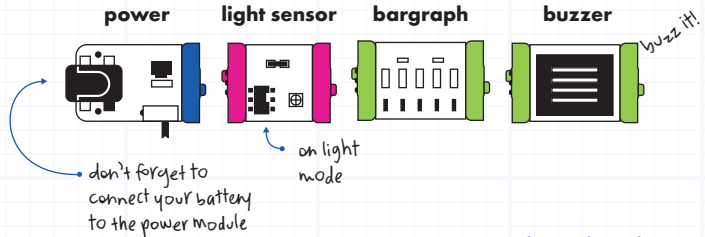




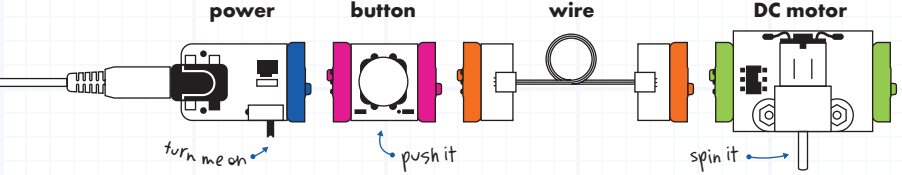
LIGHT METER Measure light around your house.



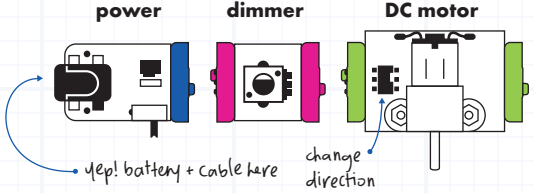
MORNING ALARM Wake up with the sun!



INTRO TO DC MOTOR Get to know the motor.

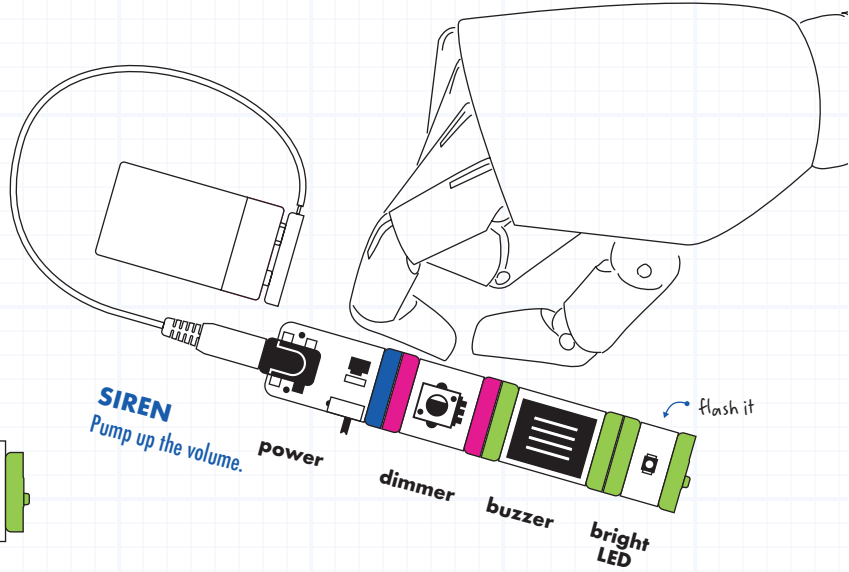


CAR SPEED Speed it up, slow it down.



SIREN

Pump up the volume.



PROJECTS

1 **Tickle Machine**
2 **Prank Handshake**
3 **The Night Rider**
4 **Flashlight**
5 **Art Bot**
6 **Doorbell**
7 **Lil' Breezy**
8 **Three Wheeler**

Tons more projects online
www.littleBits.cc/base

TRY THESE AND INVENT YOUR OWN

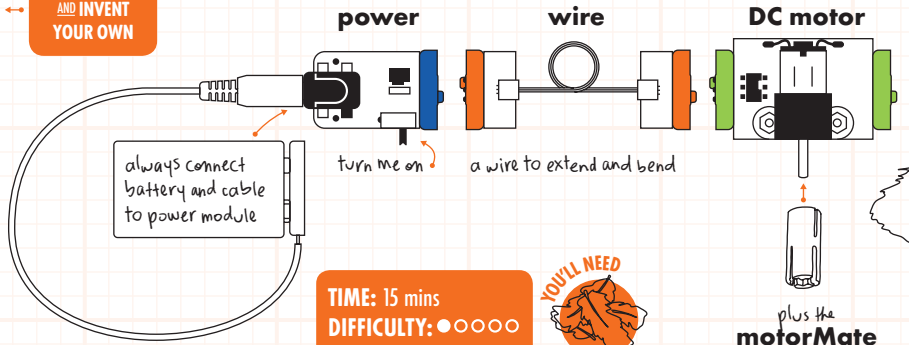
PROJECT 1: How can electronics help spread laughs?

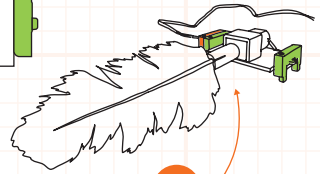
TICKLE MACHINE

TIME: 15 mins
DIFFICULTY: ●○○○○

YOU'LL NEED
feathers

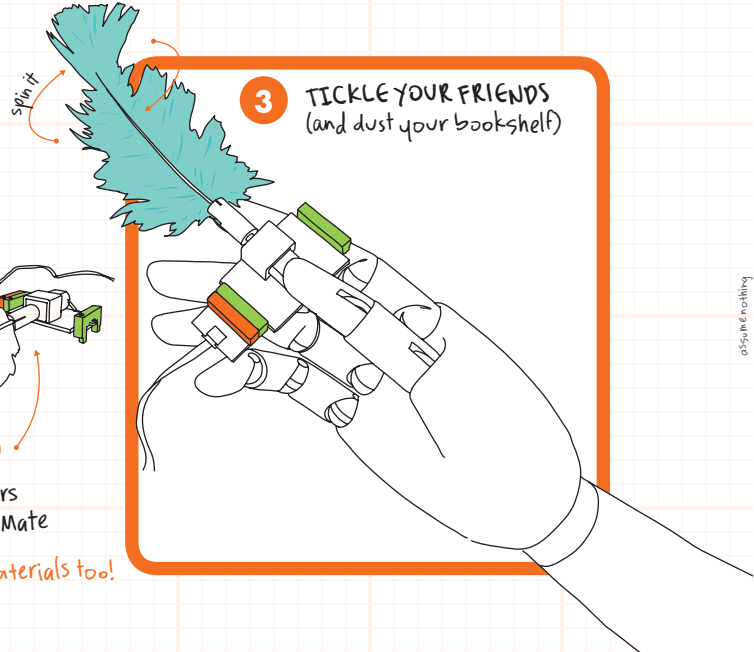
1 Start with this circuit





2 Attach feathers to the motorMate

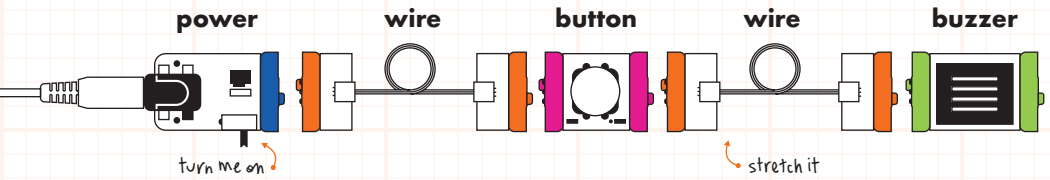
Try other materials too!



PROJECT 2: Want to trick a friend? We'll show you how!

PRANK HANDSHAKE

1 Start with this circuit



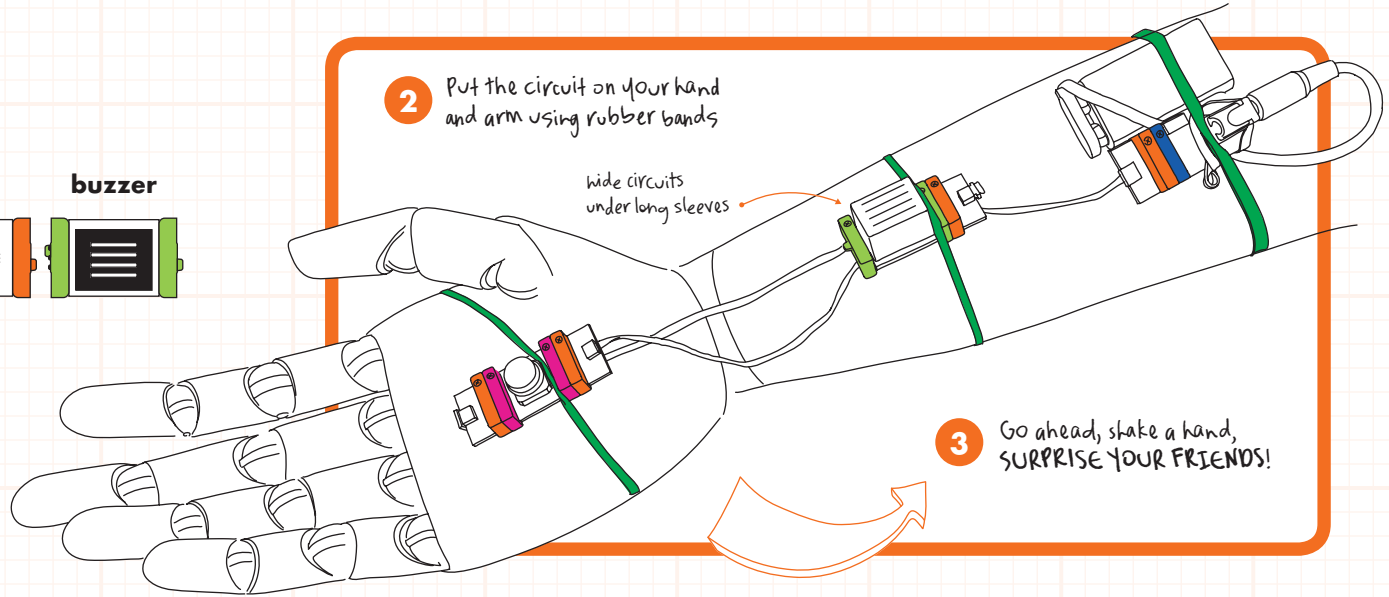
TIME: 15 mins
DIFFICULTY: ●○○○○

YOU'LL NEED

rubber bands

How else can you surprise your friends using littleBits?

2 Put the circuit on your hand and arm using rubber bands



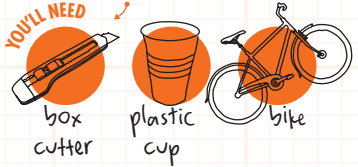
3 Go ahead, shake a hand, SURPRISE YOUR FRIENDS!

PROJECT 3: How can you create a light that only turns on at night?

THE NIGHT RIDER

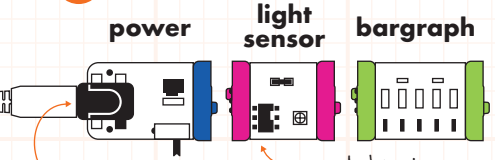
TIME: 30 mins
DIFFICULTY: ●●○○○

YOU'LL NEED

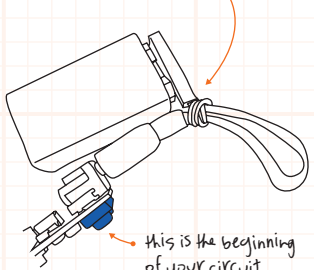


STAY SAFE! Always use with an adult.

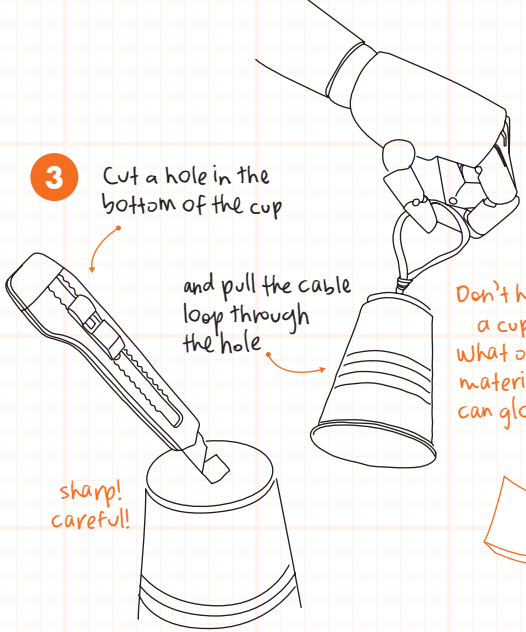
1 Start with this circuit



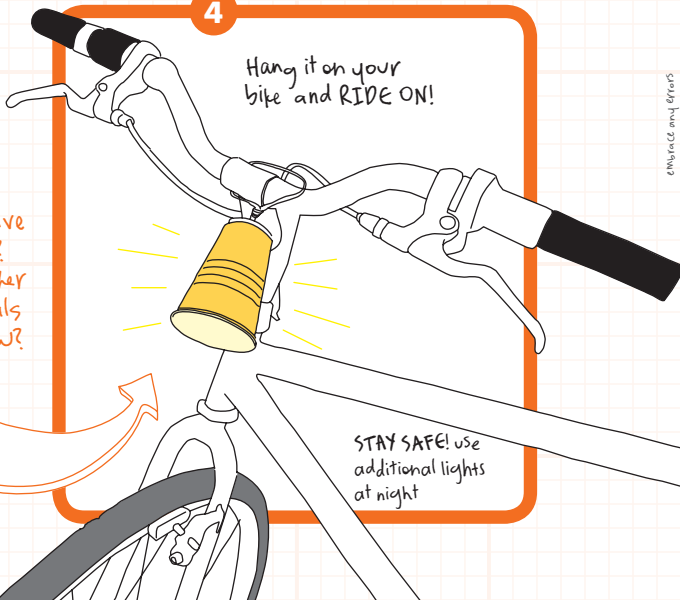
2 Rubber band battery cable in a loop



3 Cut a hole in the bottom of the cup



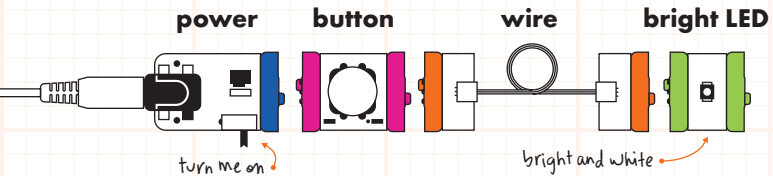
4 Hang it on your bike and RIDE ON!



PROJECT 4: Illuminate your way with household materials.

FLASHLIGHT

1 Start with this circuit



TIME: 30 mins
DIFFICULTY: ●●○○○

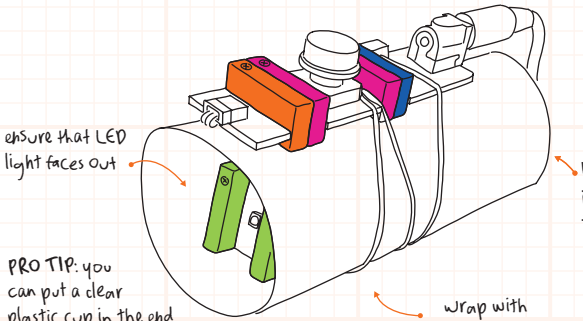
YOU'LL NEED

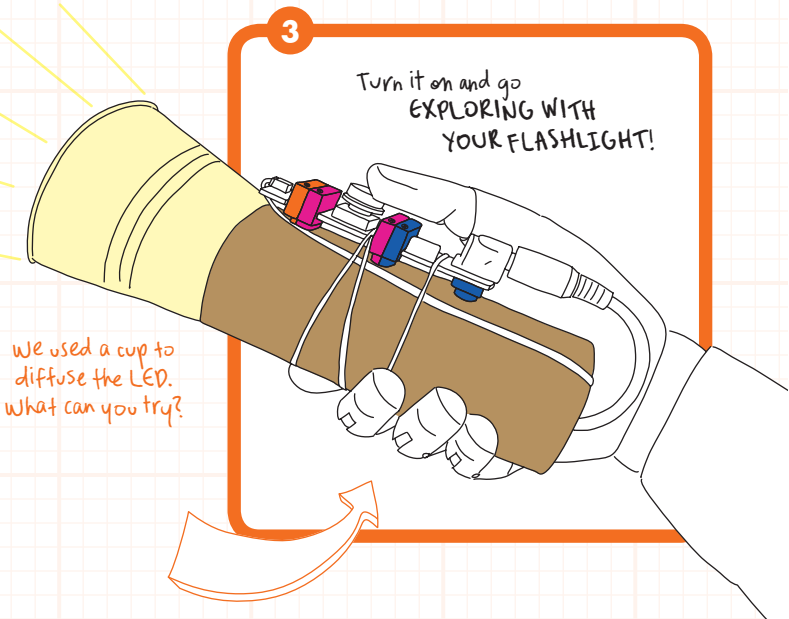

rubber bands


tube


plastic cup

2 Put circuit in tube





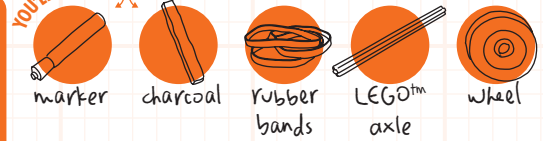
PROJECT 5: How can you build a device to draw for you?

ART BOT

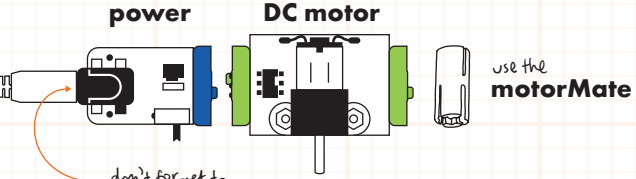
TIME: 30 mins
DIFFICULTY: ●●○○○

YOU'LL NEED

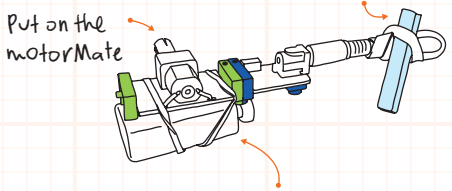
any kind of marking device is fine



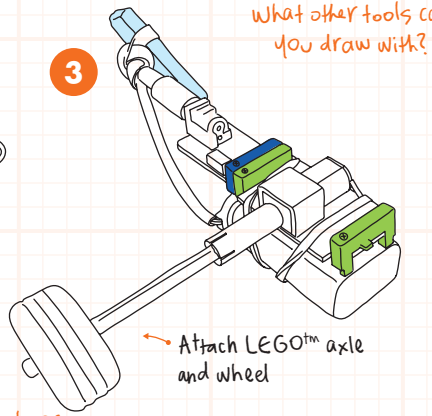
1 Start with this circuit



2 Rubber band together battery cable and insert your charcoal or marker

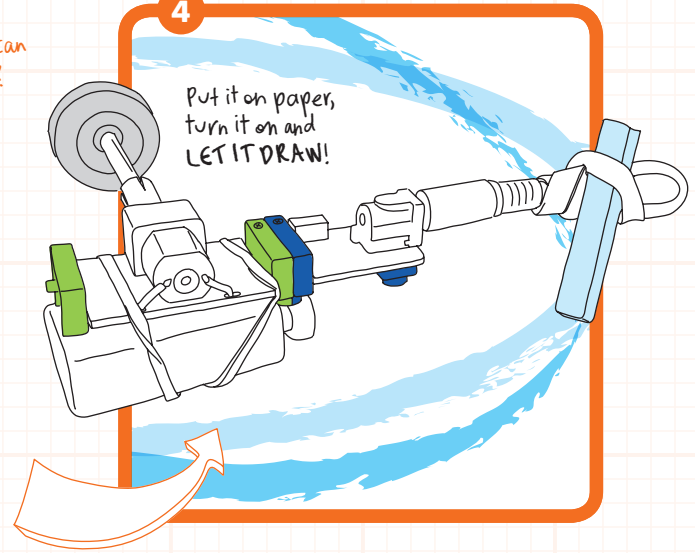


3 What other tools can you draw with?



Don't have an axle or wheel? Make one!

4 Put it on paper, turn it on and LET IT DRAW!



And now a brief intermission from the projects.

VISIT US AT LITTLEBITS.CC/TIPS FOR SOME AMAZING TIPS & TRICKS

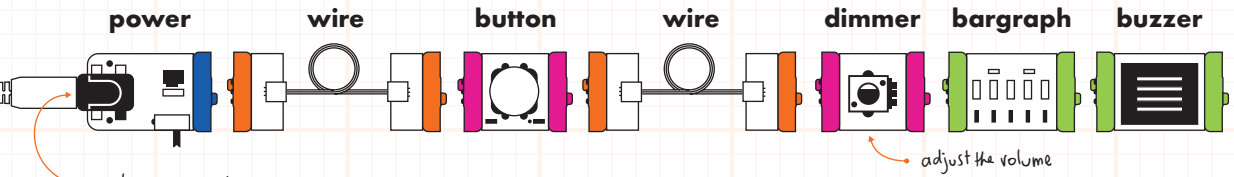
10 ways to decorate your dimmer... Play with your food by attaching it to the DC motor... You are a musician! Learn the mystical art of playing the buzzer... Find out why the wire is the second most important littleBit... 12 ways to diffuse the bright LED... bitFeet™ + cardboard – 5 different attachment techniques... Don't throw that away! It could transform your next project... What household item enhances any lighting project? We'll show you... 6 things you didn't know about the button... What do a buzzer and a baby have in common? We'll show you... 3 ways to get over your fear of the dark (hint: use the light sensor!)... How many wires would it take to circle the globe? Find out!

PROJECT 6: Deck out your bedroom door.

DOORBELL

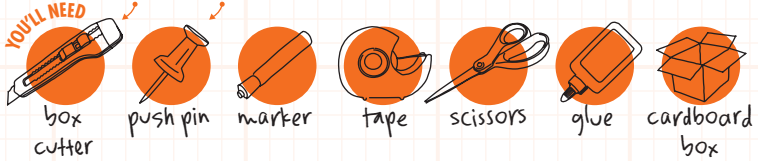
TIME: 60 mins
DIFFICULTY: ●●●○○

1 Start with this circuit

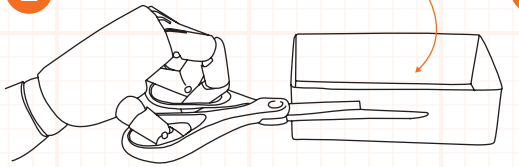


STAY SAFE! Always use with an adult.

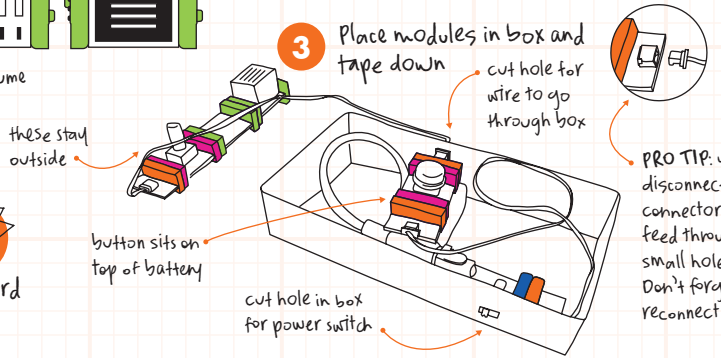
YOU'LL NEED



2 Find a box and cut the bottom off

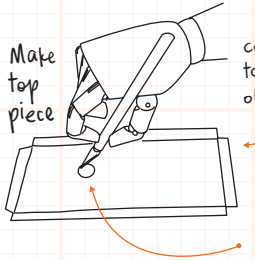


3 Place modules in box and tape down

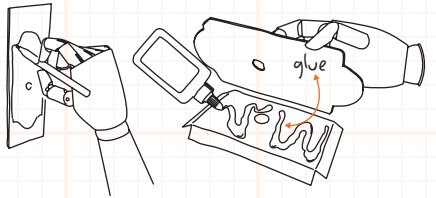


PRO TIP: you can disconnect the connector to feed through small holes. Don't forget to reconnect it!

4 Make top piece

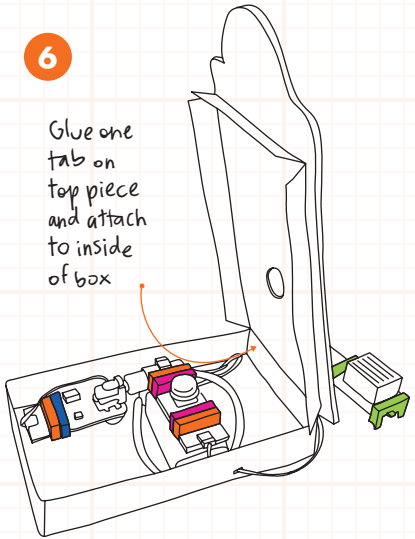


5 Cut out decorative doorbell shape and glue to top piece



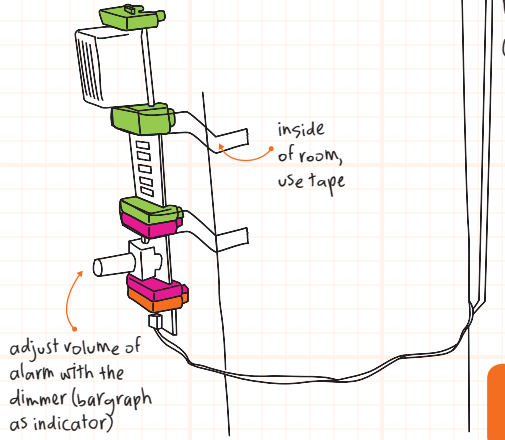
6

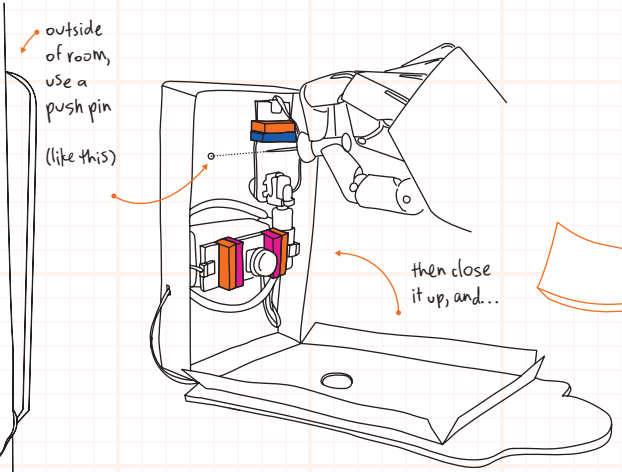
Glue one tab on top piece and attach to inside of box



7

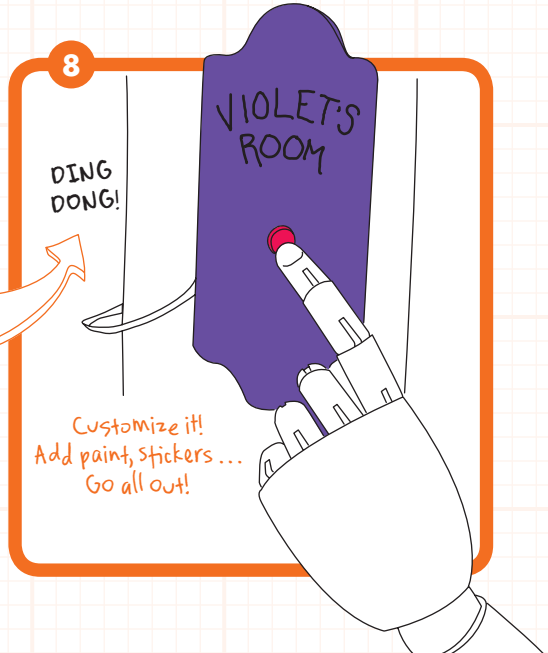
Place doorbell outside door and rest of Bit modules inside room





We'd like to see your take on the doorbell project, upload it here! littleBits.cc/upload

8

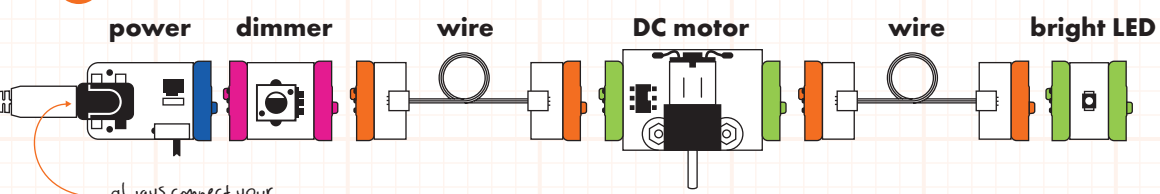


PROJECT 7: Make your own spinning windmill.

LIL' BREEZY

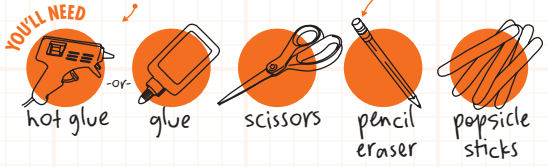
TIME: 90 mins
DIFFICULTY: ●●●○○

1 Start with this circuit

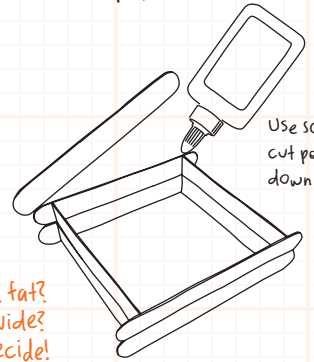


STAY SAFE! Always use with an adult.

YOU'LL NEED



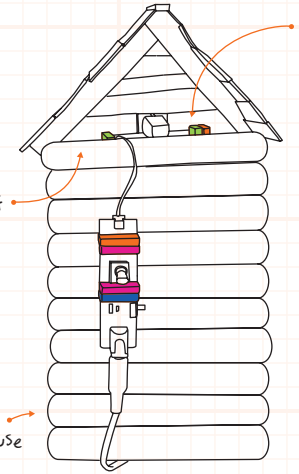
2 Make a house out of popsicle sticks

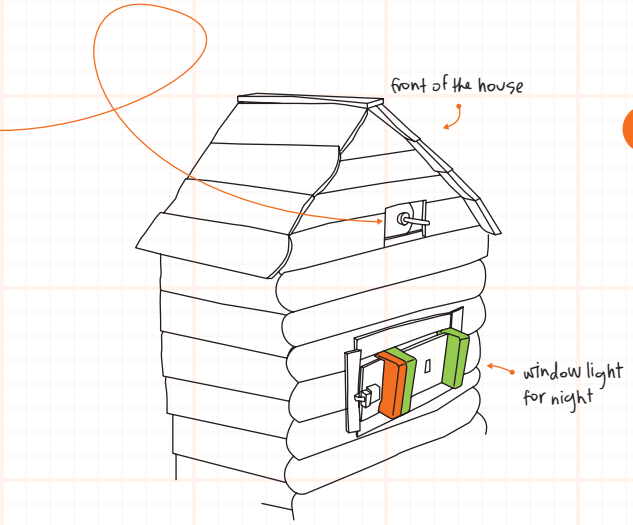


Use scissors to cut popsicle sticks down to size

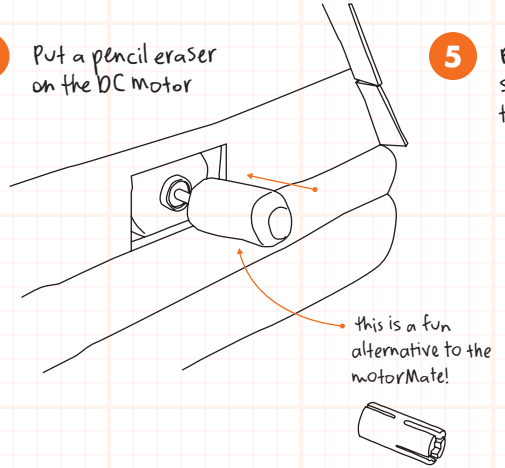
short? fat? tall? wide? you decide!

3 Put the littleBits in your house

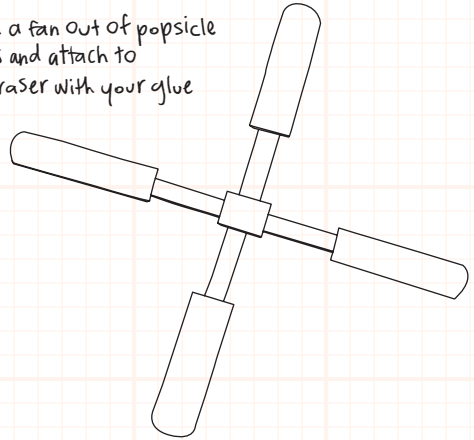




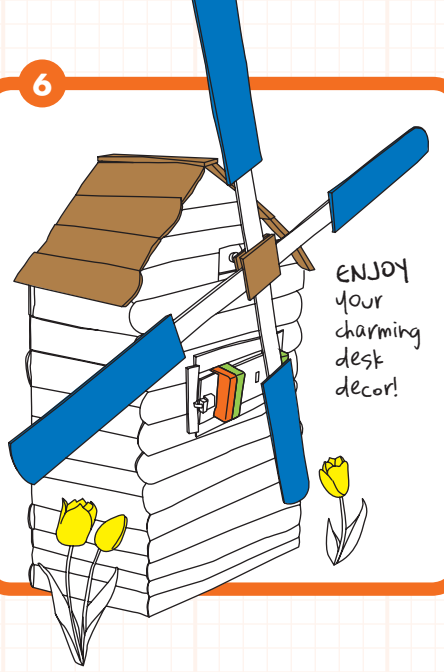
4 Put a pencil eraser on the DC motor



5 Build a fan out of popsicle sticks and attach to the eraser with your glue



6

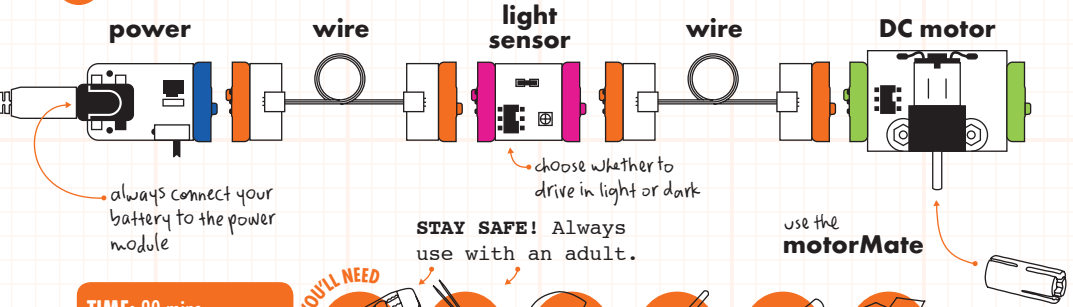


PROJECT 8: Learn how to make a light-controlled vehicle.

THREE WHEELER

See this tutorial with video extras at littleBits.cc/base

1 Start with this circuit

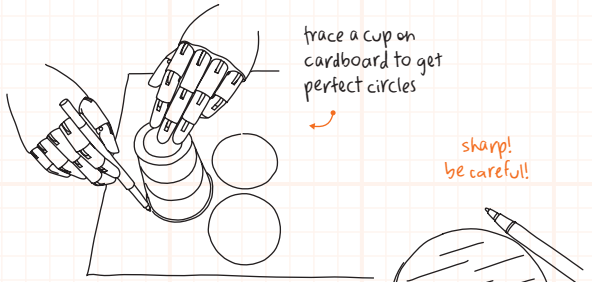


STAY SAFE! Always use with an adult.

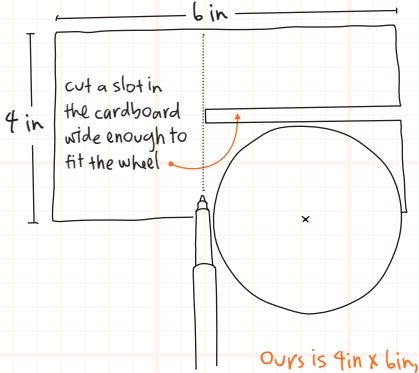
TIME: 90 mins
DIFFICULTY: ●●●●○

YOU'LL NEED

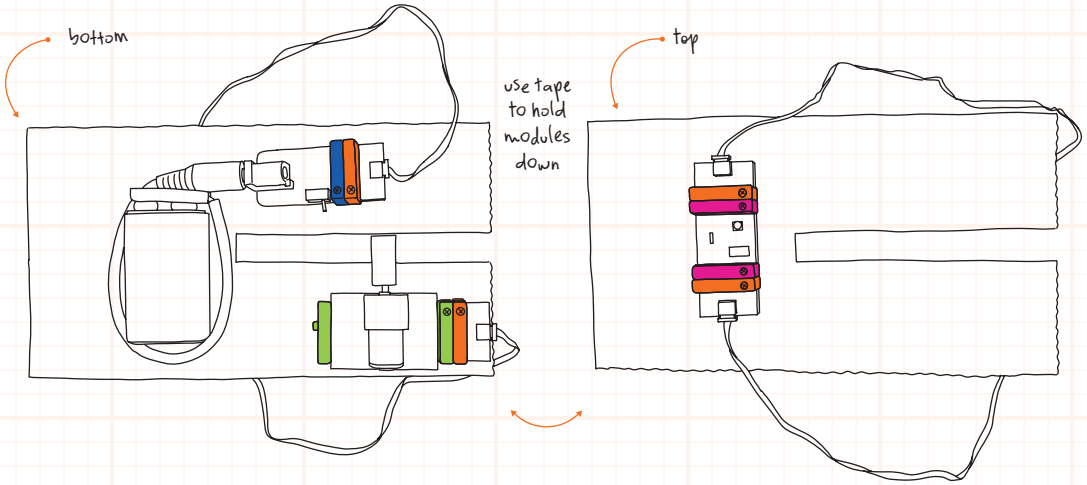
2 Make 3 wheels



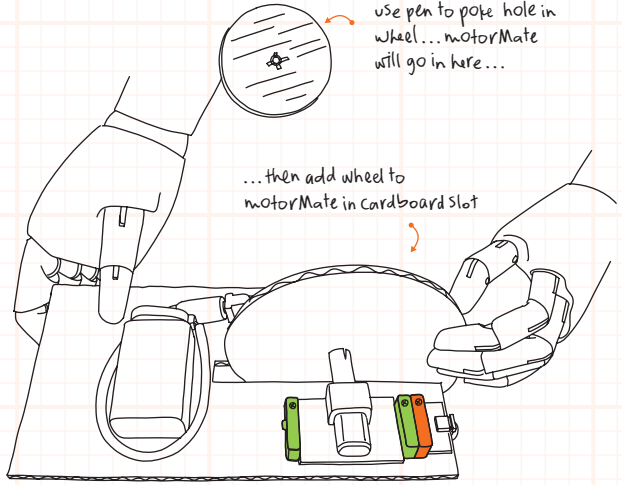
3 Make the base out of cardboard



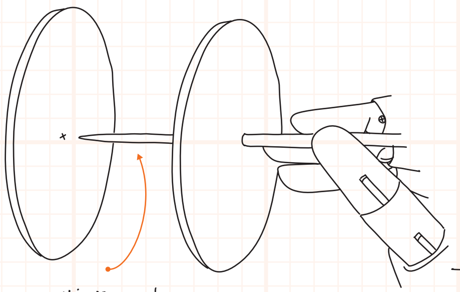
4 Put littleBits on cardboard base



5 Add wheel to motorMate



6 Poke skewer through two remaining wheels and glue them in place, these will be the back two wheels

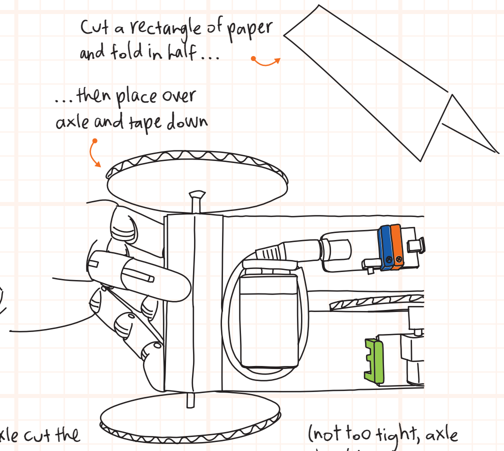


this is an axle

7 Attach back wheels

Cut a rectangle of paper and fold in half...

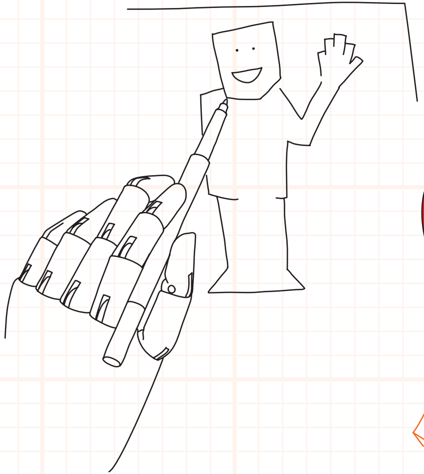
...then place over axle and tape down



after you've made the axle cut the points off the ends of the skewers

(not too tight, axle should still spin)

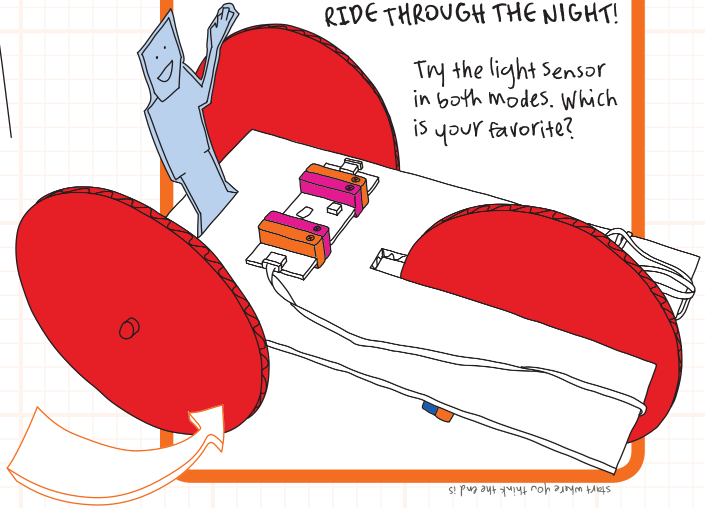
8 Draw yourself and cut the figure out



9

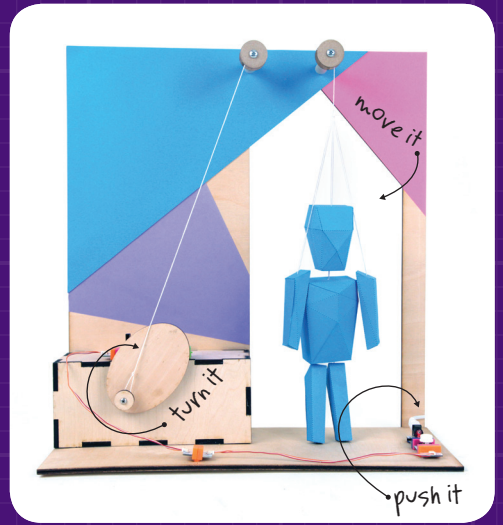
RIDE THROUGH THE NIGHT!

Try the light sensor in both modes. Which is your favorite?



start where you think the end is


MAKE SOMETHING THAT DOES SOMETHING™



This booklet's over but the fun's not done.

LITTLEBITS.CC/UPLOAD

Upload your project and you may be handsomely rewarded. We regularly feature awesome community projects and send out exclusive gifts.

Visit us online where we've got tons more projects and tips and tricks for every Bits module. Check out other littleBits in the expanding library.

Online we'll show you how to make this great PUPPET MASTER
www.littleBits.cc/puppet
and
TONS MORE PROJECTS at
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THE SCREAMING FANS. THE FLOOD OF LIGHTS. THE ONSTAGE RUSH. littleBits AND KORG WANT YOU TO

UNLEASH YOUR INNER ROCK STAR.

⚠ WARNING

• This product contains small magnets. Swallowed magnets can stick together across intestines causing serious infections and death. Seek immediate medical attention if magnets are swallowed or inhaled.
• Most littleBits modules are small parts. DO NOT allow children under 3 years old to play with or near this product.
• NEVER connect any littleBits modules or circuits to any AC electrical outlet.
• Do not touch or hold any moving parts of littleBits modules while they are operating.
• Keep conductive materials (such as aluminum foil, staples, paper clips, etc.) away from the circuit and the connector terminals.
• Always turn off circuits when not in use or when left unattended.
• Never use littleBits modules in or near any liquid.
• Never use in any extreme environments such as extreme hot or cold, high humidity, dust or sand.
• littleBits modules are subject to damage by static electricity. Handle with care.
• Some littleBits modules may become warm to the touch when used in certain circuit designs. This is normal. Rearrange modules or discontinue using if they become excessively hot.
• Discontinue use of any littleBits modules that malfunction, become damaged or broken.

VERY IMPORTANT NOTE

• Several projects in this kit involve the use of a box cutter and/or a hot glue gun.
• These tools should be used ONLY under direct adult supervision and ONLY by children capable of using them safely.

INSTRUCTIONS

We recommend using littleBits brand 9-volt batteries, but standard alkaline or standard rechargeable batteries may also be used. Properly discard and replace exhausted battery. Do not connect the two battery terminals with any conducting material.

CARE AND CLEANING

Clean Bits modules ONLY by wiping with a dry cloth. If necessary, isopropyl alcohol on a cloth may be used sparingly.

DO NOT use any other cleaning products on Bits modules. Congratulations for reading this fine print. Your dedication and persistence will serve you well.

FC RADIO AND TELEVISION INTERFERENCE

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
• Reorient or relocate the receiving antenna.
• Increase the separation between the equipment and the receiver.
• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
• Consult the dealer or an experienced radio/TV technician for help.

Changes and modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commissions rules.

SEND US YOUR LOVE

Contact support@littleBits.cc with any questions or comments.

www.littleBits.cc

littleBits Electronics, Inc.
60 E. 11th Street, Fifth Floor
NY, NY 10003
(917) 464-4577

You are a proud owner of the **Synth Kit v1.**
Over 500,000 combinations?! Are you serious?
Yep, www.littleBits.cc/mathmagic

An open source project under Creative Commons license ⓒ and OSHW definition v1.1

Design and engineering by KORG Inc., Japan and littleBits Electronics, Inc. New York. Made in Dongguan City, CHINA for littleBits Electronics, Inc. New York.

littleBits, Bits, Circuits in Seconds, and Make Something That Does Something are trademarks of littleBits Electronics, Inc.


MAKE SOMETHING THAT DOES SOMETHING™

LITTLEBITS™ BASICS

1 CIRCUITS IN SECONDS™

littleBits™ makes an expanding library of modular electronics that snap together with magnets.

You always need a Blue and a Green, Pink and Orange are optional, in between

2 COLOR CODED

Bits™ modules are grouped into four different categories, which are color coded:

POWER is needed in every circuit and the start of all your creations.

INPUT modules accept input from you and the environment and send signals to the modules that follow.

OUTPUT modules DO something–light, buzz, move...

WIRE modules expand your reach and change direction–great for helping to incorporate modules into your projects.

3 ORDER IS IMPORTANT

Power Modules always come first and **Input Modules** only affect the **Output Modules** that come after them.

4 MAGNET MAGIC

littleBits™ modules snap together with magnets. The magnets are always right, you can't put modules together the wrong way.

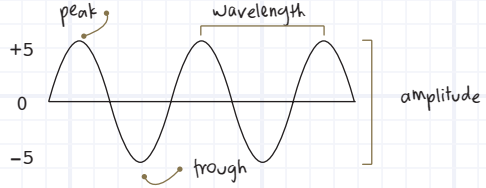
5 littleBits™ + anything

The modules are just the beginning. Combine them with craft materials, building sets, and other toys to electrify your life. We'll show you how!

no soldering
no programming
no wiring

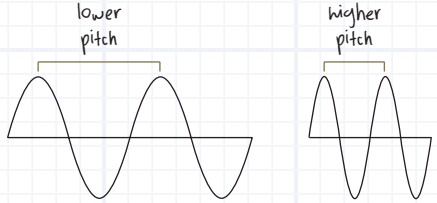
WHAT IS SOUND?

Sound is the vibration of air or another medium (like water). When you speak, sing, or clap, you create sound waves that radiate out into the environment. Every sound has its own "signature" that is called a waveform.



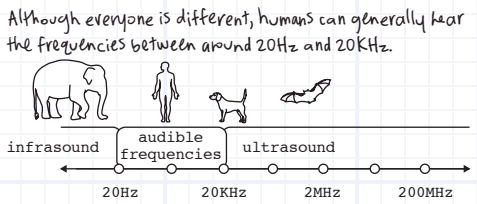
PITCH

Pitch is how a person perceives the frequency of a vibration. Every person perceives pitch differently and some have a better sense of pitch than others. Sound can generally be categorized as pitched or un-pitched.



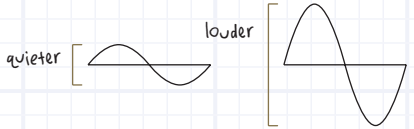
PITCH VS. FREQUENCY

Frequency and pitch are similar, but not the same! Frequency can be measured scientifically, while pitch is dependent on individual perception. You can distinguish pitches as being "higher" or "lower."



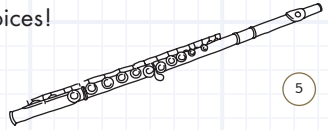
AMPLITUDE

Amplitude relates to the change in the peaks of waveforms and is perceived as the loudness of a sound. The higher the amplitude of a waveform, the louder it sounds.



TIMBRE

Timbre (pronounced tam-ber) is what differentiates sounds of the same pitch. It is what makes a violin and a flute sound different... or your friends' voices!



HISTORY OF THE SYNTH

THEREMIN - first electronic musical instrument.

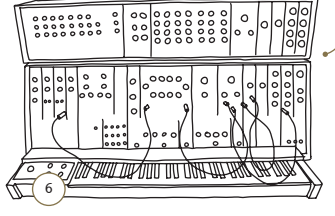
Film score for FORBIDDEN PLANET see pg 23

SWITCHED ON BACH see pg 13

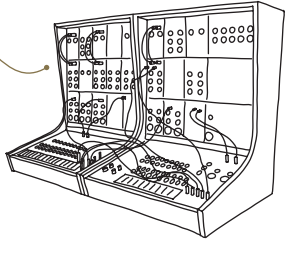
KORG MS-20 introduced.

Sounds were created digitally. Most famous was the Yamaha DX7, which used FM synthesis.

then | 50 | 60 | 70 | 80 | 90 | 00 | now



ROBERT MOOG and DON BUCHLA began producing the first commercial musical synthesizers.



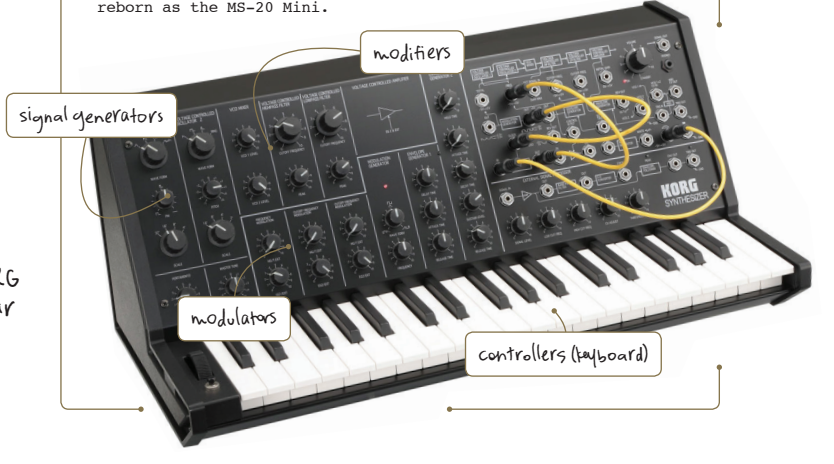
Synthesis dominated by computer interfaces.

Rebirth of analog modular synths.

littleBits + KORG launch modular Synth Kit!

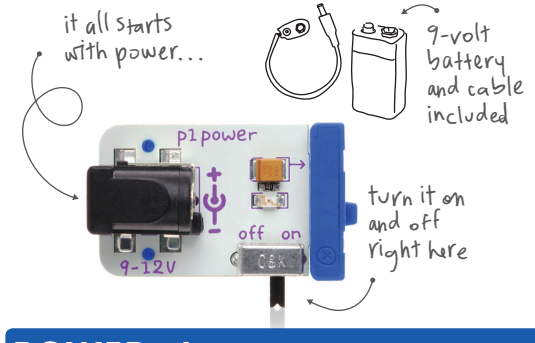
ELEMENTS OF A SYNTH

Korg's MS-20 synthesizer, first introduced in 1978, is still a coveted instrument to this day; thanks to its thick, robust sound, its powerful, iconic analog filter, and its versatile patching options. Today, the sounds of the MS-20 have been reborn as the MS-20 Mini.



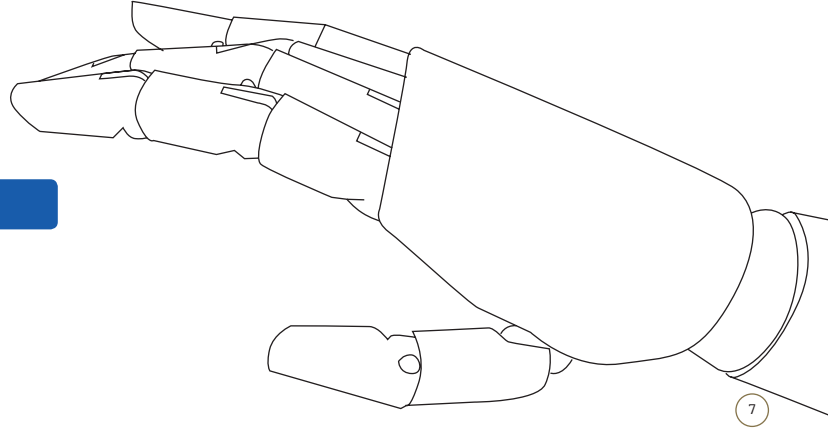
KNOW YOUR BITS™ MODULES

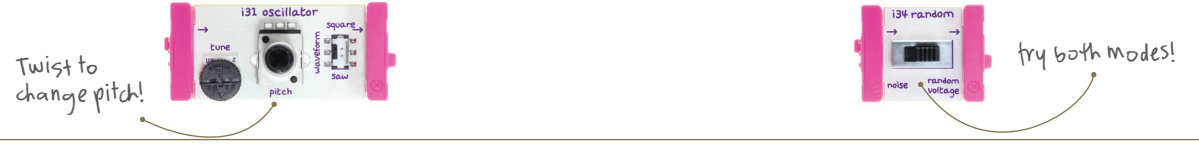
This is the Synth Kit, Version 1
Learn more and shop for individual
Bits modules at littleBits.cc/Bits



POWER p1

This power module lets you use a 9-volt battery to supply electricity to your other Bits modules. Snap in the battery + cable (both included) and flip the switch to turn it on.





OSCILLATOR i31

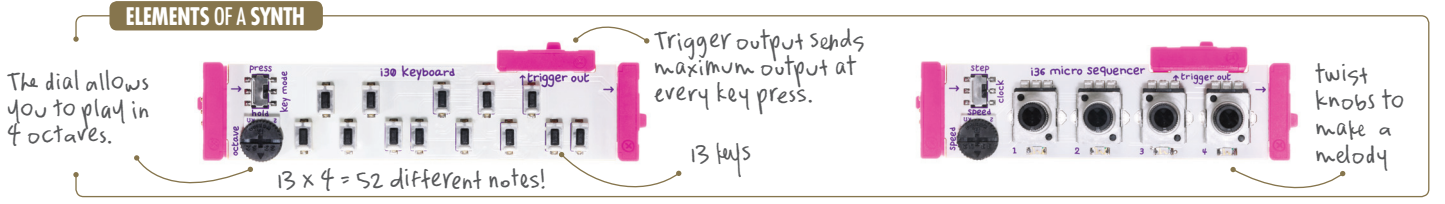
The oscillator is the main sound source in the Synth Kit and is capable of creating audio tones that will be used in almost every sound experiment you create. It features a "pitch" knob to adjust its output tone and a "tune" dial for adjusting the tuning (learn about tuning on pg 21) when using with the keyboard. It also features a mode switch that selects between "square" and "saw" waveforms. The "square" waveform has a rich, powerful character, and the "saw" waveform has a more mellow, rounder character.

RANDOM i34

The random module has two modes: "noise" and "random voltage". In "noise" mode, it outputs white noise, like a television set not tuned to any channel. In "random voltage" mode, it outputs random voltage signals that can control oscillators and make them play random pitches. The "trigger out" of the micro sequencer can be used to set the timing of the random voltages.

SIGNAL GENERATORS

In a synthesizer, these elements are known as signal generators and can be either pitched or un-pitched. In the Synth Kit, you have both (oscillator & random). These are the modules that actually produce the sound.



KEYBOARD i30

The keyboard lets you play melodies – it features 13 switches that make up an octave of notes. It has two modes: "press" (which only produces output when you press a switch) and "hold" (which will sustain the last note you played). It also features an octave control which changes the playable range. In addition to its main output, which is great for controlling our oscillators, it also has a "trigger out", which you can send to the "trigger in" of the envelope or other littleBits modules.

MICRO SEQUENCER i36

The micro sequencer sends out voltages based on the position of each of the four "step" knobs. Connect it to an oscillator and it will step through the "sequence" consecutively to make a melody (The LEDs tell you which step is active). Turn a knob fully counterclockwise to make the step silent. Use the module in "speed" mode to set the speed using the dial, or flip the switch to "step" mode to use an input module like a pulse or button for control. It also has a trigger output, which you can send to any of your other modules.

CONTROLLERS

Controllers do exactly what it sounds like they do; they control elements of a synthesizer. Sometimes controllers are familiar like a keyboard and some are lesser known like a sequencer. The Synth Kit has both!

The control can come in the form of control voltages or triggers. A control voltage is usually a changing signal that is often used to control the pitch of an oscillator. A trigger is a short voltage pulse that is commonly used to trigger or "turn on" other parts of circuits. Triggers are also good at generating rhythmic patterns.

To see how triggers are used, go to page 24 for the Percussion Party project.

ELEMENTS OF A SYNTH

Attack = time to reach loudest point

Decay = time to return to silence

ENVELOPE i33

The envelope modifies the loudness contour of a sound. It takes a sound input and shapes it into something you'd hear from an acoustic musical instrument, like a piano or saxophone. This envelope has two controls: "attack", which is how long it takes to ramp up to maximum volume, and "decay", which is how long it takes to fade to silence again. You can use its third bitSnap™ to trigger the envelope from different sources, like the keyboard.

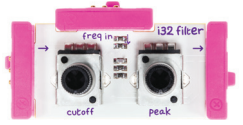
MODULATORS

Modulators are elements of a synthesizer that alter the main audio signal with another signal. In the synth Kit, they are the oscillator, envelope and random modules.

Even though the oscillator is a signal generator, it can also be used as a modulator. You can turn the pitch knob fully counterclockwise to produce frequencies low enough to control other modules.

When the random module is in "random voltages" mode, it is also a modulator.

ELEMENTS OF A SYNTH



Cutoff = set limit for frequencies

Peak = set intensity of cutoff

FILTER i32

The filter has the biggest effect on the sound's character or "timbre". It affects the timbre by changing the relative volume of certain frequencies in the sound. Use it to give the impression that a sound is "brighter" (more high frequencies) or "darker" (more low frequencies.) The "cutoff" knob sets the frequency to be emphasized, and the other controls "peak," or intensity of the filter. If the "peak" is turned up all the way, the filter turns into an oscillator!

create spacey echoes!

DELAY i35

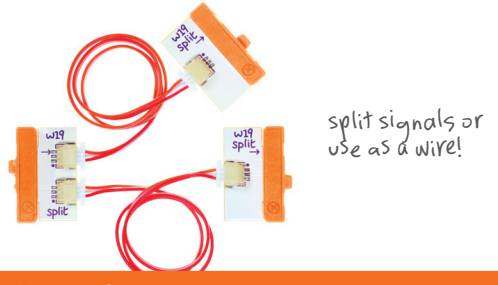
The delay module takes incoming audio and repeats it, like an echo. It has two knobs: "time", which sets the delay length between a sound and its repetition, and "feedback", which controls how many times the sound repeats. Delays can be long and spacey, like shouting into the Grand Canyon, or loud and crazy. This module will play forever if you turn the "feedback" knob all the way up. You can also shift the pitch of a sound by turning the "time" control while a sound is repeating.

MIX i37

The mix module allows you to combine two inputs and send them to a single output. It also has a volume control for each of its inputs – that's where the mixing comes in. Use it to play two oscillators on a single speaker!

MODIFIERS

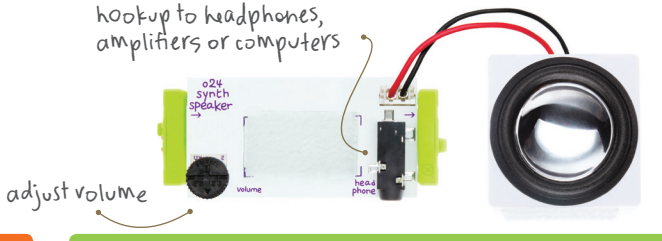
Modifiers are synthesizer elements that directly affect the sound of the signal generator. They can either reduce or enhance characteristics of sound and manipulate waveforms (filter, delay, and mix modules).



split signals or use as a wire!

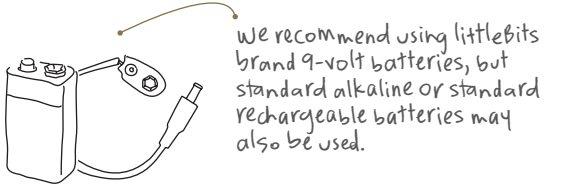
SPLIT w19

The littleBits split module sends a single input to two wired outputs. It's great for connecting one output to two inputs, like using a keyboard to control two oscillators. But keep in mind that it can be used just like a wire module if you ignore one of its outputs.



SYNTH SPEAKER o24

The synth speaker amplifies your sonic explorations! You can control the volume with a dial on the front of the module. It also features an output jack. Use an audio cable to connect to headphones or a computer for recording, or to an amplifier for a show. The speaker can detach from the circuit board, so you can orient it to your liking.

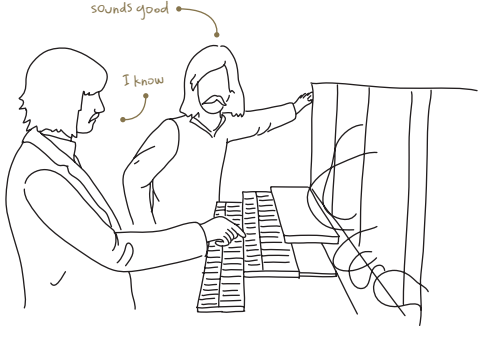


We recommend using littleBits brand 9-volt batteries, but standard alkaline or standard rechargeable batteries may also be used.

BATTERY AND CABLE a1

This Kit contains a 9-volt alkaline battery and a cable to connect it to the power module. Connect it and then flip the switch to power all of your creations!

SYNTH IN POP CULTURE



IN 1968, **Wendy Carlos** a pioneer in electronic music recorded the landmark album **"Switched-On Bach"**, which consisted of pieces by Johann Sebastian Bach performed on a synthesizer. "Switched-On Bach" was one of the first classical albums to sell half a million copies. The album won 3 Grammy Awards. **FORMED IN 1970**, **Kraftwerk**, which means "power station" in German, built the foundation of the electro-pop genre with their revolutionary synth sound. The band and its members are recognized as pioneers in music technology. Kraftwerk is credited with making machine made sounds commercially appealing and an integral part of pop music. Their studio, "Kling Klang", was a place where the band not only recorded music, but also invented and built their own complex electronic instruments. **FORMED IN 1965**, **Pink Floyd** was a progressive rock band known for experimenting with different technologies to create a unique, uncharted experience with music. Released in 1973, **"The Dark Side of the Moon"** featured heavy use of analog synthesizers and brought electronic sound further into the main stream. They've sold more than 250 million albums worldwide and are one of the world's most legendary rock bands. **THE 1982 ALBUM "Thriller"** by **Michael Jackson** is one of the best-selling albums of all time. Nearly every song on the album features synthesized sounds. **IN 2000** the renowned rock band **Radiohead** won a Grammy for their album **"Kid A"** which brought synth sounds to the forefront. The album features wide use of analog modular synthesizers and the **Ondes Martenot**, an early electronic instrument. **TODAY** **Björk** is praised for her experimental electronic music. She has received 13 Grammy nominations as well as an Oscar nomination for Best Original Song from the film **"Dancer in the Dark."** She uses cutting-edge synths like the **"Reactable,"** a digital tabletop that creates sounds by moving tangible blocks.

LISTEN Carlos' compositions can be heard in the films A Clockwork Orange (1972), The Shining (1980) and Tron (1982).

LISTEN "Trans-Europe Express" from Kraftwerk's 1977 album of the same name. Replicate the background beats with "Percussion Party" on page 24.

LISTEN "On The Run" from "The Dark Side of the Moon" is one of the first uses of a sequencer.

LISTEN "Thriller", the loud blast of chords that queues the zombie dance was performed on a synthesizer.

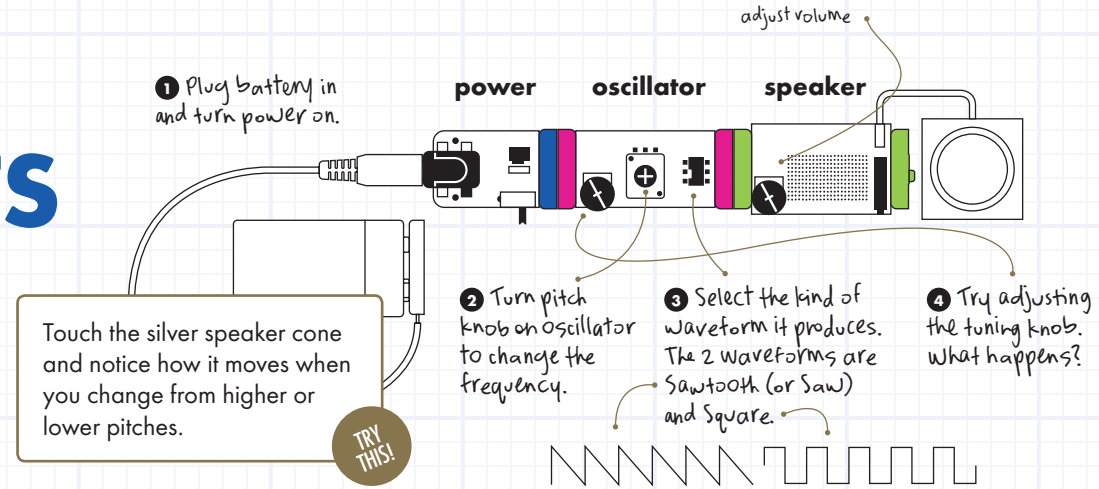
LISTEN "Idioteque" from Kid A. Try replicating these sounds in the "Synth Band" project on page 26.

LISTEN "Army of Me" (1995) by Björk. Try replicating the bass line by lowering the pitch of the oscillator and playing with the micro sequencer or keyboard.

TRY THESE CIRCUITS

Get started with these but don't let us hold you back – every module fits with every other module – feel free to experiment.

PITCH SWEEPS Learn how an oscillator works.

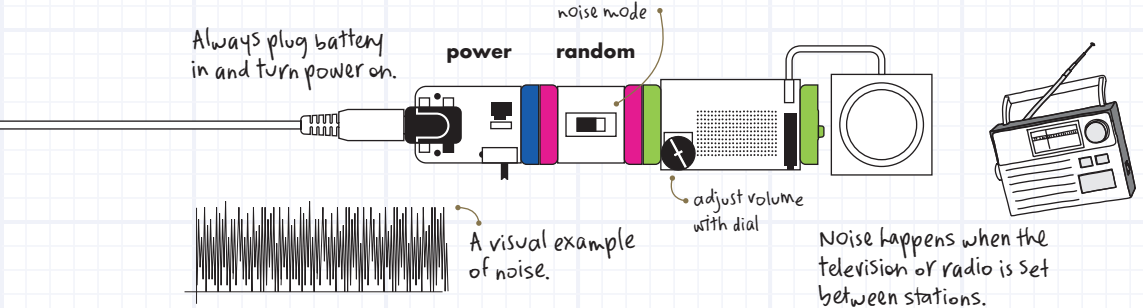


The "pitch" range goes from being so low that it is unpitched (you actually hear clicks) to very high pitches. You can have lots of fun by twisting the pitch knob and "sweeping" through all the frequencies!

"Saw" and "square" are similar waveforms. The saw has a "mellow" character to it and the square sounds more "edgy."

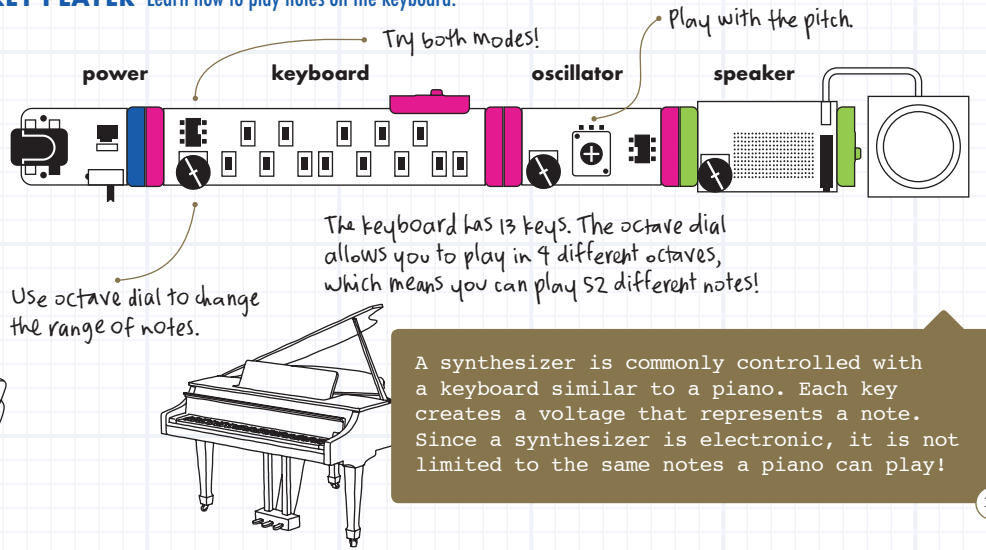
The timbres of these two waveforms are most related to bowed strings and brass in the acoustic instrument families.

WHITE NOISE Experience the random module.



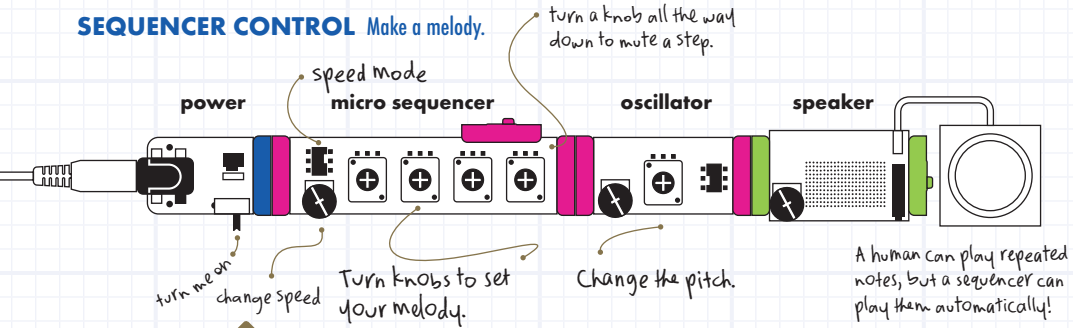
The random module has two modes and one of them is called "noise". Un-pitched sound is generally categorized as noise or a collection of many frequencies that are not distinguishable from one another. Unlike a waveform, noise has no repeating pattern.

KEY PLAYER Learn how to play notes on the keyboard.



A synthesizer is commonly controlled with a keyboard similar to a piano. Each key creates a voltage that represents a note. Since a synthesizer is electronic, it is not limited to the same notes a piano can play!

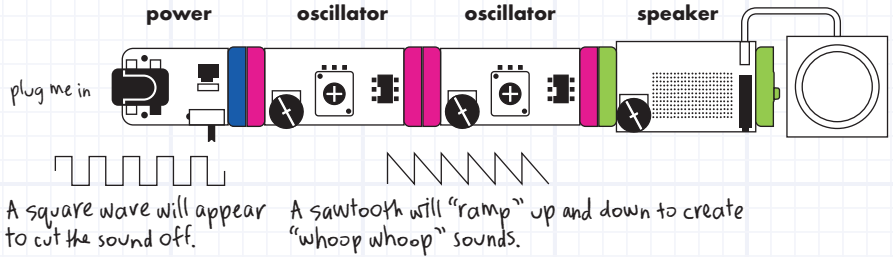
SEQUENCER CONTROL Make a melody.



A sequencer is a very novel controller and is unique to the world of synthesizers. A sequencer allows you to store note values and play them back in a repeating order.

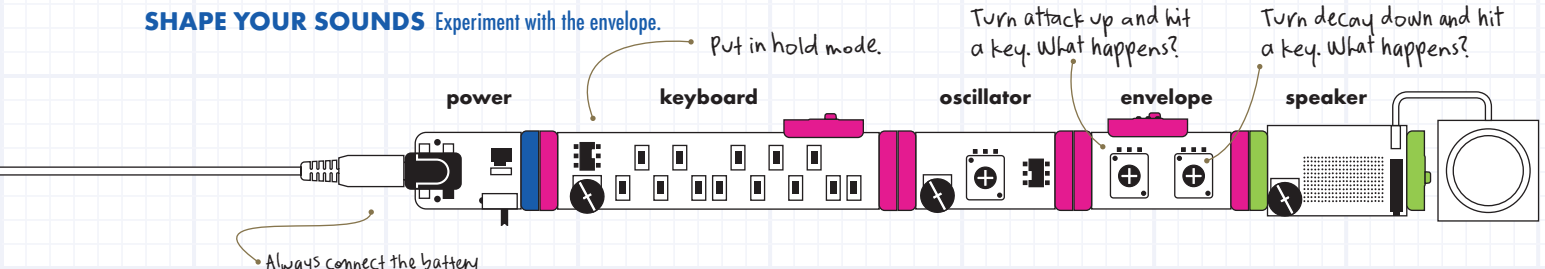
The stored notes are set by tuning each step using the knobs. The pattern will repeat sequentially forever and the speed can be controlled within the sequencer or from an outside pulse.

FREQUENCY MODULATION Discover how two oscillators interact.



As previously mentioned, an oscillator can produce a frequency that is too low to be perceived as a pitch. In this case it is known as an LFO or low frequency oscillator. Because the oscillator in your kit can be both low frequency and audio range, you can turn up the frequency of one oscillator and feed it into another oscillator to create "frequency modulation."

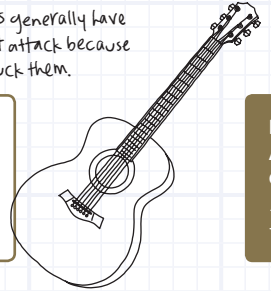
SHAPE YOUR SOUNDS Experiment with the envelope.

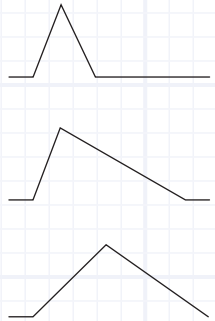


The envelope of a sound has a big effect on the character of the sound. The controls on the envelope Bits module are "attack" and "decay."

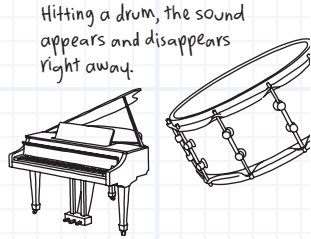
ATTACK
Attack is how long it takes the sound to get to its loudest point.

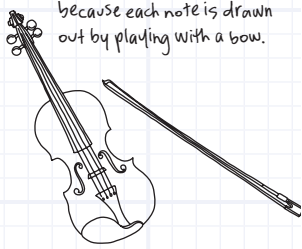
DECAY
Decay is how long it takes the sound to fade to silence.



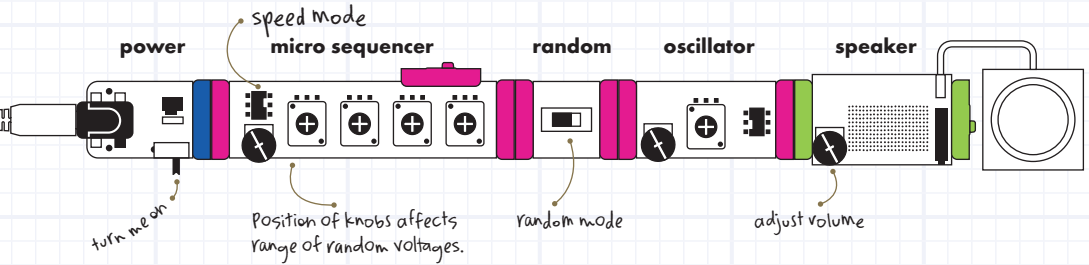


EXAMPLES OF ENVELOPE AMPLITUDE OVER TIME
Can you think of other instruments that fit these profiles?



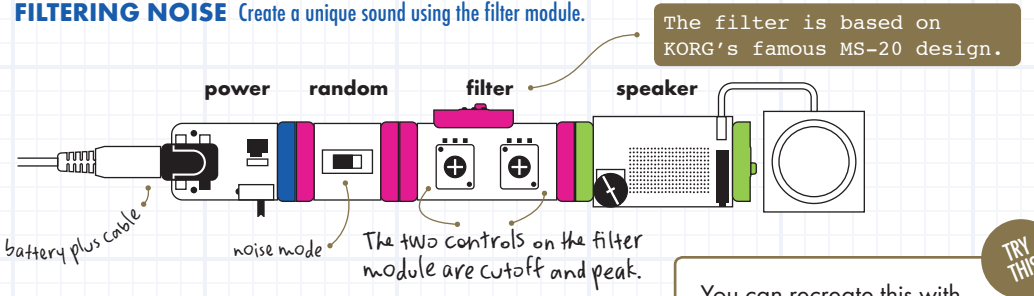


RANDOM VOLTAGE Have fun with this random sound generator!



Random voltages can produce interesting effects in a synthesizer. Traditionally, this is created by a circuit called "sample and hold" or "S&H". In a sample and hold circuit, a voltage is sampled from noise and sent to affect another circuit. There is no telling which voltage will be sampled!

FILTERING NOISE Create a unique sound using the filter module.

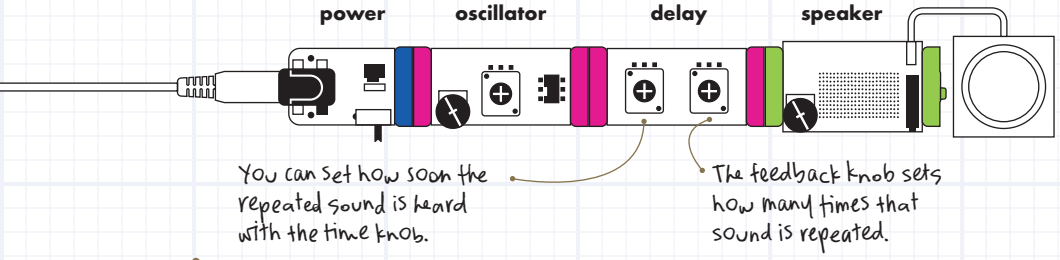


- The filter is known as a low-pass filter. This means that frequencies higher than a certain point will be reduced or filtered out.
- When the peak is increased and the cutoff is adjusted, the timbral effect can sound like a person making vowel like sounds.

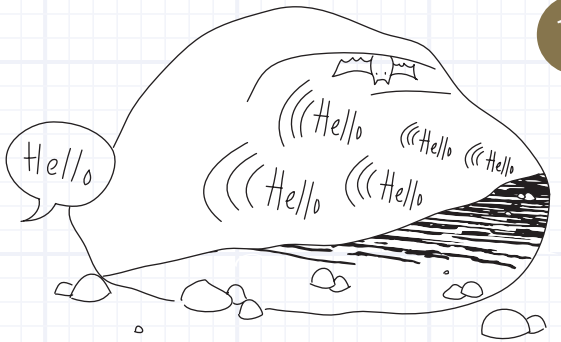
TRY THIS

You can recreate this with your voice. Try making an "Ah" sound and then slowly shift to an "Ooh" sound. Your mouth creates a filter that changes the timbre of the sound much like the filter.

ECHO AND DELAY Learn how to make infinite repeating sounds with the delay.



The delay affects the sound, but unlike the filter, its primary function is not to add or subtract from the original sound, but to reproduce it. Think of it as an echo in a large room or cave. You make a sound, and that sound gets repeated for some amount of time depending on how big the space is.



TRY THIS

1. Set the "feedback" knob fully clockwise and play a few notes, the delay will repeat those notes and then repeat the repeats.
2. Adjust the "time" knob to create the effect of raising or lowering the pitch.
3. Twist the knob really fast in both directions to create some really crazy effects!

SYNTH HIST

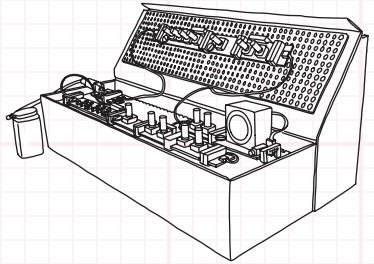
Artist and producer **Brian Eno** is well known for pushing the technological boundaries of music. He has famously produced mega albums like "Low" by **David Bowie**, "Remain in Light" by **Talking Heads**, and "Joshua Tree" by **U2**.

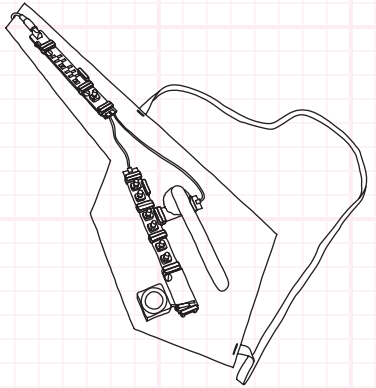
PROJECTS

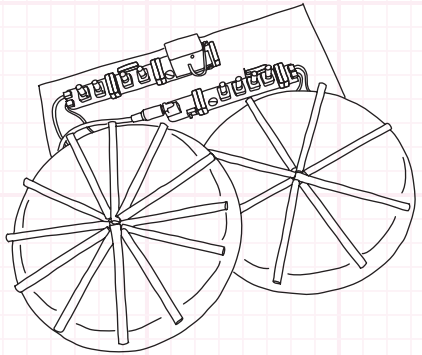
Enhanced instructions plus tons more projects online, **littleBits.cc/synth**

Visit **littleBits.cc/recordyourmusic** for tips on how to record, edit and share your music.

TRY THESE AND INVENT YOUR OWN





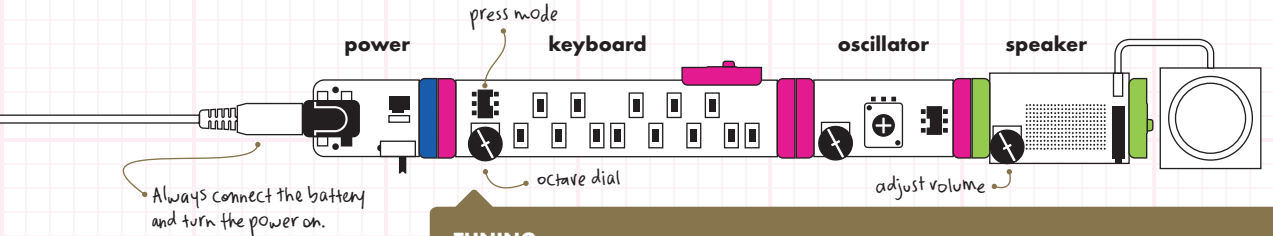


PROJECT 1: Learn how to make your song's pitch perfect.

TUNING

❶ Start with this circuit.

❷ Pick one key and turn the "octave" dial clockwise and counterclockwise. Do you hear the difference? Listen to the range (how "high" and "low" the sound goes).



❸ Turn the keyboard "octave" control to the middle of the range.

❹ Turn pitch knob on oscillator to change the frequency.

❺ Play all the notes on the bottom row of the keyboard consecutively from left to right. This is called a major scale in music. You may recognize it as do-re-mi-fa-so-la-ti-do.

❻ Play do-re-mi again, does it sound "right" to you? Remember "pitch" is perceived differently for everyone! If the notes didn't sound quite right, try slowly adjusting the tune dial counterclockwise until it sounds "in tune."

❼ You've successfully tuned your oscillator, YOU'RE READY TO PLAY!

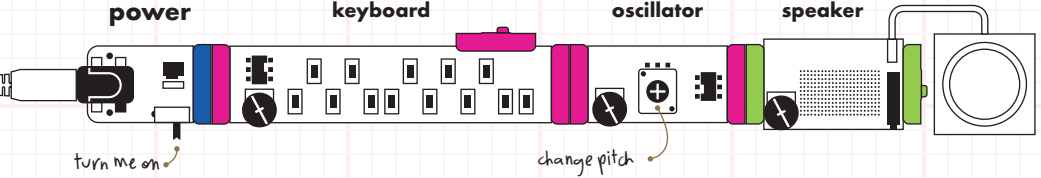
TUNING

- Tuning is the relationship between the pitches in a musical instrument. Instruments need to be "tuned" and a synthesizer is no different. By tuning instruments, you can create "melodies" that are recognizable.
- The tuning dial on the oscillator Bits module will alter the relationship between pitches. This will be important when using the keyboard and micro sequencer.

PROJECT 2: Serenade a friend!

PLAY A SONG

1. Start with this circuit.
2. Then, tune your oscillator (see previous project).
3. Adjust pitch to match the range of your voice!



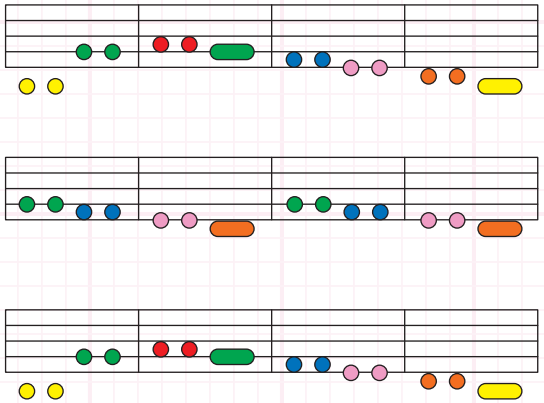
The bass sound in **Stevie Wonder's** 1973 song "Living for the City" features the use of a keyboard, oscillator, and envelope. Can you replicate that sound?

SYNTH HIST

4. USE THIS COLOR CODED KEYBOARD AND THE NOTES TO THE RIGHT TO HELP YOU PLAY A SONG!

Go to **littleBits.cc/synth** to learn how to play more tunes!

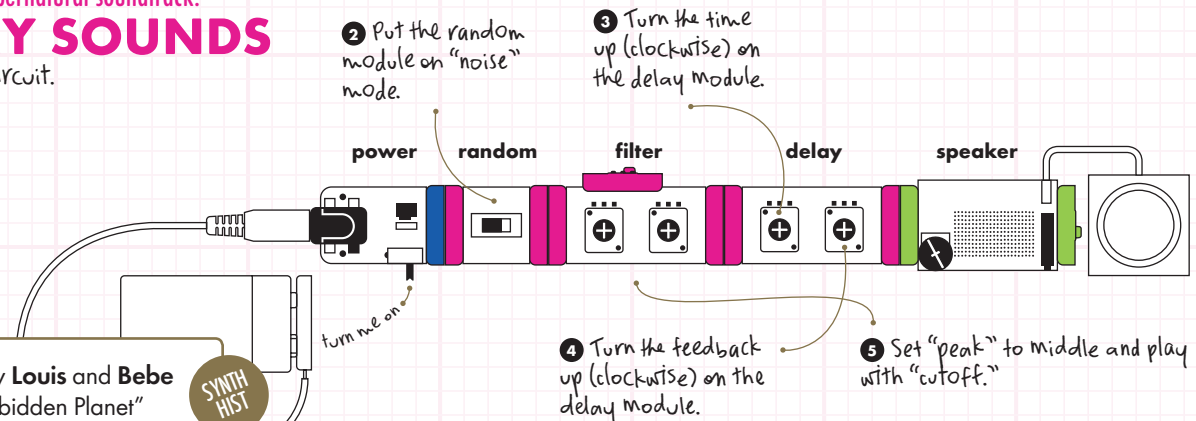
Do you recognize it?



PROJECT 3: Create a supernatural soundtrack.

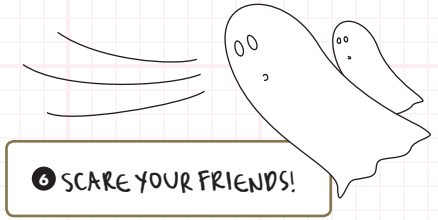
SPOOKY SOUNDS

1. Start with this circuit.



SYNTH HIST

The film score by **Louis** and **Bebe Barron** for "Forbidden Planet" (1958) was one of the first to make use of entirely electronic music.

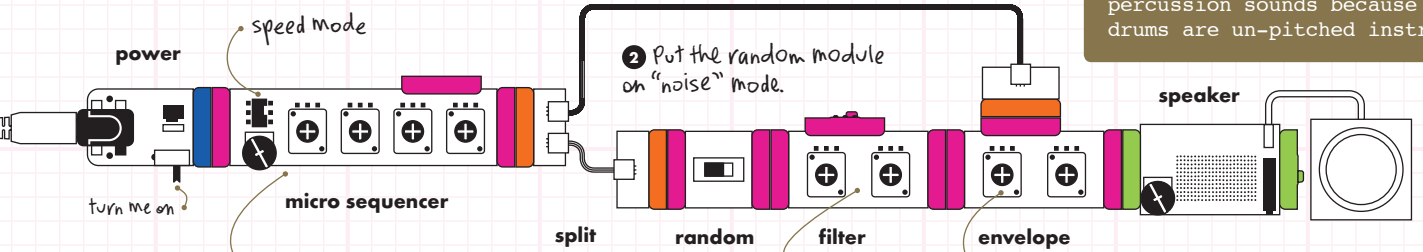


The peak knob has a large effect on what the cutoff knob does. It emphasizes certain frequencies and creates a "peak" at these frequencies. If the peak is turned all the way up, the emphasis can be strong enough to increase the loudness of the sound and in some cases create an oscillation.

PROJECT 4: Dance to the beat of your own drums.

PERCUSSION PARTY

1. Start with this circuit.



2. Put the random module on "noise" mode.

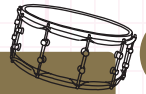
3. Set your rhythm by adjusting knobs on the micro sequencer and adjust tempo with speed dial.

4. Adjust the filter to affect the timbre.

5. Turn the "attack" knob all the way down (counterclockwise). Turn the "decay" knob low, but slightly higher than the "attack."

NOISE

Noise is an un-pitched sound. It is often used as a way to create percussion sounds because most drums are un-pitched instruments.



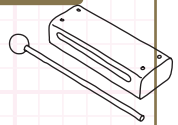
BONUS

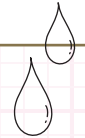
TRY MAKING A...

...horse galloping sound – Turn one of the knobs all the way down on the sequencer to make the sound effect for a horse galloping.

...woodblock sound – Turn the peak knob up (clockwise), turn the cut off down (counter clockwise).

...water drop sound – Keep the peak up. Turn the cut off to a mid-range (higher than the woodblock).



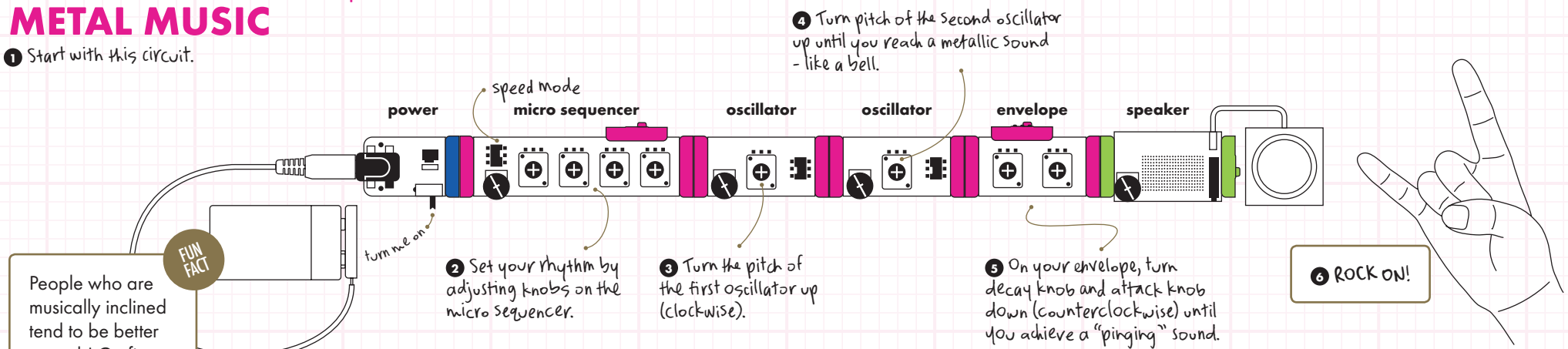


6. WAIL on your synth drumset!

PROJECT 5: Recreate metallic sounds with the envelope.

METAL MUSIC

1. Start with this circuit.



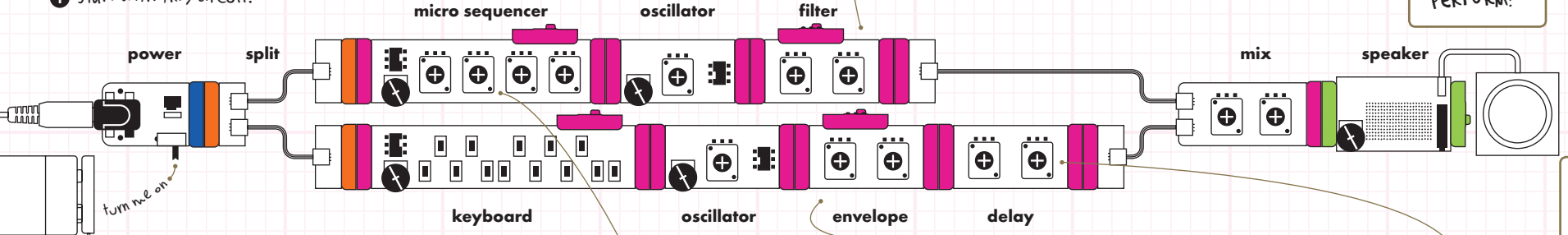
FUN FACT

People who are musically inclined tend to be better at math! Go figure.

PROJECT 6: Learn how to play a melody with accompaniment.

SYNTH BAND

1 Start with this circuit.



4 Adjust the filter until you reach the sound you like.

5 Set mix level 1 low and mix level 2 higher.

8 YOU'RE READY TO PERFORM!

2 Tune both oscillators (refer to page 21 on how to do this). Oscillators can either be set to "consonant" or "dissonant" intervals. In consonance, they are in harmony. In dissonance, they will sound inharmonious.

3 Create a pattern on the micro sequencer that you like. This will become your backing music.

6 Play a few notes on the keyboard. The keyboard is like the "lead singer" and will appear louder than your sequencer because nothing is filtering the sound.

7 Adjust the envelope and delay – these will change your keyboard's sound.

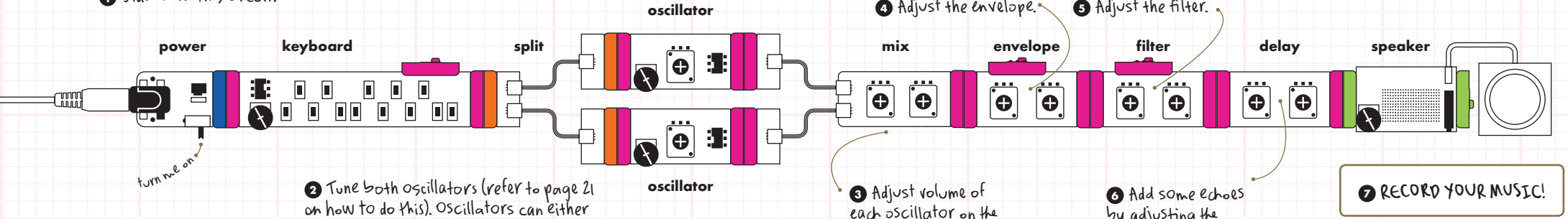
PRO TIP

Use an audio cable to connect your speaker to your computer, headphones, or an amplifier!

PROJECT 7: Create one monster synth with all of these modules!

SYNTHESIZER WITH THE WORKS

❶ Start with this circuit.



❷ Tune both oscillators (refer to page 21 on how to do this). Oscillators can either be set to "consonant" (harmonious) or "dissonant" (inharmonious) intervals.

❸ Adjust volume of each oscillator on the mix module.

❹ Adjust the envelope.

❺ Adjust the filter.

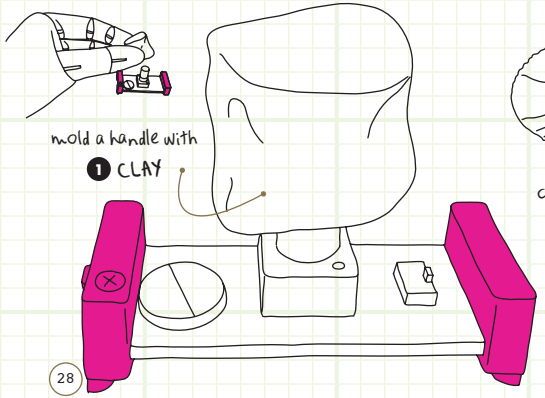
❻ Add some echoes by adjusting the delay module.

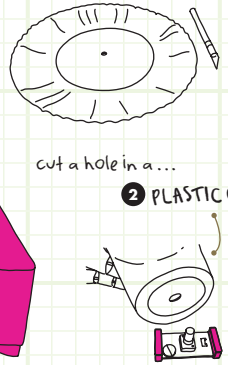
❼ RECORD YOUR MUSIC!

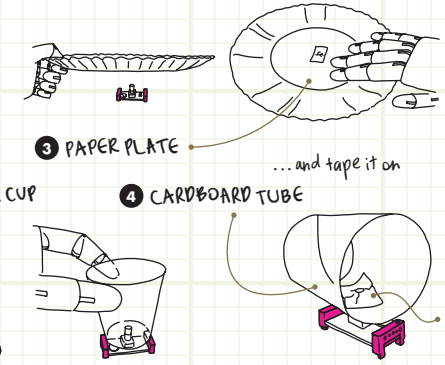
Record your music and share it with us! **littleBits.cc/upload**

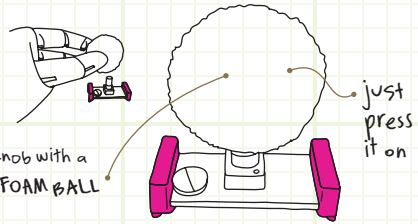
And now a brief intermission from the projects.

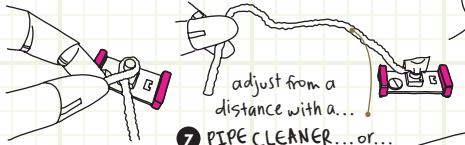
VISIT US AT LITTLEBITS.CC/TIPS FOR SOME AMAZING TIPS & TRICKS

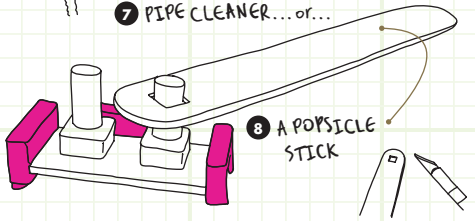


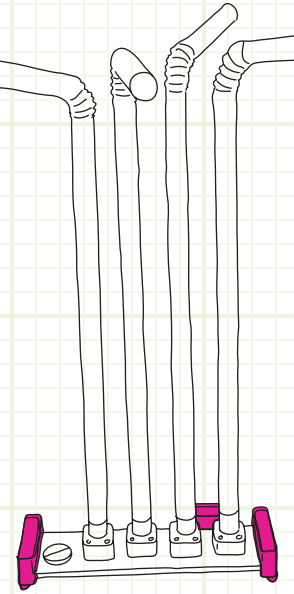










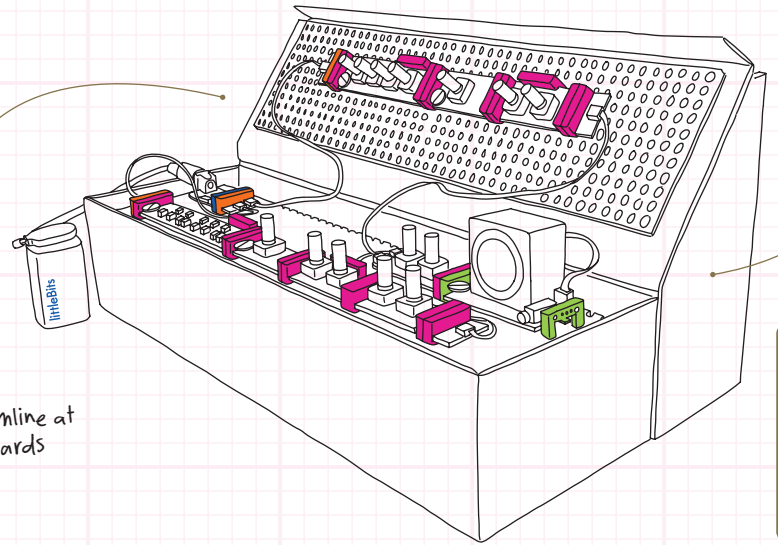


PROJECT 8: Transform your box!

PERFORM LIKE A PRO

Visit **littleBits.cc/prosetup** for instructions on how to set up your modules so you can put on live performances anywhere and on the go!

TIME: 60 mins
DIFFICULTY: ●●○○○



Buy mounting boards online at littleBits.cc/mountingboards

Build a performance station!

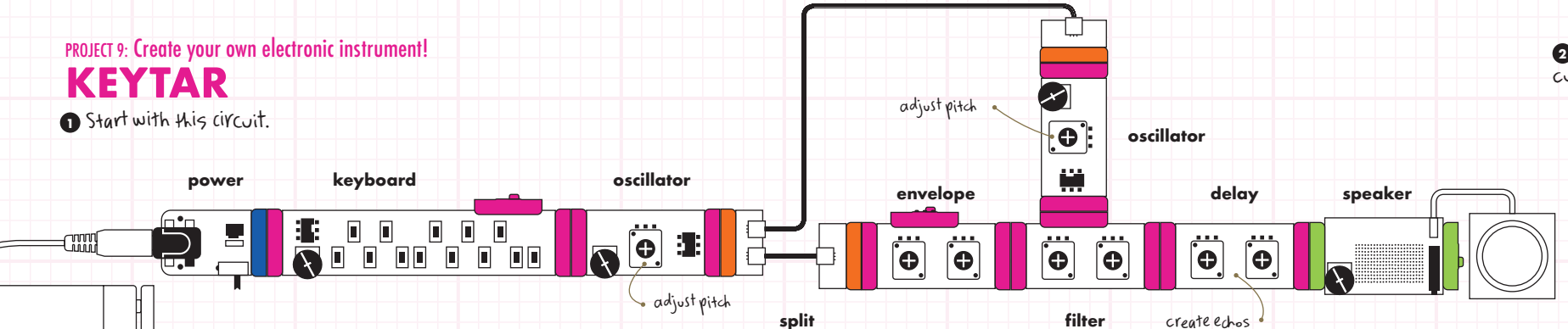
Power up your circuit and START PLAYING!

COOL! Just like the KORG MS-20.

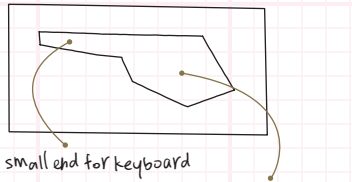
PROJECT 9: Create your own electronic instrument!

KEYTAR

1 Start with this circuit.

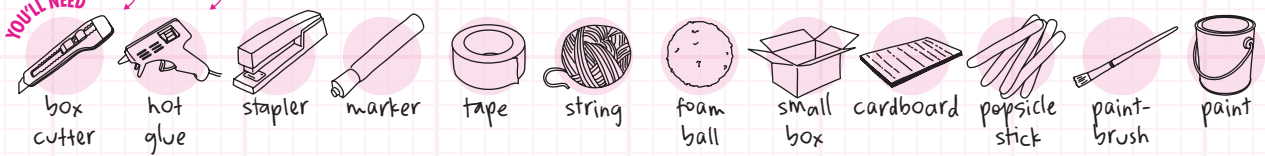


2 Draw a guitar-like shape and cut it out of cardboard.



STAY SAFE! Always use with an adult.

YOU'LL NEED

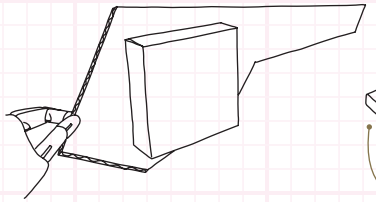


TIME: 60 mins
DIFFICULTY: ●●○○○

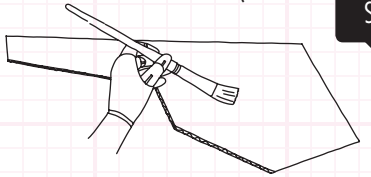
In the early '70s **Edgar Winter** was one of the first people to create a makeshift "keytar" by adding a shoulder strap to an electronic keyboard. Check out the popular song "Frankenstein."

SYNTH HIST

3 Tape or glue smaller box to the back of the wider end.

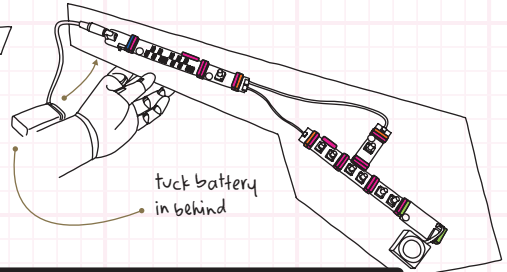


4 Decorate! Use paint, markers, whatever you have!

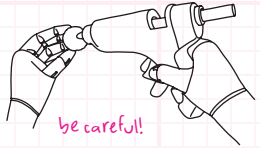


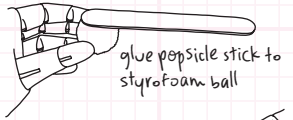
Show us your design! **littleBits.cc/upload**

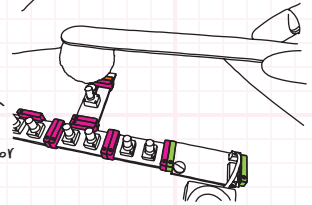
5 Add the circuit.



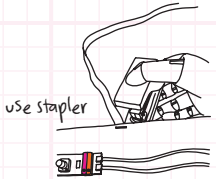
6 Add a whammy bar!

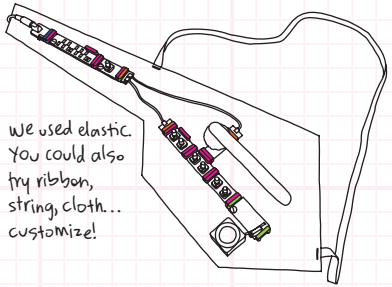




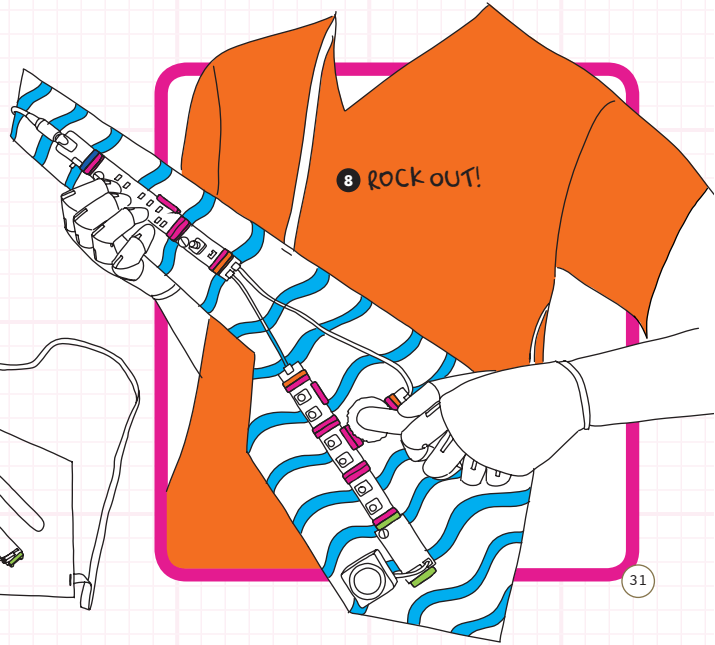


7 Add a strap.





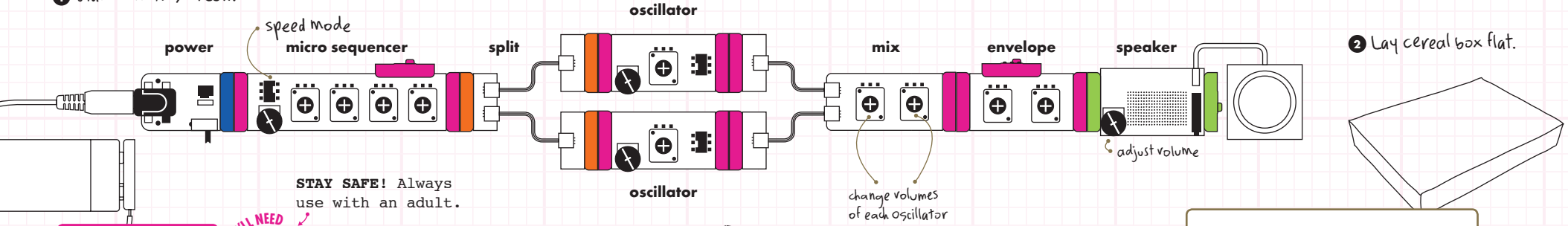
8 ROCK OUT!



PROJECT 10: Play your Synth Kit like a DJ.

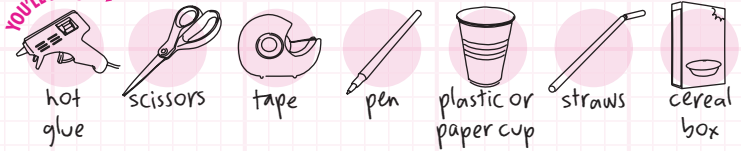
SYNTH SPIN TABLE

❶ Start with this circuit.



STAY SAFE! Always use with an adult.

YOU'LL NEED



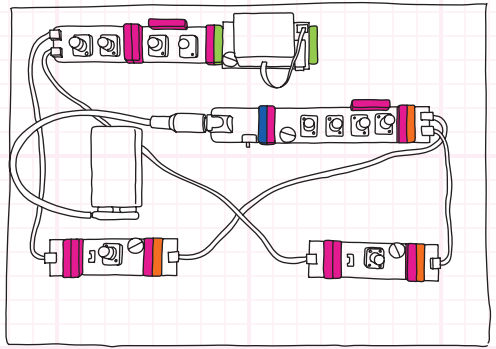
TIME: 2 hrs
DIFFICULTY: ●●●○○

❷ Lay cereal box flat.

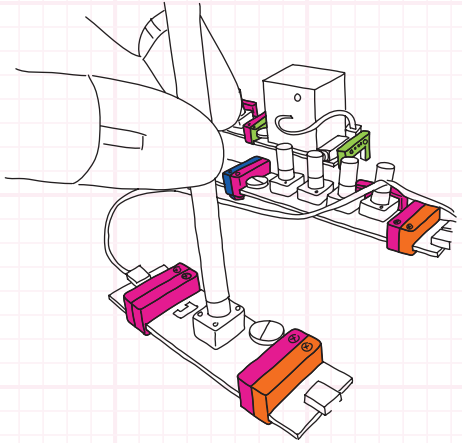
SYNTH HIST

Disco! The first notable fully synthesized disco hit was "I Feel Love" by **Donna Summer** in 1977.

❸ Put the circuit on the box. Use tape to keep 'em in place.

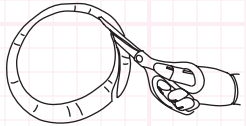


❹ Attach one straw on each oscillator knob.

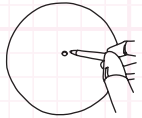


make first turntable

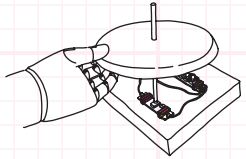
❺ Get paper plate cut down to size.



❻ Mark center of plate and poke hole.

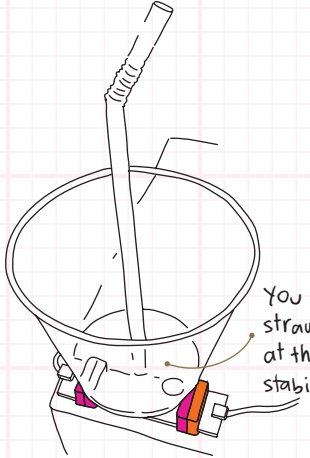


❼ Slide plate onto straw.



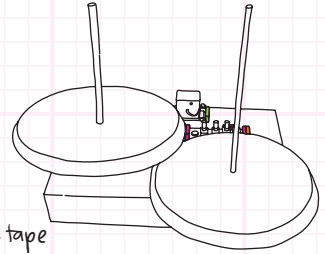
make second turntable

❽ Poke a hole in the bottom of a cup and slide it on the straw of the second oscillator.

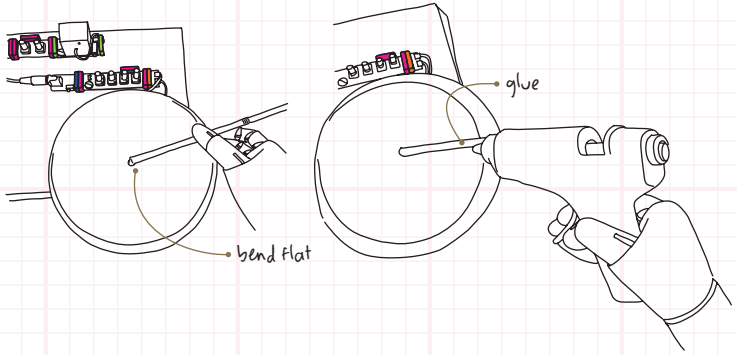


You can tape straw to cup at the base for stabilizing.

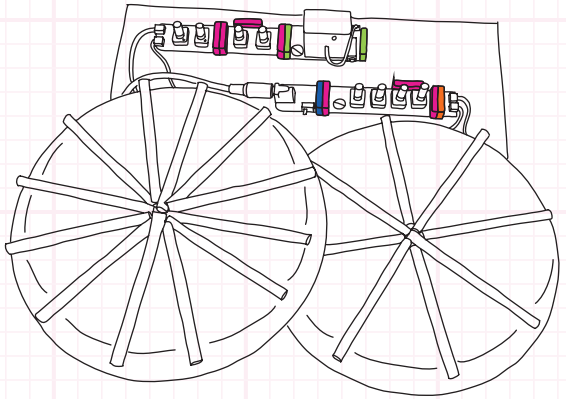
❾ Repeat steps 5-7 and add another plate on top of the cup.



10 Glue straws to plates.

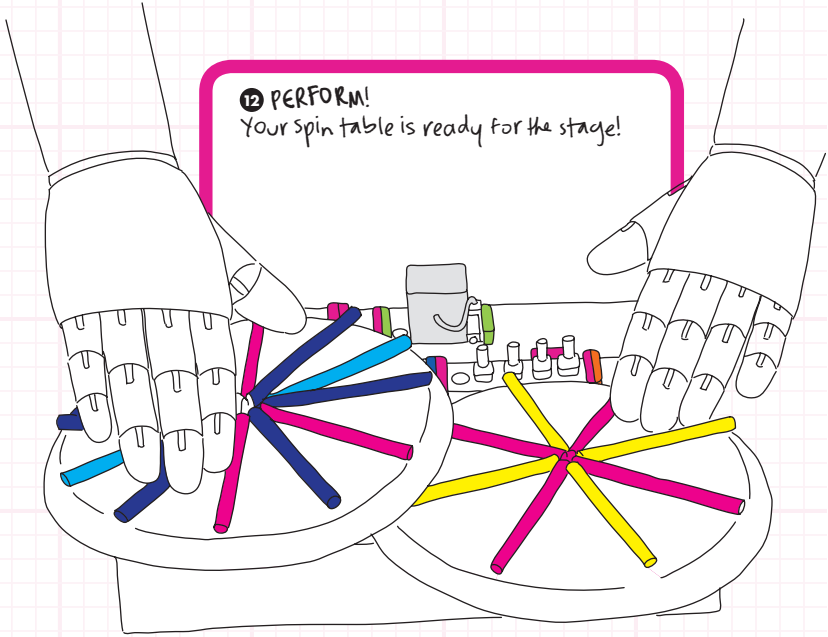


11 Decorate!



We used colored straws. What materials do you have at home?

12 PERFORM!
Your spin table is ready for the stage!

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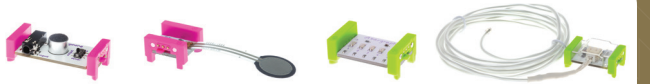

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