



Let's Get Started Coding Your Home

iRobot™ Education's Coding Your Home launches learners into a programming adventure for the whole household accompanied by the iRobot® Root® Coding Robot.

The activities in this pack are designed to accompany the **Root® Coding Robot**, the **iRobot™ Coding App**, and the **Coding Your Home Adventure Pack**.

Activities

- | | | | |
|---|-----------------------|----|----------------------|
| 1 | Pizza Delivery | 6 | Mood Lighting |
| 2 | Mission-Driven Robots | 7 | Custom Doorbell Ring |
| 3 | Logic Mapping | 8 | Sensor Seeker |
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| 5 | Clean-Up Bot | 10 | Up in the Cloud(s) |

Supplies to Gather



Printer



iRobot Root Coding Robot



iRobot Coding App



Coding Your Home Adventure Mat



Vinyl Clings



Scissors



Coloring Materials



2 Dry-Erase Markers

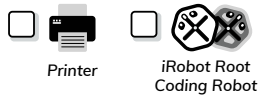




Pizza Delivery

Transform Root into an in-house custom delivery service! Create your own pizza box to attach to your robot.

Supplies:



Printer



iRobot Root Coding Robot



iRobot Coding App



Coding Your Home Adventure Mat

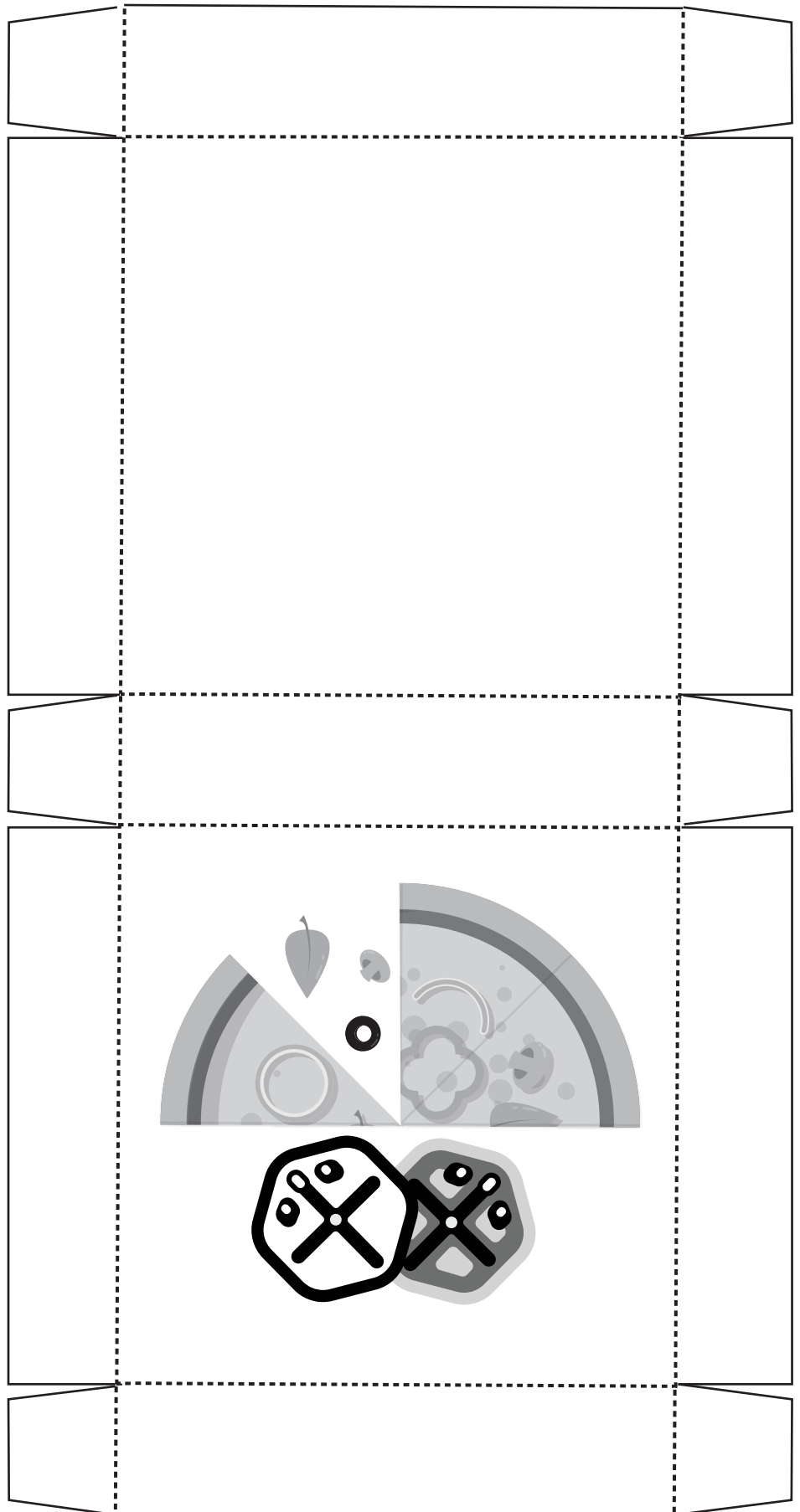


Scissors



Coloring Materials

- 1** Print and decorate your custom pizza box!
- 2** **Cut** along the solid black line. Ask an adult for help with scissors!
- 3** **Fold** along the dashed lines to make your box come to life.
- 4** **Attach** to your robot with tape.
- 5** **Code** your path to deliver some pizza throughout the house! Use the iRobot Coding App to navigate across the scene.





Mission Driven Robots

Help Root explore the house with code! Draw cards to determine each mission!

Activity Supplies

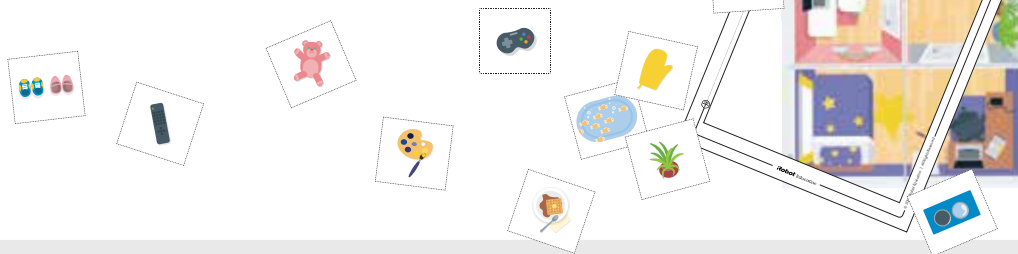


How to Play

- 1 Cut out the Target Cards. Place them in a pile, face down.
- 2 Open the iRobot Coding app and open a blank coding project. Connect to your robot.
- 3 Player 1 draws two Target Cards. The first card will be their starting point on the mat. Use the iRobot Coding app to code your robot to move to the target pictured on your second card.

Remember, your robot can only enter rooms through the door!

- 4 Once Player 1 has completed their challenge, Player 2 may take a turn. Repeat until all of the Target Cards have been used!



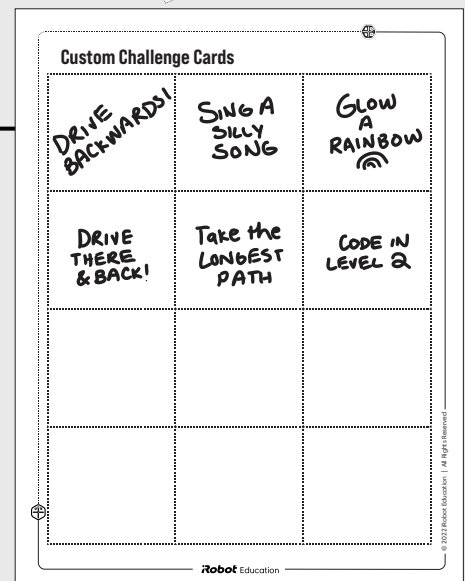
Looking to Go Further?

Level up by creating Custom Challenge Cards!

- 1 Fill in the **Custom Challenge Cards** sheet with code challenges to complete with your robot.
- 2 During their turns, players must draw two Target Cards and one Custom Challenge Card. Players must then place their robot on the start target and code its path to reach the finish target while ALSO completing their selected challenge.

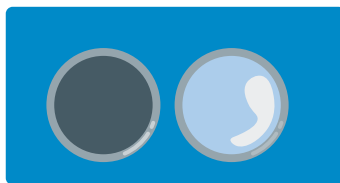
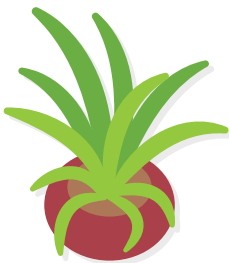
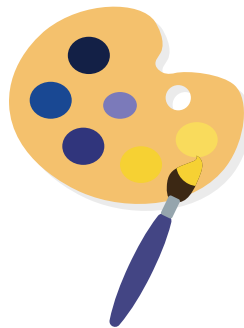
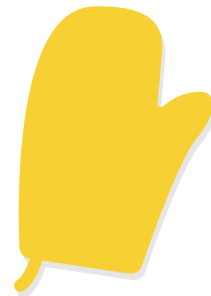
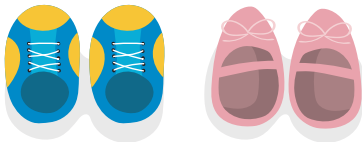
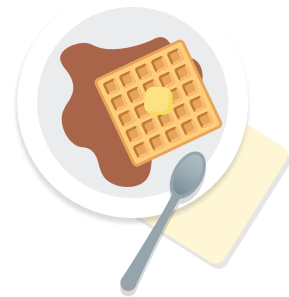
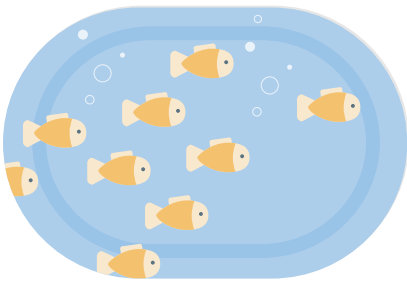
Example

Cara must code her robot to drive from the shoes to the game controller, but her robot must drive backwards the entire way!





Target Cards





Custom Challenge Cards





Logic Mapping

Help add household items to the mat! Read the clues to place the clings on the correct square.

Activity Supplies



Coding Your Home Adventure Mat



Vinyl Clings

Example to Follow

IF the mat has a frog in the pool,
THEN place a garden gnome in G1.
ELSE place a plant in G3.



IF



THEN



ELSE



Which square did you change?

G1

1 IF the mat has pizza on a side table, **THEN** place the flamingo floatie in C1. **ELSE** place the grey cat in C2.

IF



THEN



ELSE



Which square did you change?



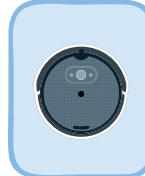
2 IF the mat has an even number of backpacks, **THEN** place a robot in D1. **ELSE** place a black dog in F2.

IF

even



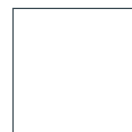
THEN



ELSE



Which square did you change?



3 IF the mat has less than five pillows, **THEN** place the white dog in H1. **ELSE** place the soccer ball in F4.

IF

> 5



THEN



ELSE



Which square did you change?



4 IF the mat has an odd number of windows, **THEN** place the basketball by the paint. **ELSE** place the white cat by their water bowl.

IF

odd



THEN



ELSE



Which square did you change?

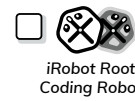




TouchBot Races

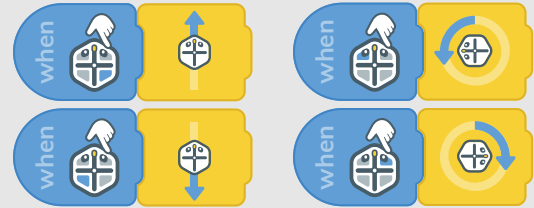
Transform your robot into a TouchBot to race around the house!

Activity Supplies



Build Your Program

The touch sensors are like buttons on top of your robot. Open the iRobot Coding App to build a TouchBot program. Code your robot to move forward, backward, and turn!



How to Play

- 1 Determine three checkpoints throughout the house. You can use the Target Cards from the Mission Driven Robots activity or identify your own!



- 2 Place robot(s) in starting positions!

If one robot:

Place your robot on A2 to begin.

If two robots:

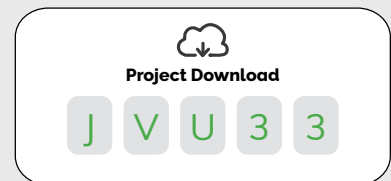
Place one robot on A2 and another robot on D1.

- 3 Press Play. Guide your robot by tapping the touch sensors to move forward, backward, and turn.
- 4 Race to each checkpoint. How fast can your robot make it? Only enter through doorways!



Going Further

Build a TouchBot that moves and turns randomly! Download the example program or build your own!

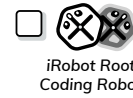




Clean-Up Bot

Friends are coming over and the house needs to be cleaned!
Code your robot to clear the clutter as quickly as possible.

Activity Supplies



Set Up

It's your turn to make a mess! Add some cotton ball clutter throughout the house. No need to add any clutter outside!

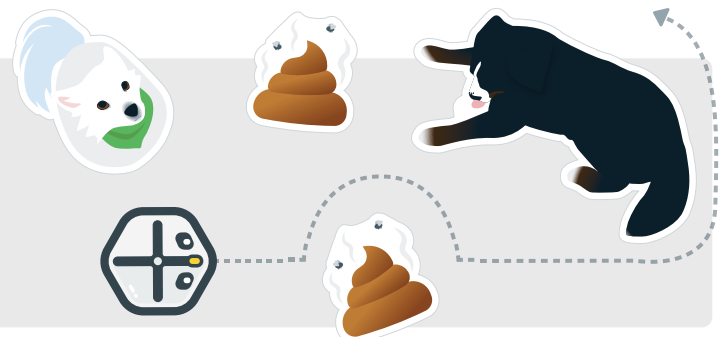
How to Play

- 1 Identify where the stairs are on the mat. Your goal is to move all the cotton ball clutter upstairs before guests arrive.
- 2 Open the iRobot Coding App to start a new coding project.
- 3 Attach a robo bulldozer to your robot and place on A2.
- 4 Set a timer for five minutes.
- 5 Try to clear as many cotton balls upstairs as possible! Remember to move through doors just like a real robot would!
- 6 Reset the cotton ball clutter for the next round.



Going Further

Don't be a party pooper! For an extra challenge, add some clings around the house to avoid. If you need to clean up a pet's mess, code your robot to flash blue to indicate the mess is clean!





Bulldozer Attachment

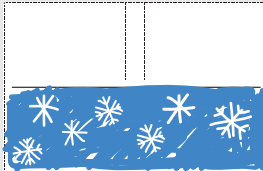
Use this outline to design and create a bulldozer attachment for Root to use.

Activity Supplies



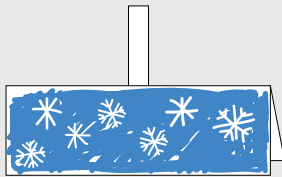
Instructions

- 1 Plan and design, your clean-up attachment.

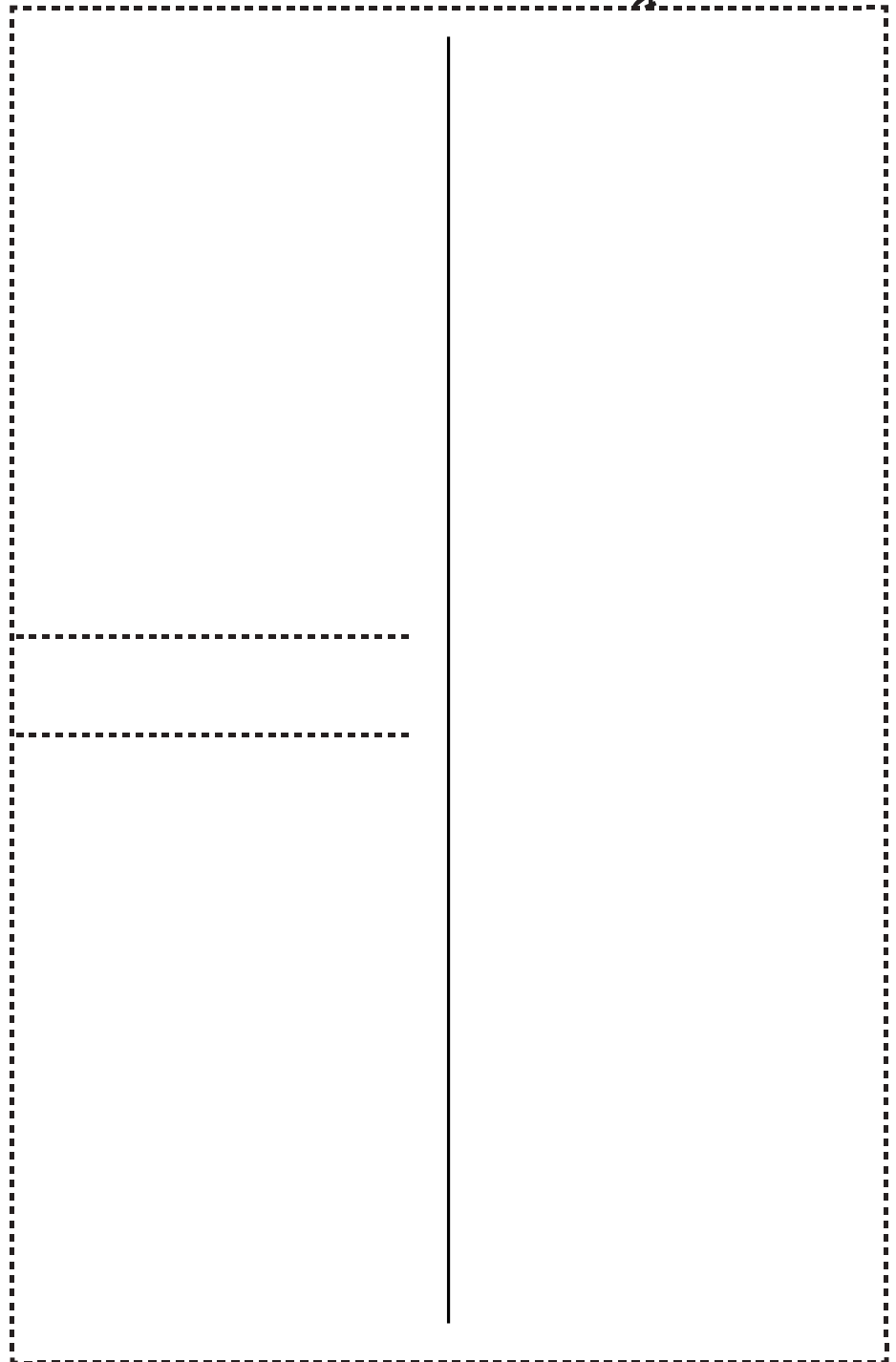
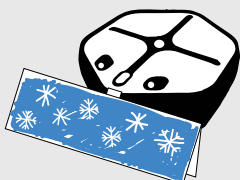


- 2 Cut along the dotted lines.

- 3 Fold along the solid line, leaving the tab up.



- 4 Attach to your robot by folding the tab into the front bumper.

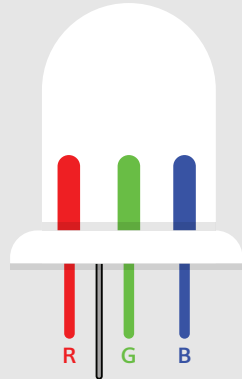




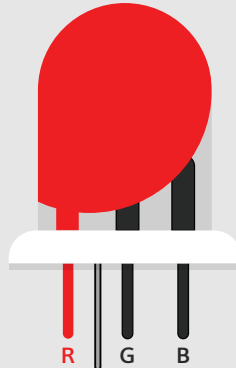
Mood Lighting

In this activity, you'll learn how we create new light colors by mixing red, green and blue light!

Learn About RGB LED's

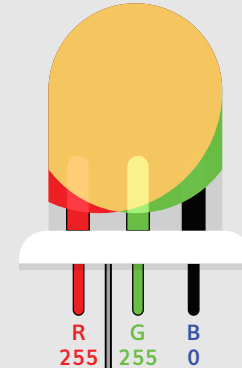


This RGB LED is one "big" light with red, green, and blue lights inside. Changing the brightness of these smaller lights from 0 to 255 with **RGB color codes** creates new colors, just like mixing a new color of paint!



To make RED, you need to turn red up all the way to 255 and turn both the green and blue lights all the way down to 0. The color code would be:

$$\left(\frac{255}{\text{RED}}, \frac{0}{\text{GREEN}}, \frac{0}{\text{BLUE}} \right)$$



To make YELLOW, you need to turn both red and green all the way up to 255 and turn blue all the way down to 0. The color code would be:

$$\left(\frac{255}{\text{RED}}, \frac{255}{\text{GREEN}}, \frac{0}{\text{BLUE}} \right)$$

- 1 Program your robot with the Light Block in Level 2 to match each of the color codes below. Circle the color that your robot glows when you press Play.

set lights on : red 255 green 255 blue 255

white purple red rainbow

set lights on : red 255 green 115 blue 0

orange yellow blue green

set lights on : red 110 green 70 blue 125

blue white red purple

- 2 Many smart devices glow different colors depending on a series of settings, such as the status of a security system. Imagine you are programming a smart lights that change color in each of the following situations and write the RGB color code to match.

(, ,)
RED GREEN BLUE
Time to Wake-Up!

(, ,)
RED GREEN BLUE
Doorbell Ringing

(, ,)
RED GREEN BLUE
Intruder Alarm Triggered





Custom Doorbell Ring

Transform your robot into a musical doorbell.

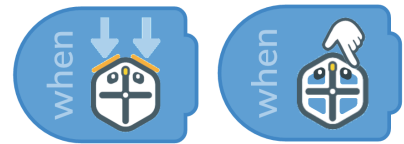
Making Music Into Code

To create music notes with code, we need two values: frequency and duration.

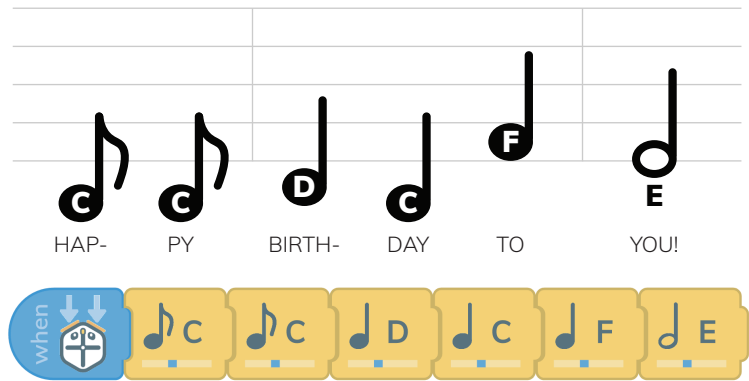
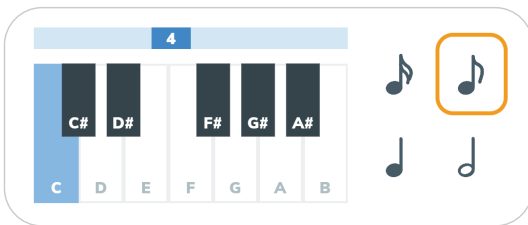
- **Frequency** (Hz) tells your speaker what kind of sound waves to make. High frequency means lots of very short sound waves (making a high-pitched note). Low frequency means a few long sound waves (making a low note).
- **Duration** tells your speaker how long to play the note.

261 Hz	277 Hz	293 Hz	311 Hz	329 Hz	349 Hz	369 Hz	391 Hz	415 Hz	440 Hz	466 Hz	493 Hz
C	D	E	F	G	A	B	C	D	E	F	G
C	D	E	F	G	A	B	C	D	E	F	G

- 1 Decide which part of your robot should be the “doorbell” button. The bumper? A touch sensor? Find the corresponding When code block for that sensor and add it to your coding project.



- 2 Next, find sheet music for the song you want to program your robot to play. Drag out a series of Play Music code blocks and open their editors to set the note frequency and the duration.

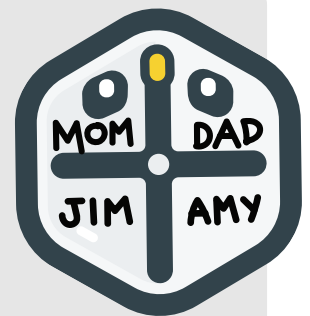


- 3 Once your song has been transcribed into a coding project, it's time to put your new doorbell to work! Press play and place your robot outside of your bedroom. Invite visitors to press the doorbell!

Going Further!

Try creating custom doorbell chimes for every member of your household!

- To achieve this, use the **When Touch Block** four times, one for each of the four touch zones. If you need more than four doorbell chimes, you can always use the **When Bump Block** as well.
- When selecting the different songs for your chimes, consider what feelings each piece of music evokes. What would a scary song be, for someone who isn't usually welcome? Or a welcoming song?





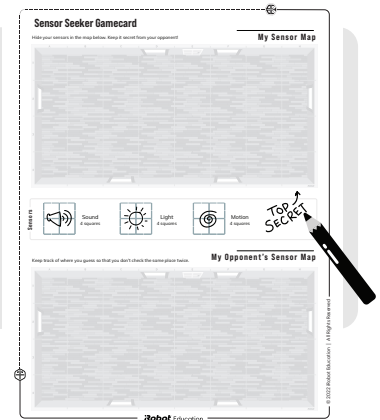
Sensor Seeker

In this multi-player game, navigate your robot around the adventure mat looking for hidden smart sensors!

About the Game

In Sensor Seeker, your goal is to uncover all of your opponent's hidden smart sensors before they discover yours!

You will use the gameboard on the following page to mark the locations where your sensors will be hidden and keep track of your search for your opponent's sensors.



How to Play

- 1 Print 2 copies of the Sensor Seeker Gamecard, so that each player has 1 copy.
- 2 Each player must "hide" their sensors by drawing them on "My Sensor Map." *Keep the gamecard secret so that your partner can't see where you have hidden your sensors.*

- 3 Player 1 will navigate the robot across the Adventure Mat to a specific square. Once they arrive at their target location, their robot must perform 1 of 3 actions to "trigger" one of the opponent's hidden sensors:

- To trigger a **Sound Sensor**, the robot must play a music note.
- To trigger a **Light Sensor**, the robot must glow a color.
- To trigger a **Motion Sensor**, the robot must spin around 360 degrees.

- 4 If Player 2's corresponding sensor **IS** located in the square:

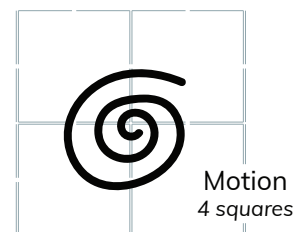
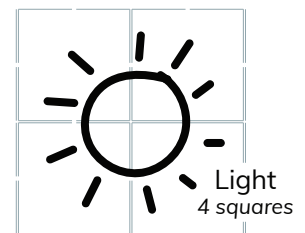
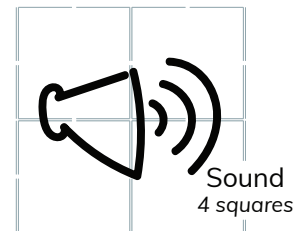
- Player 2 must say "[Light] sensor triggered."
- Player 1 must write "[Light] Sensor" in the matching space on "My Partner's Sensor Map" on their game card. Their turn is then over.

If Player 2's corresponding sensor **IS NOT** located in the square:

- Player 2 must say "[Light] sensor NOT triggered."
- Player 1 may write "No [light] in the corresponding space on "My Partner's Sensor Map" on their game card to remember that the space does not have the selected sensor. The turn is then over. **NOTE:** *On their next turn, they may choose to stay in the same space and try to trigger a different sensor.*

- 5 Player 2 will now take their turn, repeating steps 3-4. Take turns until all the landmark squares have been discovered!

Sensors

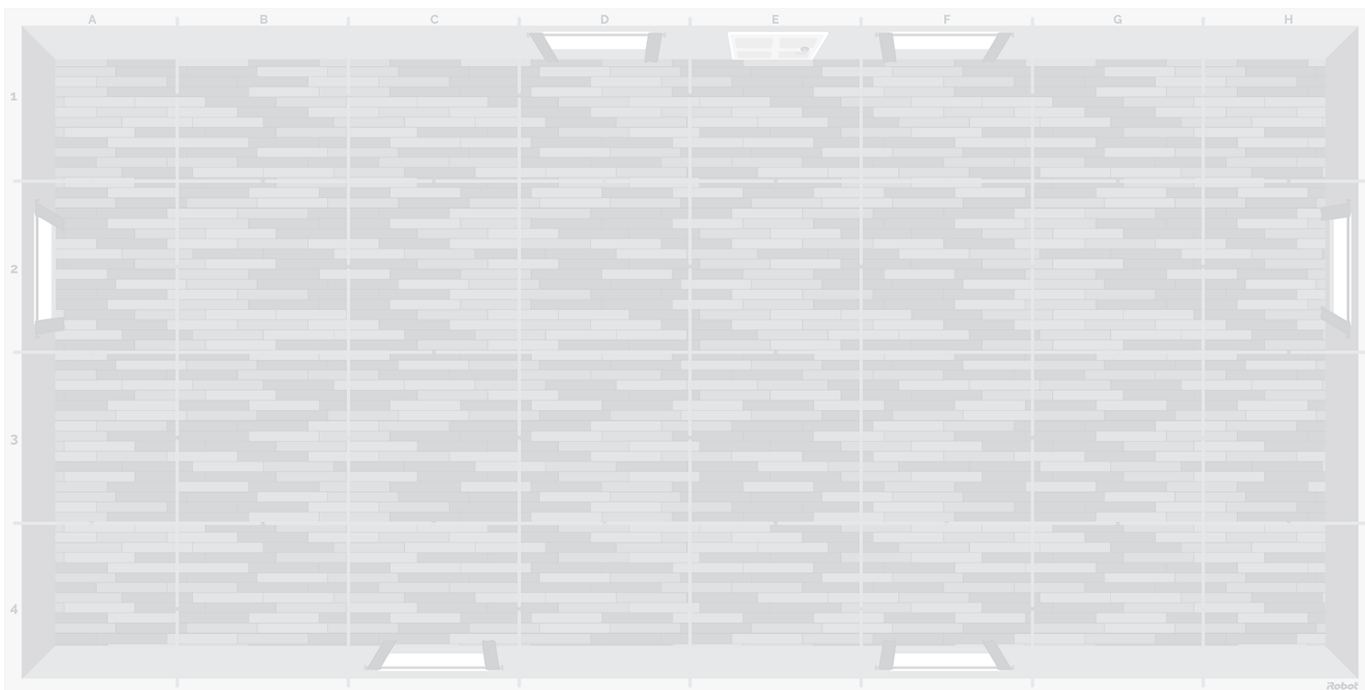




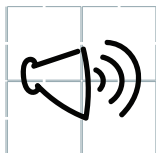
Sensor Seeker Gamecard

Hide your sensors in the map below. Keep it secret from your opponent!

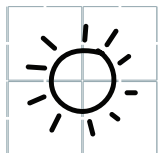
My Sensor Map



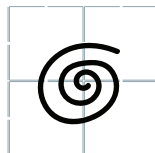
Sensors



Sound
4 squares



Light
4 squares

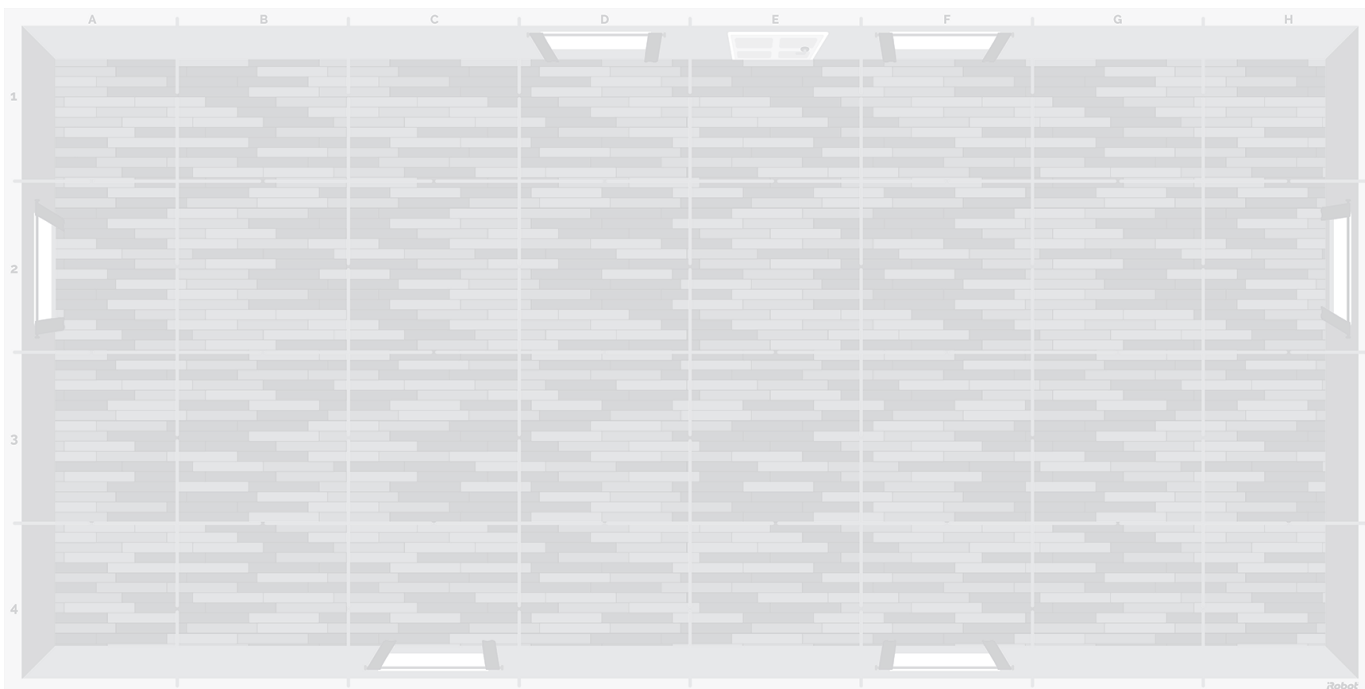


Motion
4 squares

TOP SECRET

Keep track of where you guess so that you don't check the same place twice.

My Opponent's Sensor Map



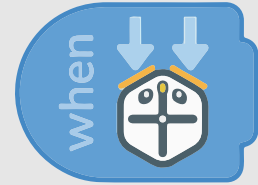


3D Floor Plan

Build a 3D walls on top of your Adventure Mat to create an autonomous cleaning robot.

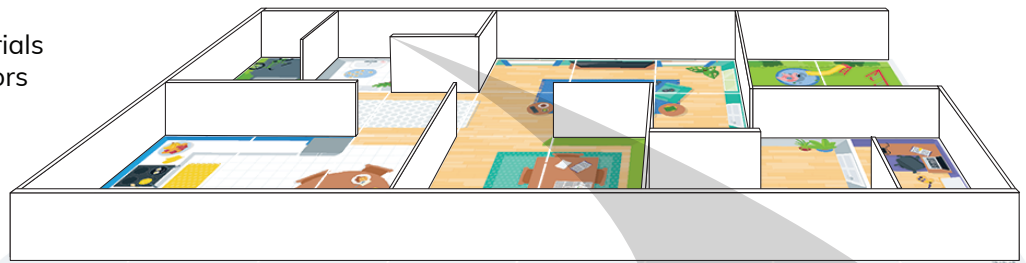
The Power of Bump Sensors

The Root Coding Robot is equipped with bump sensors to help it navigate around obstacles, much like the original Roomba® Robot Vacuums. Through the power of code, you can tell your robot what to do when it encounters an obstacle, such as back up, turn around and driving forward again.

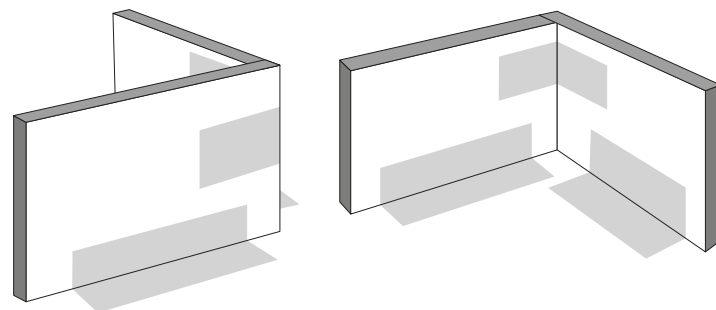
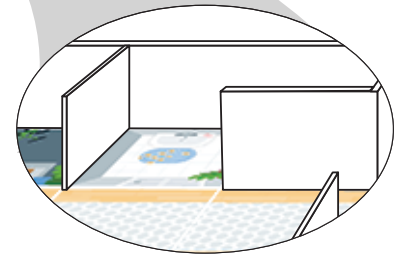


Building Your Floor Plan

- 1 Gather sturdy craft materials such as cardboard, scissors and duct tape. You'll use these materials to create physical walls to match the 2D walls of the adventure mat.



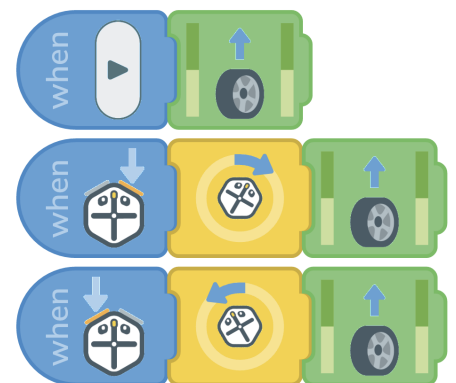
- 2 Measure along the walls of the rooms on the Adventure Mat and cut your cardboard to size. Ensure that your robot is able to navigate around the board by NOT putting any cardboard walls on squares with doors.



- 3 The Root Robot only activates its bump sensors on sturdy obstacles. Reinforce the walls of your floor plan with duct tape to prevent them from getting knocked over!

Program Your Robot

- 4 Now that your floorplan has been built out, program your robot to drive autonomously across the home. You can create an autonomous driving program with **When Bump**, **Turn** and **Wheel Speeds Blocks**. Navigating by itself, can the robot make it into every room of the house? Every square of the board?



- 5 Take your project further by using the When Touch Block to activate specific "missions" across your home, like driving from the hallway to the pink bedroom when the front-left zone is pressed!





Up In The Cloud(s)!

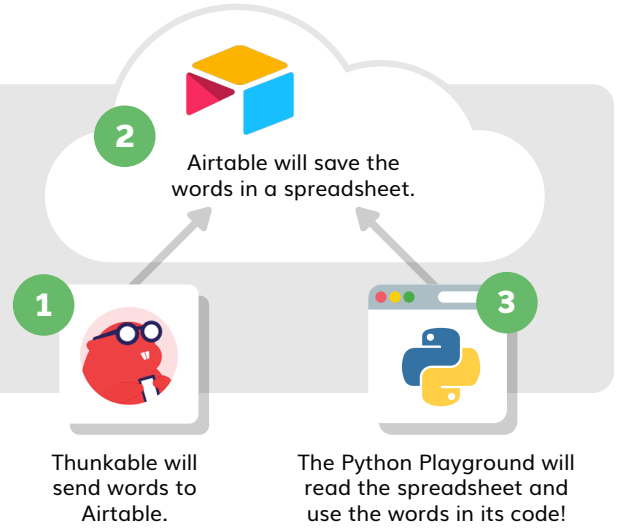
Create a smart home integration for the Root Coding Robot.

What is The Cloud?

A "cloud" is a secure place on the internet where you can store data, like photos, keywords or important documents.

In this project, you will:

- Create your own data cloud with Airtable
- Create a python project in the iRobot Python Web Playground
- Create your own app with Thinkable



Intermediate

Integrating AirTable With the Python Web Playground

Tutorial for connecting an Airtable base to the Python Web Playground.

Coding, Python, Robotics

Intermediate

Integrating Thinkable with the Python Playground

Create a remote-control app to drive your robot around.

Coding, Python, Robotics

- 1 Visit edu.irobot.com/Learning-Library, and follow the tutorial titled **"Integrating AirTable With The Python Web Playground"**
- 2 Next, follow the tutorial titled **"Integrating Thinkable With The Python Web Playground."** After completing both tutorials, you'll know how to create a web app to control the Root Coding Robot.

3 Using your new skills, transform your robot into a smart home device by exploring some the ideas below!

Robot Alarm Clock

Create an app that programs your robot to play a song at a specific time of day.

Mood Lighting

Control the color of the lights on your robot with buttons on a Thinkable app.

TweetBot 6000

Create a robot that posts on Twitter or sends a text whenever it bumps into something.

Poker Face

Drive your robot around with your facial expressions using Thinkable's Image Recognition feature.

