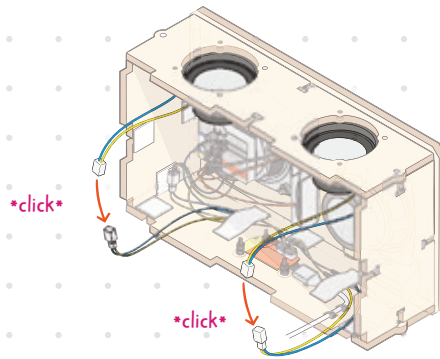


Part F

Finish the speaker

Step 11

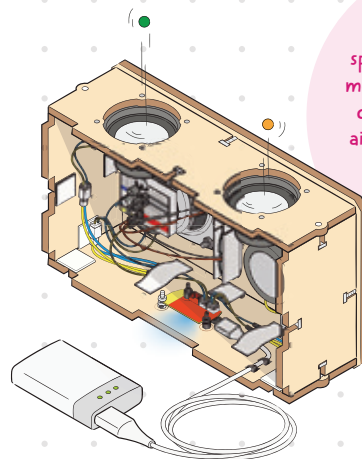
Plug the small speaker drivers' wires into the open wire ends.



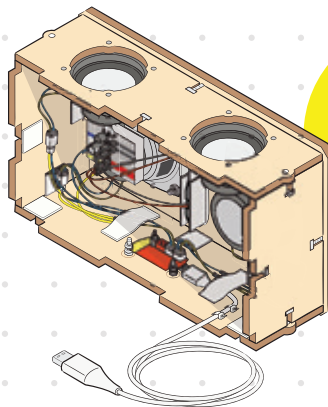
Step 12

Set a single **foam ball** on top of each small speaker driver. Plug the speaker into a **USB power source**.

If the balls jump at the beep, that means the small speaker drivers are working!



Remember how the speaker driver's diaphragm moves back and forth? The diaphragm pushes on the air to create sound waves, but it can also push on other things – like the foam balls!



You installed the small speaker drivers!

You'll need:

- ☐ speaker with small drivers (from Part E)
- ☐ foam circles
- ☐ back panel
- ☐ long screws
- ☐ screwdriver
- ☐ tubes
- ☐ foam balls
- ☐ caps

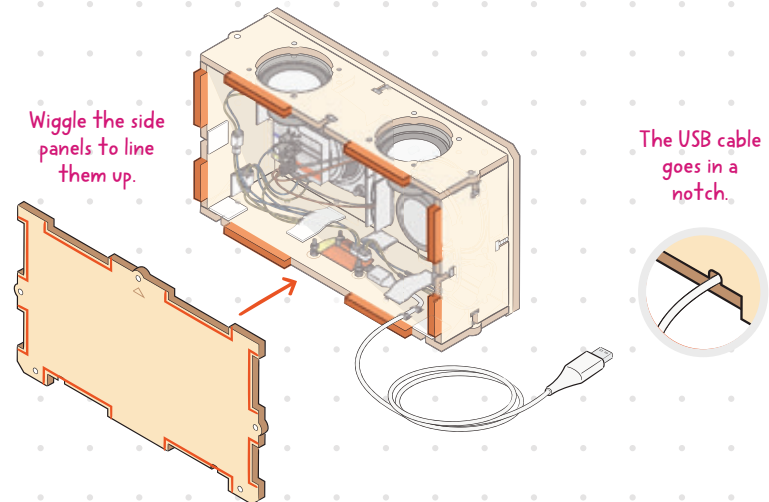
From home:

- ☐ USB power source
- ☐ device with Bluetooth technology

Step 1

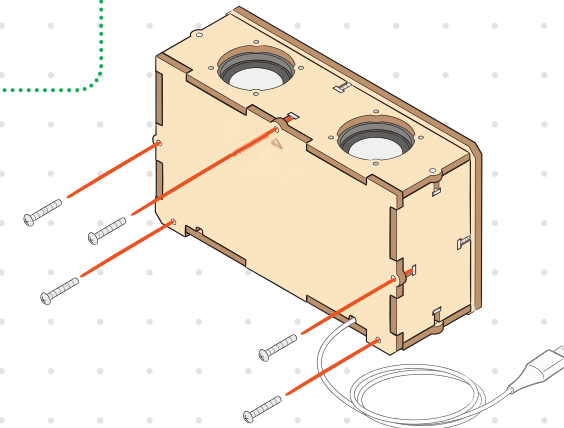
Slide the **back panel** onto the **speaker** with the arrow pointing up.

Make sure all the wires are tucked in.



Step 2

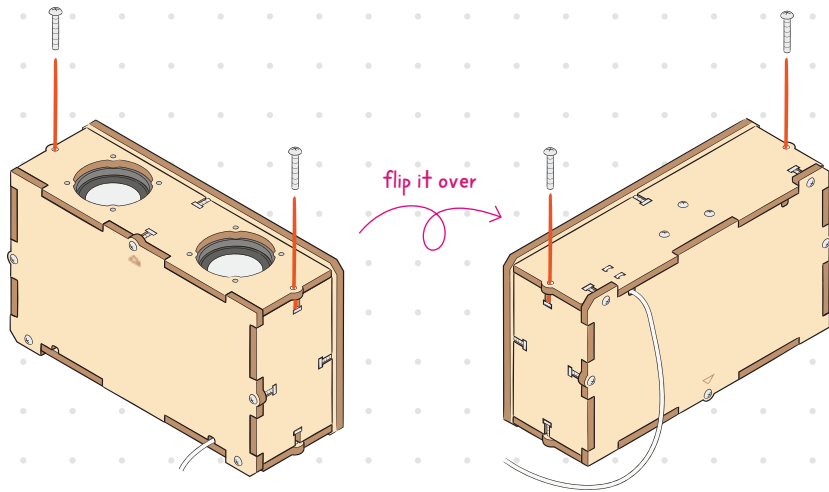
Twist **long screws** into all 5 holes in the back panel. Tighten them with the **screwdriver**.



Step 3

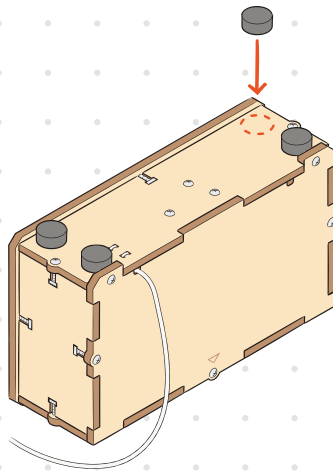
Twist a long screw into each end of the top panel.

Repeat on the bottom.



Step 4

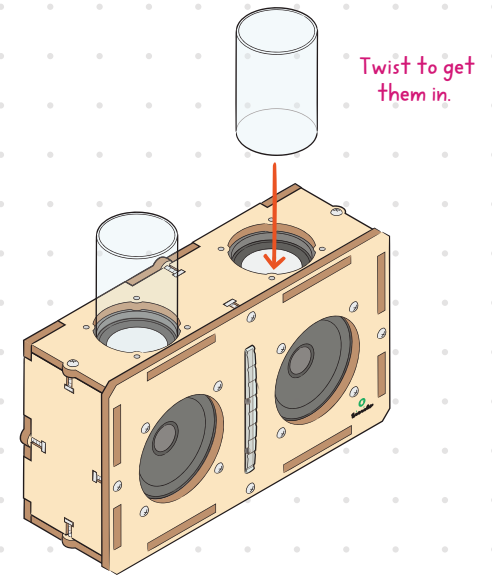
Stick **foam circles** to the bottom panel.



Step 5

Push the **tubes** into the holes above the small speaker drivers.

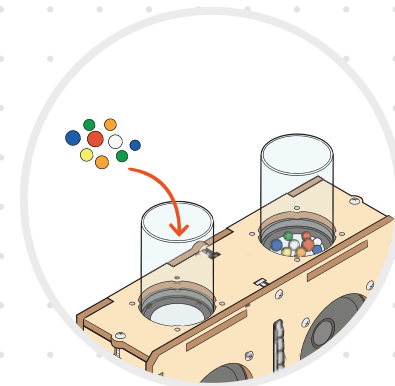
flip it over



Step 6

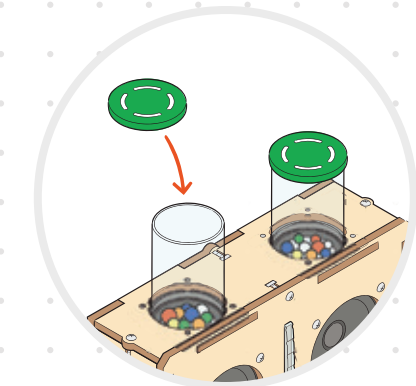
Pour 8–12 **foam balls** into each tube. You can pick any colors you want!

If you add more than 12 balls or so, they won't bounce as well. Fewer balls = more bouncing!



Step 7

Press a **cap** onto each tube.



Step 8

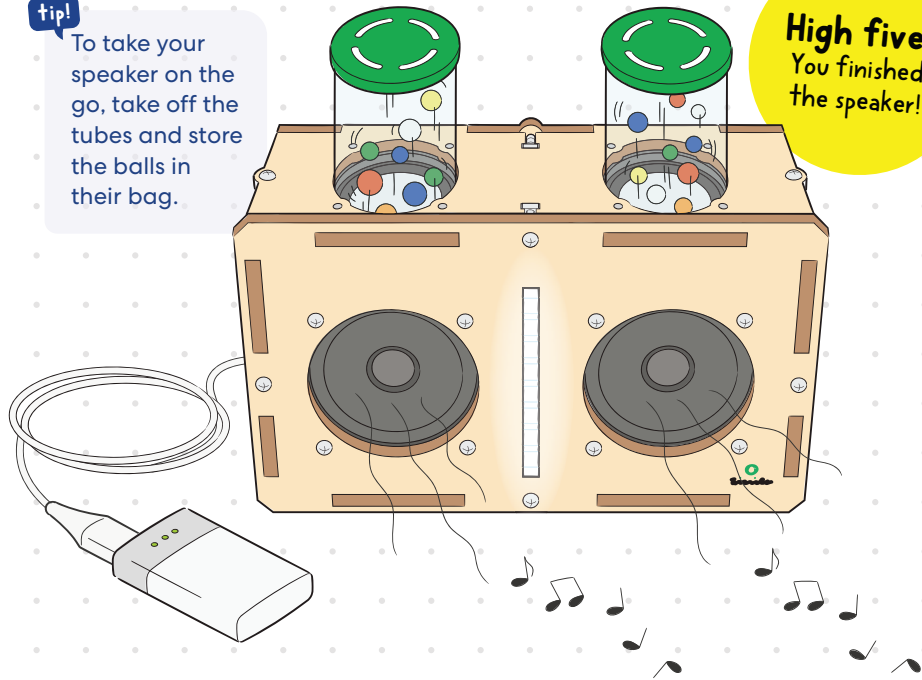
Plug the speaker into a **USB power source** and pair it with a **device with Bluetooth technology**.

Play some music and watch the balls bounce!

tip!

To take your speaker on the go, take off the tubes and store the balls in their bag.

High five!
You finished the speaker!



Experiment and see what gives you the best bounce.

Try:

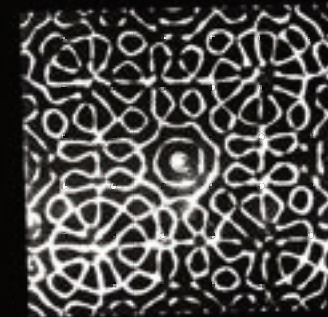
- fast songs vs. slow songs
- high volume vs. low volume
- strong beat vs. quiet beat (or no beat!)
- “crunchy” sound vs. smooth sound
- more balls vs. fewer balls
- caps on vs. caps off
- music vs. speech vs. nature sounds

... and more!



Seeing sound

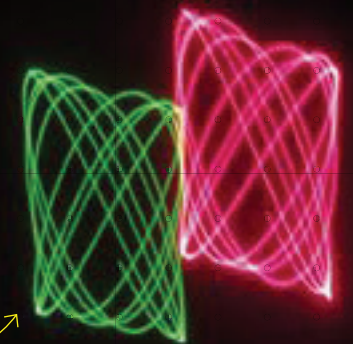
Your speaker uses light and vibrations to make sound visible. There are lots of other ways to make *beautiful* music with motion and color!



Chladni plates, sprinkled with sand or salt, show patterns of vibration from sound waves. The higher the note, the more detailed the pattern!

Laser light bounced off a vibrating membrane, suspended over a speaker, makes for a dizzying, dazzling display.

Bouncing laser light makes patterns like these!



For a colorful (and messy) show, pour some pigments on a drumhead and do some **color drumming**.



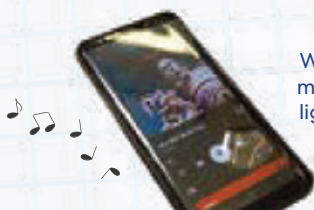
Chladni plate by Stephen Morris via flickr.com (CC BY 2.0),
light show by Amanda.yuu via Wikimedia Commons (CC BY-SA 4.0),
drum by Jag_cz / shutterstock.com

Inside the Innovation Factory



Rob, the lead designer on this crate, used to help his friends modify car sound systems with huge, bass-y speakers and lots of electronic parts. One challenge he faced when designing *this* speaker was sizing things down so they would fit in a crate!

During an early test run, we scattered some beads on a speaker cone and watched them dance around. It was so fun that we made it part of the project — but with colorful foam balls. We added the tubes later . . . after the speaker sent the balls flying all over the place. (Oops.)



We tried the speaker with a *lot* of different kinds of music, from classical to K-pop. Each song made the lights and the bouncing balls act a little differently. How do your favorite songs compare?



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Keep the instruction sheet since it contains important information.

WARNING

CHOKING HAZARD — Small parts. Not for children under 3 years.
Only for use by children aged 12 years and older. The instructions for parents or caregivers are included and shall be followed.

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Model: F2277-SSPL FCC ID: 2A2FL-SSPL

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The distance between user and products should be no less than 20cm

NOTE: 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 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.

Warning: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.