

Lesson 3

Listen to mBot2!

STEAM • 45 minutes • Beginner

Today your robot gets ears and a voice.

You'll record your own sound and make mBot2 play it back. By the end, your robot will drive around the room and shout when it gets too close to something!

sounds. These sounds can be played back later with the speaker.



What You Will Be Able To Do Today

1

Find and use the purple Audio blocks for the speaker and microphone

2

Build your own program so mBot2 records a sound and plays it back

3

Run two programs side by side at the same time

4

Understand how a speaker and a microphone actually work

Robots Talk To Us All The Time

- A vacuum robot says "battery low" — that's a speaker
- A toy robot sings a song — also a speaker
- Big speakers: theaters, concert halls and event halls make sound loud for huge crowds
- Small speakers: TVs, phones, keyboards and musical instruments

Your turn!

Name 3 more machines around you that make sound.

A Speaker Turns Electricity Into Sound

A speaker has one job: make sound. It changes electricity into sound waves your ears hear — and amazingly, it can run backwards too!

Speaker = Mouth

Turns electricity into sound waves. It can even run backwards — turning sound back into electricity!

Microphone = Ears

Works on that exact backwards principle: it turns the sound it hears into an electrical signal.

Remember: microphone = ears, speaker = mouth

Where Are the Ears and Mouth on mBot2?

sounds. These sounds can be played back later with the speaker.



- Built-in microphone: top left of the CyberPi
- Integrated speaker: on the front of the CyberPi
- The microphone records sounds; the speaker plays them back later
- Everything you need is already inside the robot — no extra parts

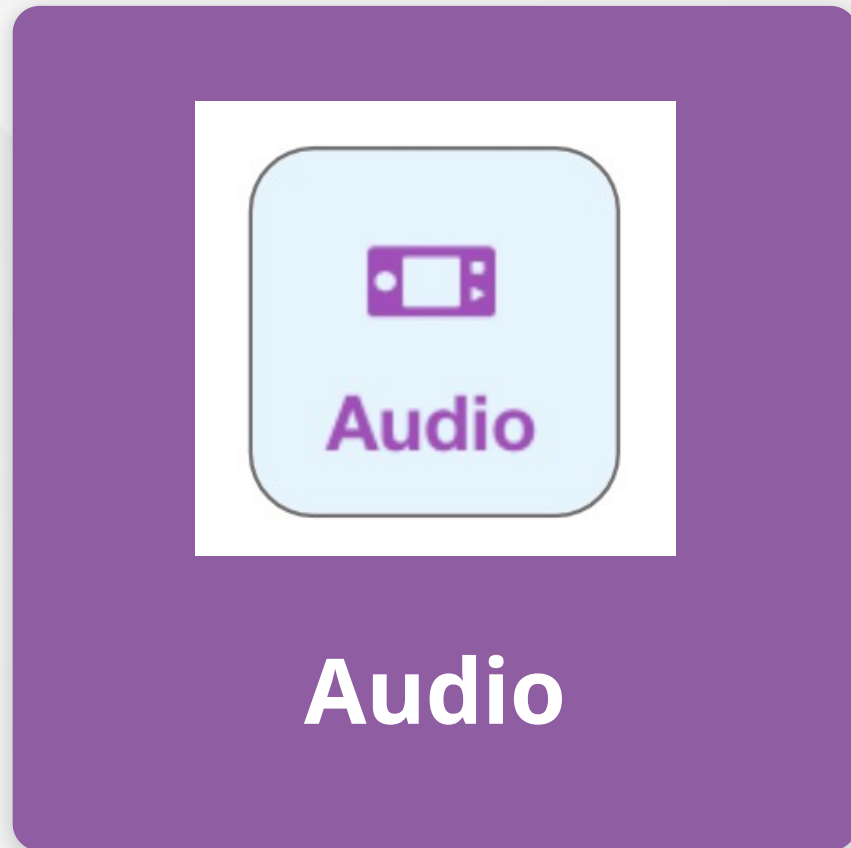
Mic + Speaker + Sensors = Smart Robot

- Combine the microphone and speaker with mBot2's other sensors to play a sound at exactly the right moment
- Real example: a city bus that announces the next stop as it arrives
- Your recorded voice can be triggered by distance, light, a button, or a timer

Group challenge

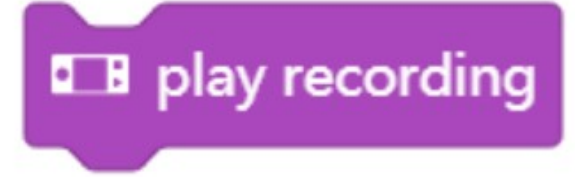
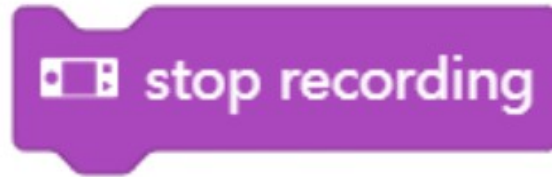
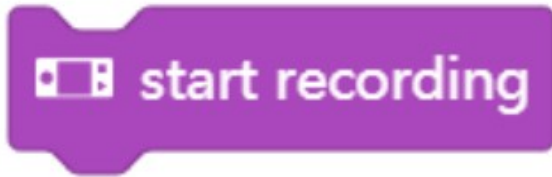
Think of 3 places a talking robot would be genuinely useful.

The Audio Blocks Live in the Purple Category



- In mBlock 5, all sound blocks sit in the 'Audio' category
- These blocks are purple — easy to spot in the block area
- Everything you need today to record, stop, and play lives right here

Recording Always Takes Three Blocks



- start recording — CyberPi begins listening and saves the mic signal in its memory
- It stops on its own after 10 seconds, or you stop it yourself
- stop recording — you decide exactly when to stop
- play recording — plays back what was saved

Warning: the sound is stored only temporarily. Turn mBot2 off and the recording is gone!

Two Programs Can Run At The Same Time



- Button A: start recording, wait 3 seconds, stop recording
- Button B: play the recording back
- Two separate event blocks = two independent programs
- No main loop needed — each one just waits for its own button

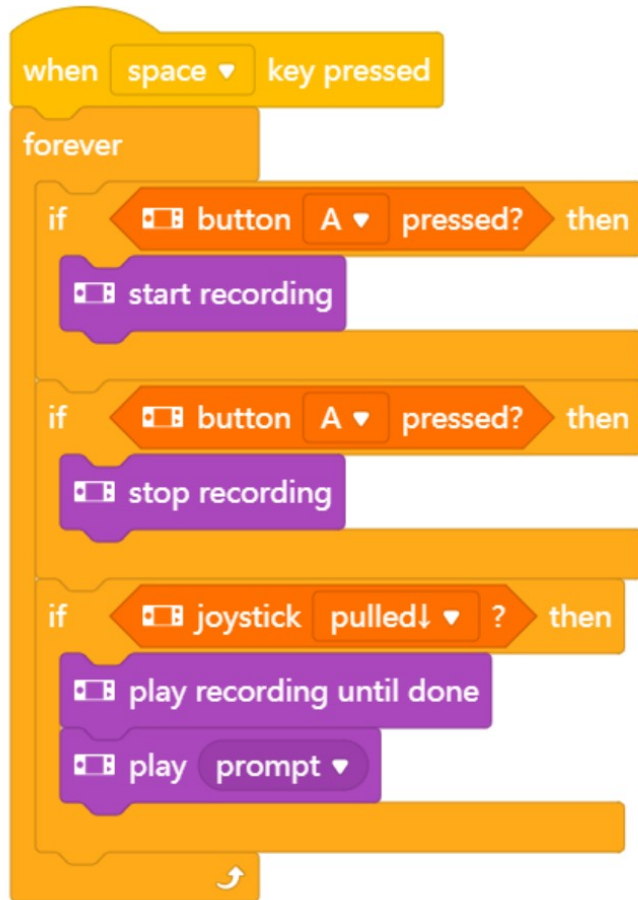
Do it now: build both stacks and record your voice!

"Until Done" Makes The Robot Wait Politely



- play recording until done plays the whole sound from start to finish
- While it plays, the next blocks are blocked — nothing else happens yet
- Once the sound finishes, mBot2 can move on to its next job
- Handy trick: play a beep afterwards so you know the recording ended

A Forever Loop Keeps The Robot Listening



- Button A: start recording
- Button A again: stop recording
- Push the joystick down: play the whole recording, then a "prompt" sound
- The forever loop checks the buttons and joystick over and over, non-stop
- Without the loop, the robot would check only once and stop caring

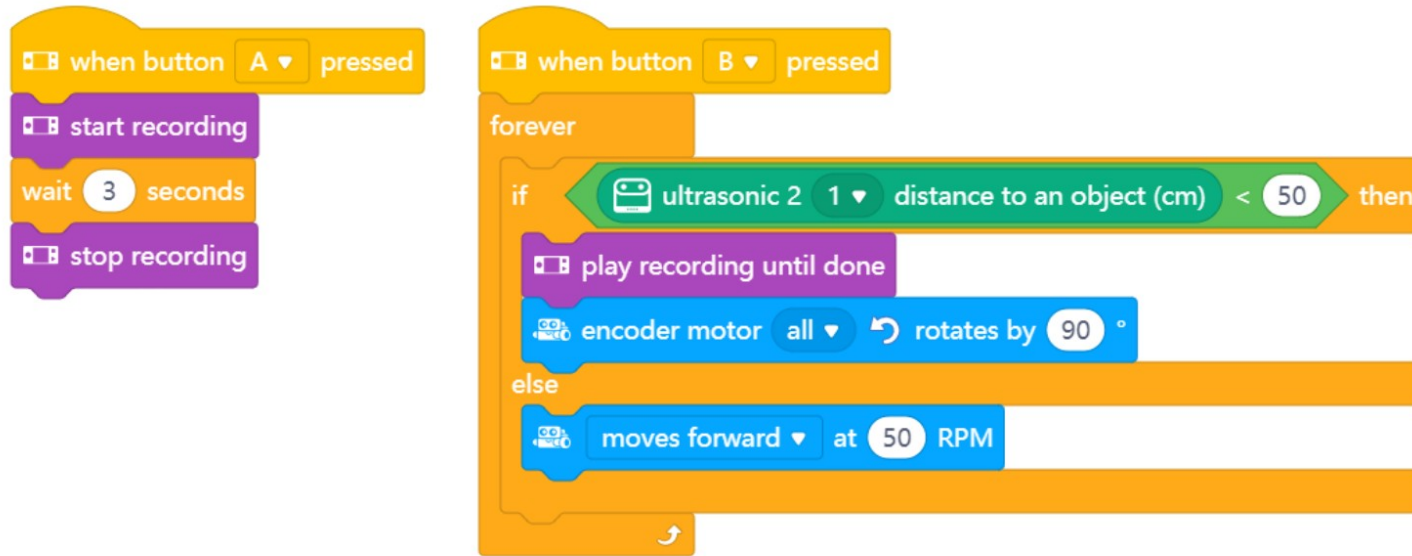
Your Mission

A Robot That Roams and Warns

- mBot2 drives a random lap around the classroom — you don't plan the route
- When it gets near an obstacle (chair, table, backpack) it makes a sound and turns around
- The sound is one you record yourself with the microphone
- Ideas: a loud beep, a car braking, a spoken warning, or even a song
- New helper: the ultrasonic sensor, which measures how far away an object is

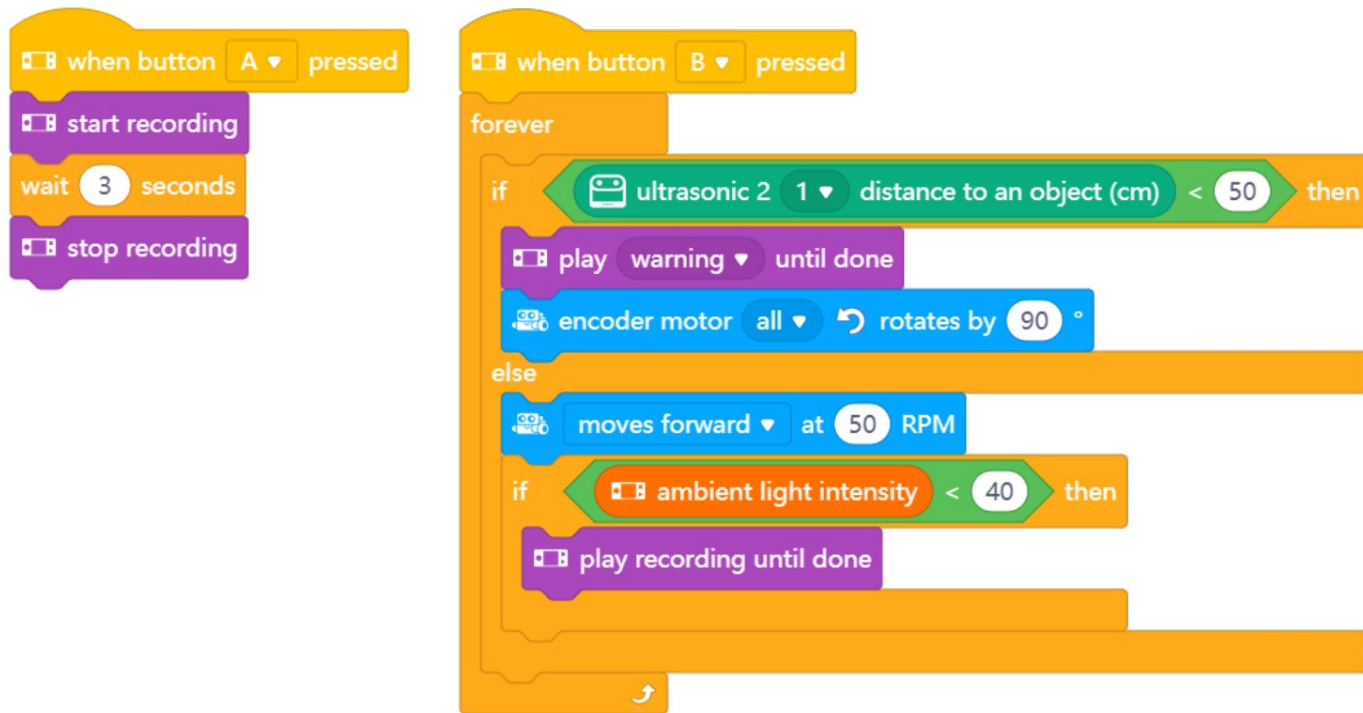
**25
minutes**

Example 1 — Beep and Turn Away



- Left stack: button A records your sound for 3 seconds
- Right stack: button B starts a forever loop that drives the robot
- If distance is less than 50 cm: play your recording, then rotate 90°
- Else: keep moving forward at 50 RPM
- That if/else is the robot making a decision all by itself!

Example 2 — Add a Light Sensor Twist



- Same idea as Example 1, plus one extra sensor
- Close to an obstacle: play the built-in warning sound, then rotate 90°
- Otherwise drive forward — and if ambient light is below 40, play your recording
- So the robot reacts to two things: distance and darkness
- Challenge: swap in your own numbers (30 cm? 60 cm?) and see what changes

Plan Before You Code — 5 Steps

- 1 What do you want?** When should mBot2 turn around? What sound at an obstacle?
- 2 What do you need?** Anything besides the mBot2?
- 3 Which driving blocks?** Sketch how your program works in plain words or a flowchart
- 4 Which sound blocks?** What exactly should the robot play, and when?
- 5 Test and improve** Write down what to fix, then fix it until it does what you imagined

Stuck? Ask a classmate, ask me, or use the built-in help on every mBlock block.

Showtime and Wrap-Up

- Film a short, fun movie of your robot in action
- With permission, share it with the hashtag #mBot2speaker
- Reflect: What turned out well? What could be better?
- Which parts were easy, and which were tricky?
- What do you want more explanation about, and who could help you?

Today you learned

- How speakers work
- How to record and play back sound
- How to run two programs at once