



Summer Coding Academy

Level 1 Leader Guide

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Day 1: Monday

Supplies

<ul style="list-style-type: none">• Tablets for each kid• Real Life Lightbot Supplies<ul style="list-style-type: none">◦ 10 white posterboard◦ 2 blue posterboard◦ 2 yellow posterboard◦ 4 black posterboard (or leave those areas blank)◦ Stacks of command cards: Forward, Right, Left, Jump, Light On• Evo Obstacle Course posters + Obstacles	<ul style="list-style-type: none">• Name tags• Art supplies for decorating name tags• Ozobot Evo's• DIY Packs/Skins for each kid• Demo Supplies:<ul style="list-style-type: none">◦ Shapeoko CNC mill◦ Laptop running Easel software to program the CNC mill. Have "Cody" loaded◦ Name tag secured to the CNC mill bed◦ Sharpie secured to CNC mill
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Goals for Day 1

- Learn the basics of computer programming using the app "Lightbot"
- Learn how to control the robot (known as the "Ozobot Evo") manually using the tablet

Start Time	Est. Time	Description
8:45	30	Registration Kids can start decorating nametags [art, visual, tactile]
9:15	5	Demo: CNC mill programmed with Cody's name [inspiration, visual]
9:20	5	Group sharing: "If I could make anything..." [imagination, social, auditory]
9:25	5	Share plan for the week: 1. Learn to program in a game (Lightbot) 2. Control a robot with colors and lines (Ozobot Color Codes) 3. Control a robot with visual programming blocks (Ozoblockly)
9:30	10	Real Life Lightbot 1-1 (immediate mode) – p.3 [social, tactile, visual, code]
9:40	10	Real Life Lightbot 1-2 (program mode) [social, tactile, visual, code]
9:50	10	Real Life Lightbot 1-3 (jumping) [social, tactile, visual, code]
10:00	30	Snack Make a "robot" with your snack food [social, food, tactile, art, visual]
10:30	10	Hand out tablets and show how to work with Fully Kiosk Browser app (swipe to switch, etc) Each kid gets the same tablet for the whole week
10:40	30	Launch Lightbot on tablet and do all of the challenges in Level 1 [screen, code] Leaders: setup Evo Obstacle Course while kids do Lightbot Leaders: help kids when they're stuck with a level, but try to talk them through it rather than giving them the answer ++ Veteran kids can try out Robotizen or Pocket Code
11:10	5	Demo: Evo Manual Control (drive, sounds, colors, color animations) [social, visual]
11:15	10	Pass out Evo that is already paired with each tablet Each kid gets the same Evo for the whole week (and takes it home at the end) Make sure everyone can launch the Evo app, connect, and start driving
11:25	30	Evo Obstacle Course Races [screen, tactile, competition] ++ With extra time, decorate your Evo with the DIY pack stickers and skins
12:00		GO HOME

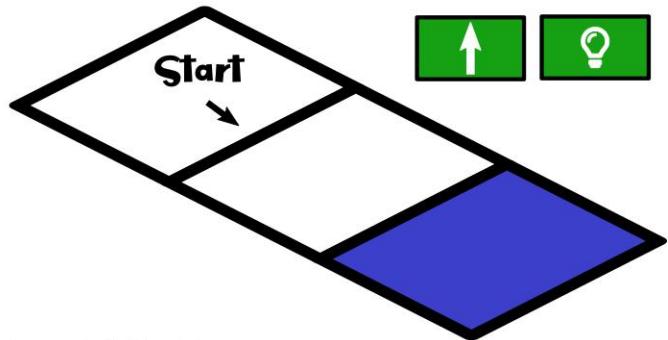
Real Life Lightbot 1-1 (immediate mode)

Supplies:

2 white posterboard
1 blue posterboard
1 yellow posterboard
Stack of "forward" cards
Stack of "light on" cards

Instructions:

1. Instructor goes to start
2. Explain the goal is to get instructor to blue tile and "turn"



Instructions:

1. Instructor goes to start, facing the direction of the arrow
2. Explain the goal is to get instructor to blue tile and "turn on the light"
3. Kids pick a command from the stacks of command cards and instructor does the action immediately
4. When they "turn on" the blue tile, flip it over to reveal a yellow "light on" tile attached to the back - VICTORY!!!

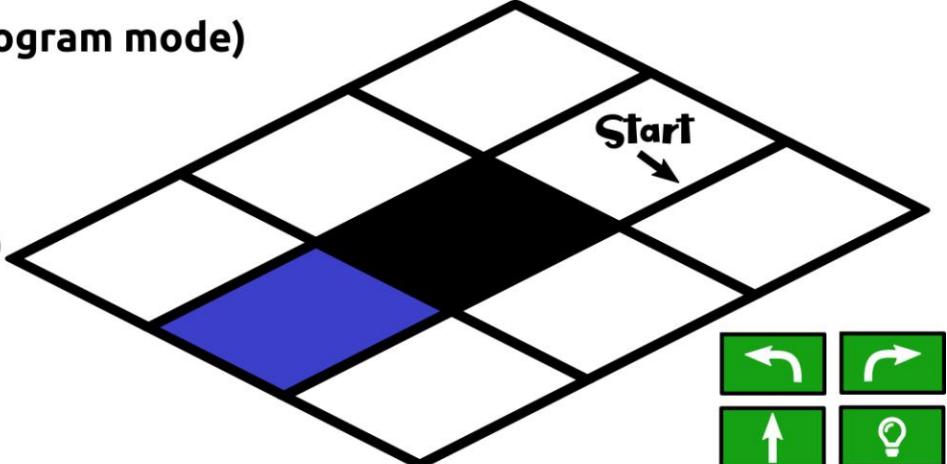
Solution:



Real Life Lightbot 1-2 (program mode)

Supplies:

7 white posterboard
1 blue posterboard
1 yellow posterboard
1 black posterboard (or leave blank)
Stack of "forward" cards
Stack of "light on" cards
Stack of "turn right" cards
Stack of "turn left" cards



Instructions:

1. Instructor goes to start, facing the direction of the arrow
2. Explain the goal is to get instructor to blue tile and "turn on the light," but now the kids have to pick the commands in order ahead of time (program mode). Also, the black tile can't be crossed - it's a wall
3. Kids pick a command from the stacks of command cards and places it in order (left to right) on the ground
4. When the kids want to "run the program," a volunteer reads out the commands in order (ex: "straight, turn left, straight...") and the instructor does the commands
5. When they "turn on" the blue tile, flip it over to reveal a yellow "light on" tile attached to the back - VICTORY!!!

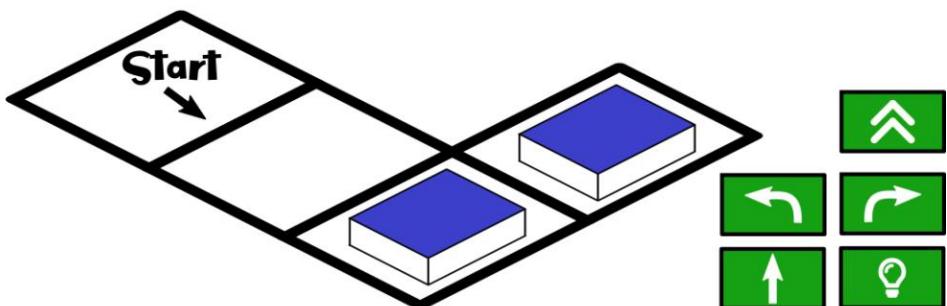
Solution:



Real Life Lightbot 1-3 (program mode)

Supplies:

2 white posterboard
2 blue posterboard
2 yellow posterboard
2 elevated platforms (chairs, etc)
Stack of "forward" cards
Stack of "light on" cards
Stack of "turn right" cards
Stack of "turn left" cards
Stack of "jump" cards



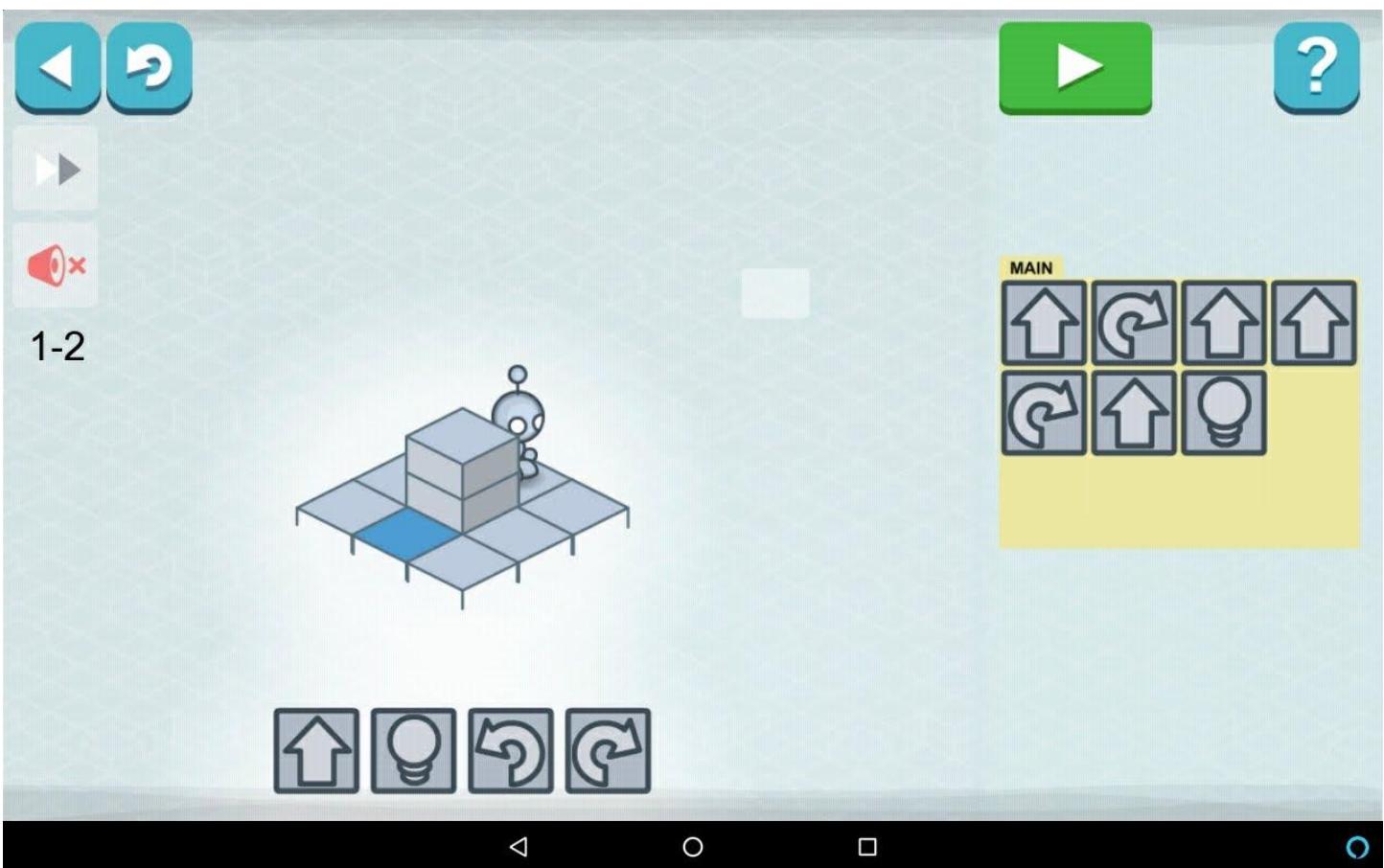
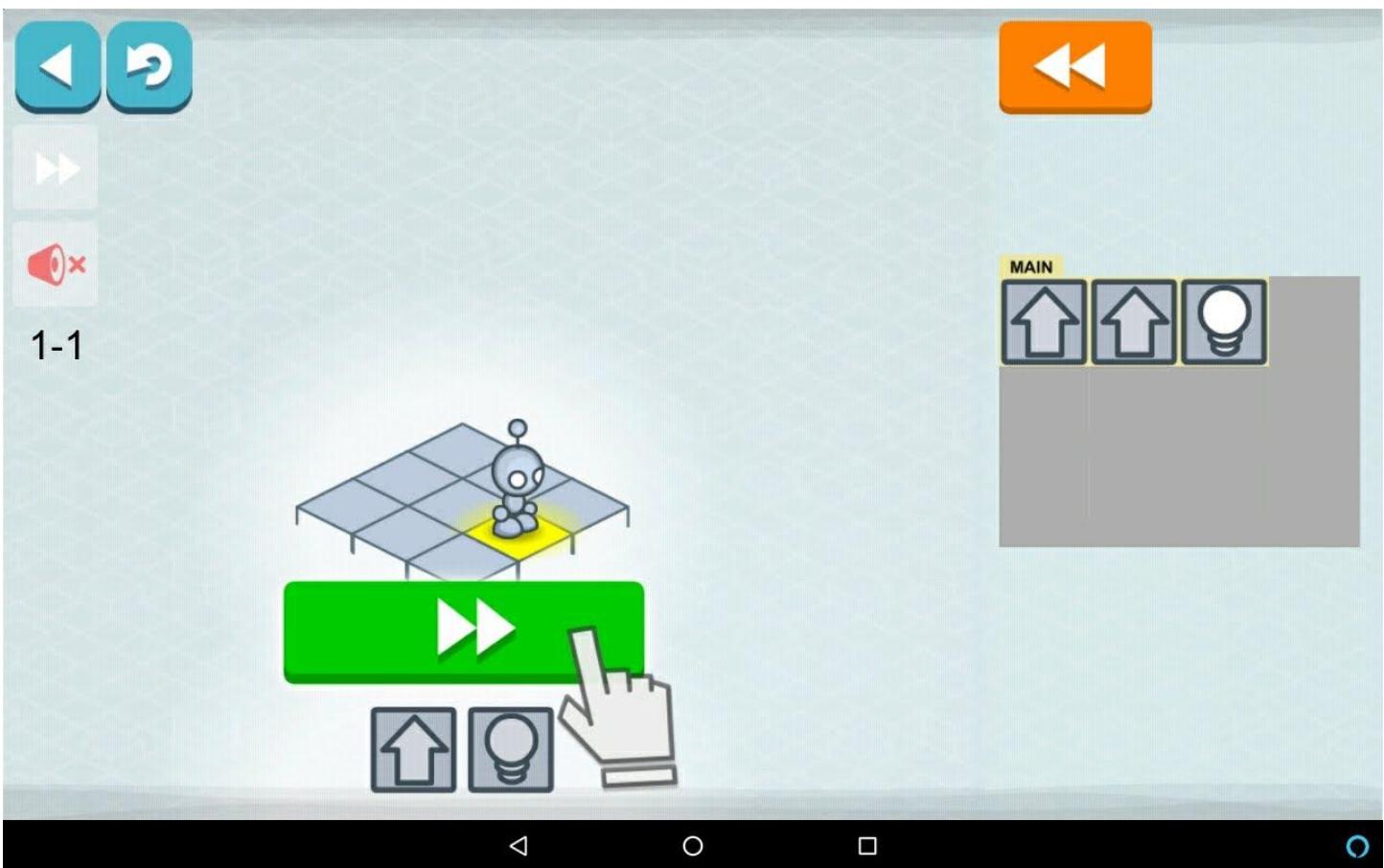
Instructions:

1. Instructor goes to start, facing the direction of the arrow
2. Explain the goal is to get instructor to all the blue tiles and "turn on the light" by choosing the commands ahead of time (program mode). To get onto the platform/chair, use a "jump" command
3. Kids pick a command from the stacks of command cards and places it in order (left to right) on the ground
4. When the kids want to "run the program," a volunteer reads out the commands in order (ex: "straight, turn left, straight...") and the instructor does the commands
5. When they "turn on" a blue tile, flip it over to reveal a yellow "light on" tile attached the back. When all blue tiles are yellow - VICTORY!!!

Solution:



Lightbot Level 1



A Scratch-like programming interface. At the top left are control buttons: a blue square with a white triangle pointing left, a blue square with a white circle with a diagonal line, a grey square with a white triangle pointing right, and a grey square with a red speaker icon. At the top right are a green play button with a white triangle and a blue question mark button. Below the control buttons is a yellow star icon. In the center is a small robot character standing on a 3D grid made of light blue blocks. To the right is a command palette titled "MAIN" with four rows of icons. The first row contains: Up arrow, Spool (stack), Left turn, Up arrow. The second row contains: Right turn, Spool, Up arrow, Lightbulb. The third row contains: Up arrow, Spool, Left turn, Up arrow. The fourth row contains: Up arrow, Spool, Left turn, Lightbulb. Below the palette is a horizontal bar with a black triangle pointing left, a white circle, a white square, and a blue circle with a white dot.

1-3

The robot is positioned on a 3D grid of light blue blocks. There is a single blue block stacked on top of the grid at the robot's current position.

The command palette shows the following blocks:

- Up arrow
- Lightbulb
- Left turn
- Right turn
- Spool

A black control bar at the bottom of the screen features a black triangle pointing left, a white circle, a white square, and a blue circle with a white dot.

A Scratch-like programming interface. At the top left are control buttons: a blue square with a white triangle pointing left, a blue square with a white circle with a diagonal line, a grey square with a white triangle pointing right, and a grey square with a red speaker icon. At the top right is a green play button with a white triangle. In the center is a yellow star icon. Below the star is a blue bar with the text "Use 6 or fewer commands". Underneath the bar is a green bar with the text "Using 6 commands". In the center is a small robot character standing on a 3D grid made of light blue blocks. To the right is a command palette titled "MAIN" with four rows of icons. The first row contains: Up arrow, Up arrow, Left turn, Spool. The second row contains: Spool, Lightbulb, Left turn, Up arrow. The third row contains: Up arrow, Spool, Left turn, Up arrow. The fourth row contains: Up arrow, Spool, Left turn, Lightbulb. Below the palette is a horizontal bar with a black triangle pointing left, a white circle, a white square, and a blue circle with a white dot.

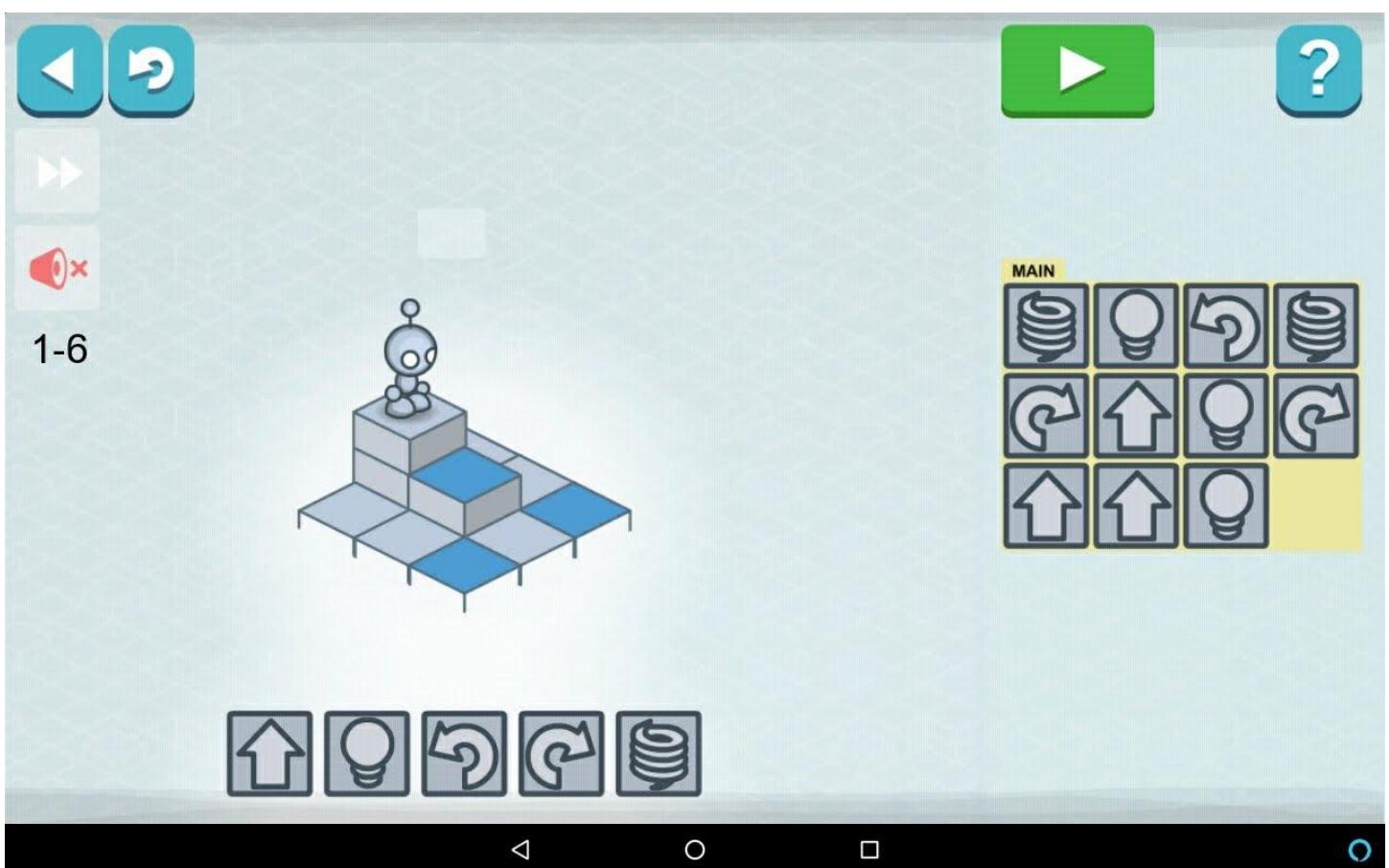
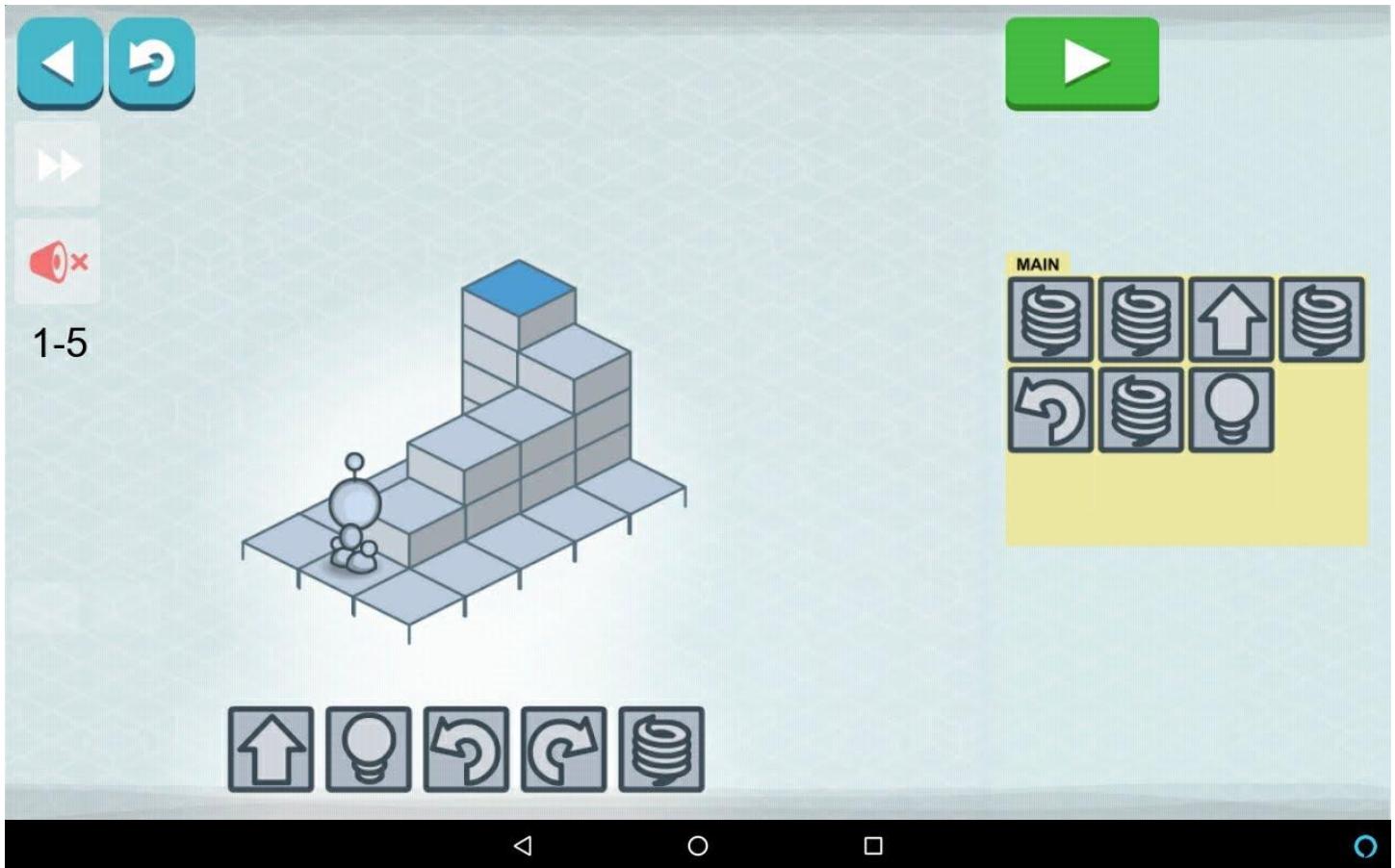
1-4

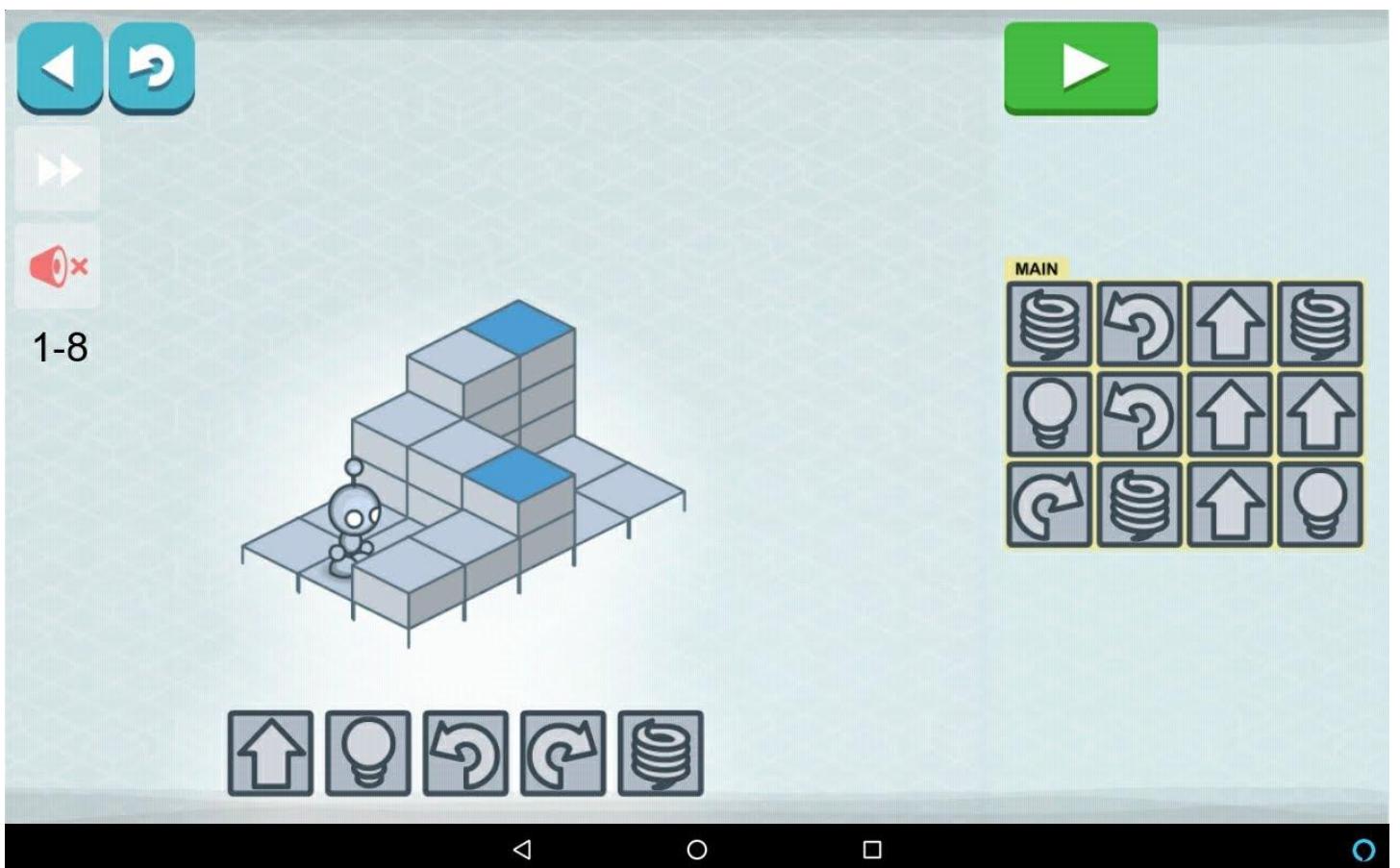
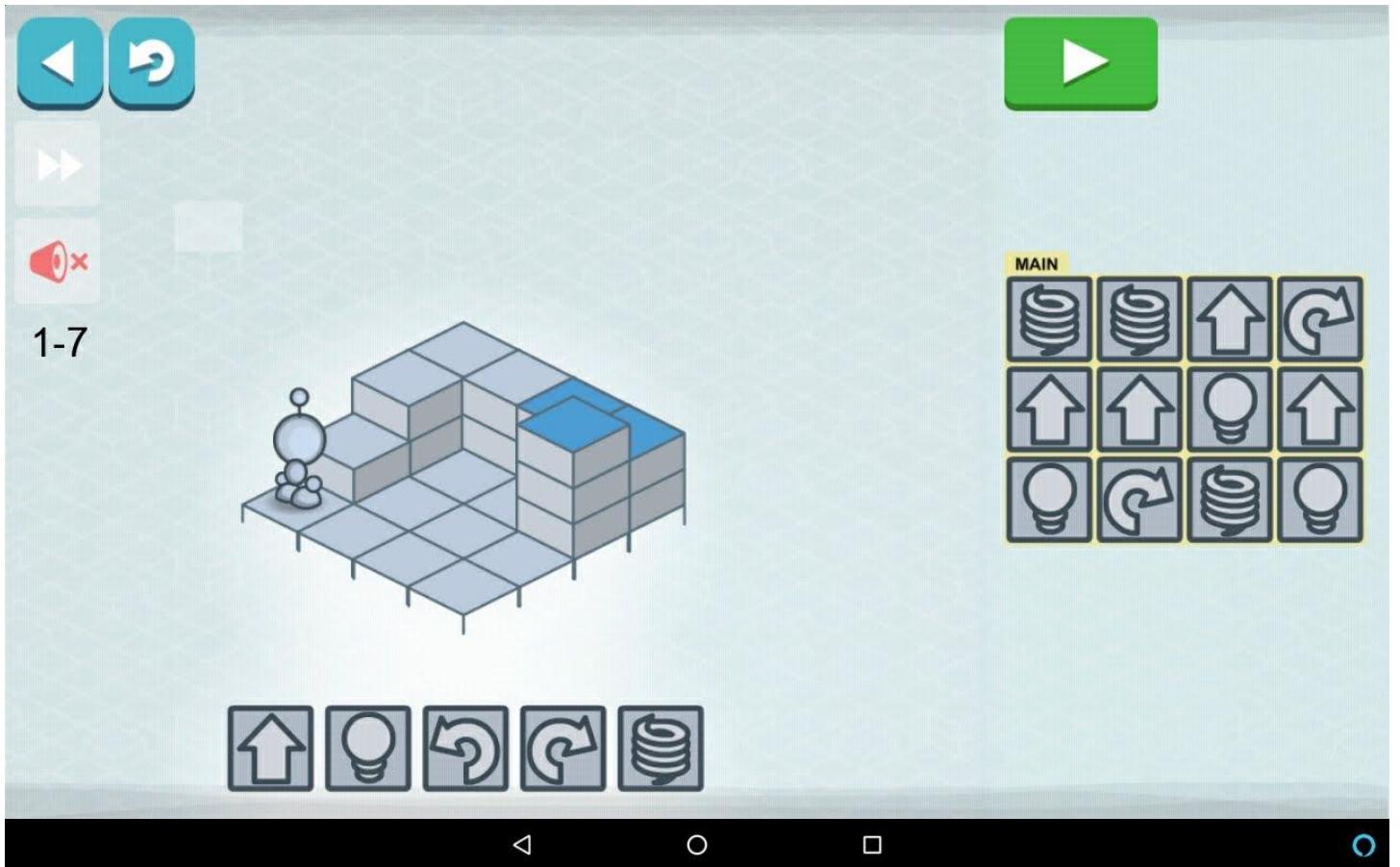
The robot is positioned on a 3D grid of light blue blocks. There is a single blue block stacked on top of the grid at the robot's current position.

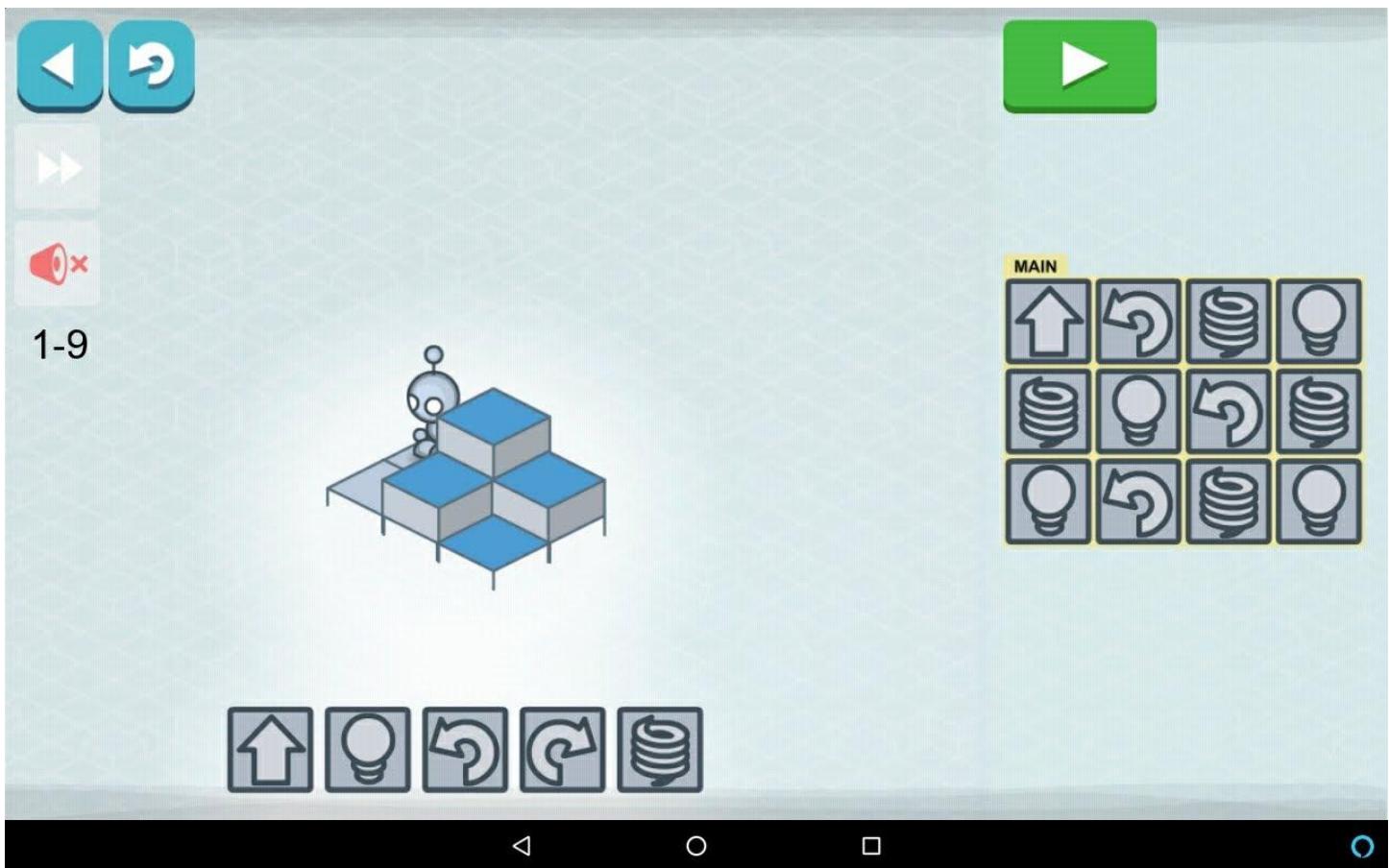
The command palette shows the following blocks:

- Up arrow
- Lightbulb
- Left turn
- Right turn
- Spool

A black control bar at the bottom of the screen features a black triangle pointing left, a white circle, a white square, and a blue circle with a white dot.

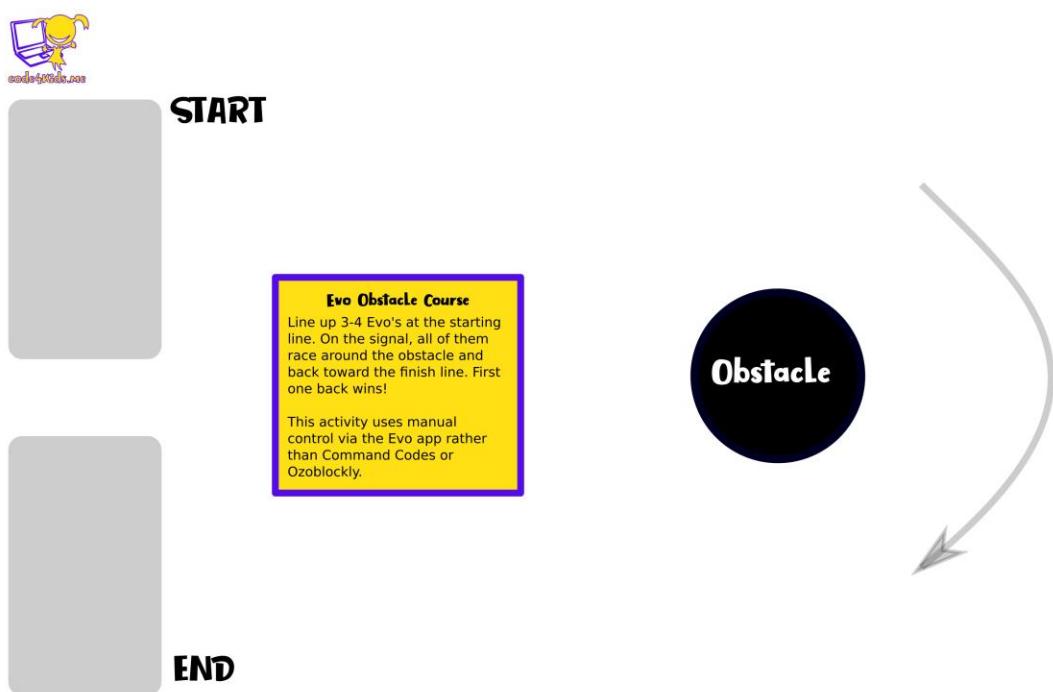






Evo Obstacle Course

- Setup poster board for each kid (see below)
- Place a heavy obstacle (ex: large coffee can) on the Obstacle spot, leaving room for robots on all sides



Day 2: Tuesday

Supplies

<ul style="list-style-type: none">• Tablets and Evo's for each kid• Real Life Lightbot Supplies<ul style="list-style-type: none">◦ 10 white posterboard◦ 1 blue posterboard◦ 1 yellow posterboard◦ 4 black posterboard◦ Stacks of command cards: Forward, Right, Left, Jump, Light On, P1• Cardboard Mazes: cardboard pieces, boxes to hold mazes, markers, glue/tape	<ul style="list-style-type: none">• Name tags from Day 1• Color Code Mazes• Extra paper and markers for custom mazes• Demo Supplies:<ul style="list-style-type: none">◦ 3D Printer◦ Laptop sending commands for "Cody"• Color Code Markers and Stickers for each kid• Ozobot Football papers
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Goals for Day 2

- Learn how the Evo follows lines on a page
- Learn how to control the Evo using Color Codes
- Understand how the Evo's proximity sensors work
- Learn how to reuse code with Lightbot app

Start Time	Est. Time	Description
8:45	25	Registration
9:10	5	Review Yesterday + Questions?
9:15	5	Demo: 3D printing “Cody” name tag or Code4Kids logo [inspiration, visual] Explain that this is same as Lightbot: move around + drop filament is like “light on”
9:20	5	Evo Line Following [art, visual, tactile] Draw lines in various colors and watch Evo follow Point out that top light changes to show color underneath Point out that Evo randomly picks a direction at an intersection Share that Evo can detect a sequence of colors to follow instructions (ex: “turn left”)
9:25	5	Color Code Lightbot 1-1 (complete the line) [visual, tactile, code]
9:30	5	Color Code Lightbot 1-2 (turning with markers) [visual, tactile, code]
9:35	10	Color Code Maze 1 (fill in blanks with markers) [visual, tactile, code]
9:45	10	Color Code Maze 2 (stickers with no blanks) [visual, tactile, code] Extra Credit: student guide has more activities inside ++ Extra time: draw your own maze for someone else to complete
9:55	30	Cardboard Maze [tactile, art, visual] Make a 3D maze out of cardboard, draw lines, use Color Codes to solve ++ Extra time: black out marker spots and solve someone else's maze
10:25	30	Snack Make a multi-colored “maze” with your snack food [social, food, art, tactile, visual]
10:55	15	Sensor Nudging [tactile, visual] Use “Pied Piper” app and sensors to nudge Evo through Cardboard Maze
11:10	15	Real Life Lightbot 2-1 (procedures/functions) [social, visual, code, audio]
11:25	30	Launch Lightbot on tablet and do all of the challenges in Level 2 [screen, code] Leaders: help kids when they’re stuck with a level, but try to talk them through it rather than giving them the answer Extra Time: Ozobot Football ++ Veteran kids can try RoboTizen or Pocket Code
12:00		GO HOME

Color Code Lightbot



Lightbot Level 1-1

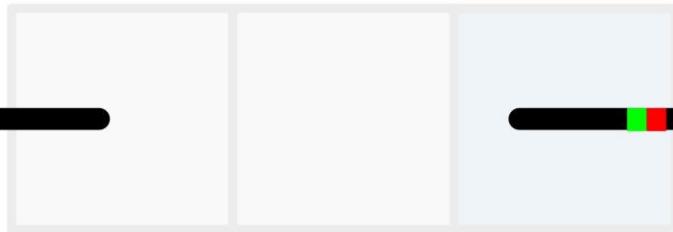
Finish drawing the thick black path so the Evo will make it from the Start to the End. When the Evo notices the "Win and Stop" code, it will do a victory dance!

Color Codes

Win and Stop



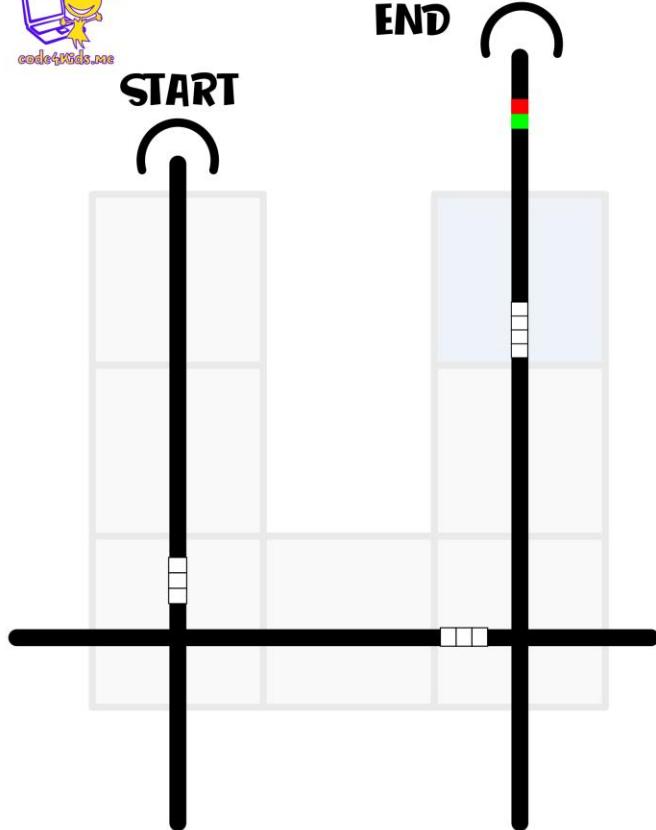
START



END



code4kids.ro

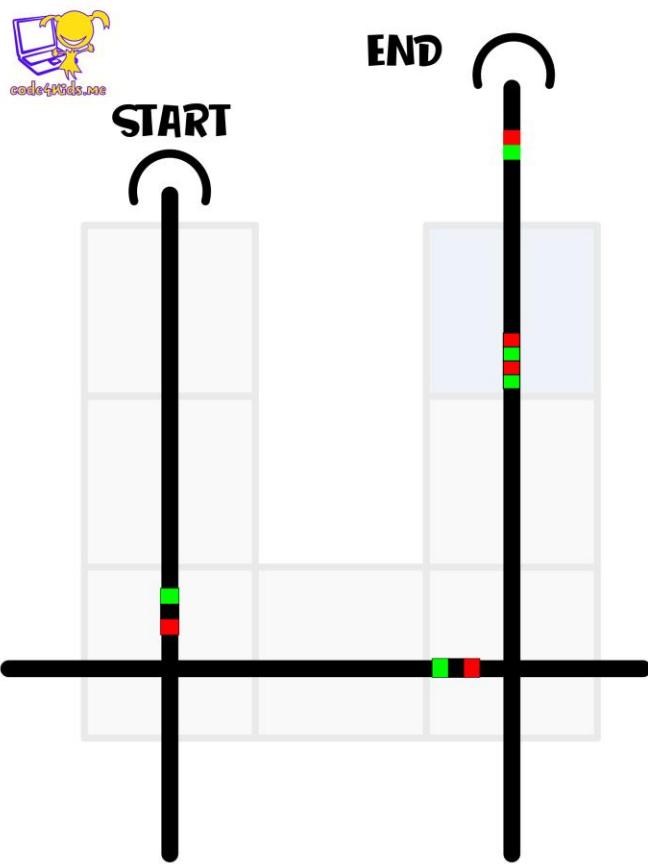


Lightbot Level 1-2

Fill in the colors to tell the Evo to "Turn Left" at the intersections. Then add the "Spin Move" color code before the Evo does its victory dance at the end!

Color Codes

Win and Stop	Spin Move	Turn Left



Lightbot Level 1-2

Fill in the colors to tell the Evo to "Turn Left" at the intersections. Then add the "Spin Move" color code before the Evo does its victory dance at the end!

Color Codes

Win and Stop	Spin Move	Turn Left

SOLUTION



code4kids.me

START



Maze 1
Place the command code stickers on the thick black path to make sure the Evo makes it to the finish.

COMMAND STICKERS

Go Straight	Win and Stop
Turn Left	Turn Right

END



code4kids.me

START



Maze 1
Place the command code stickers on the thick black path to make sure the Evo makes it to the finish.

COMMAND STICKERS

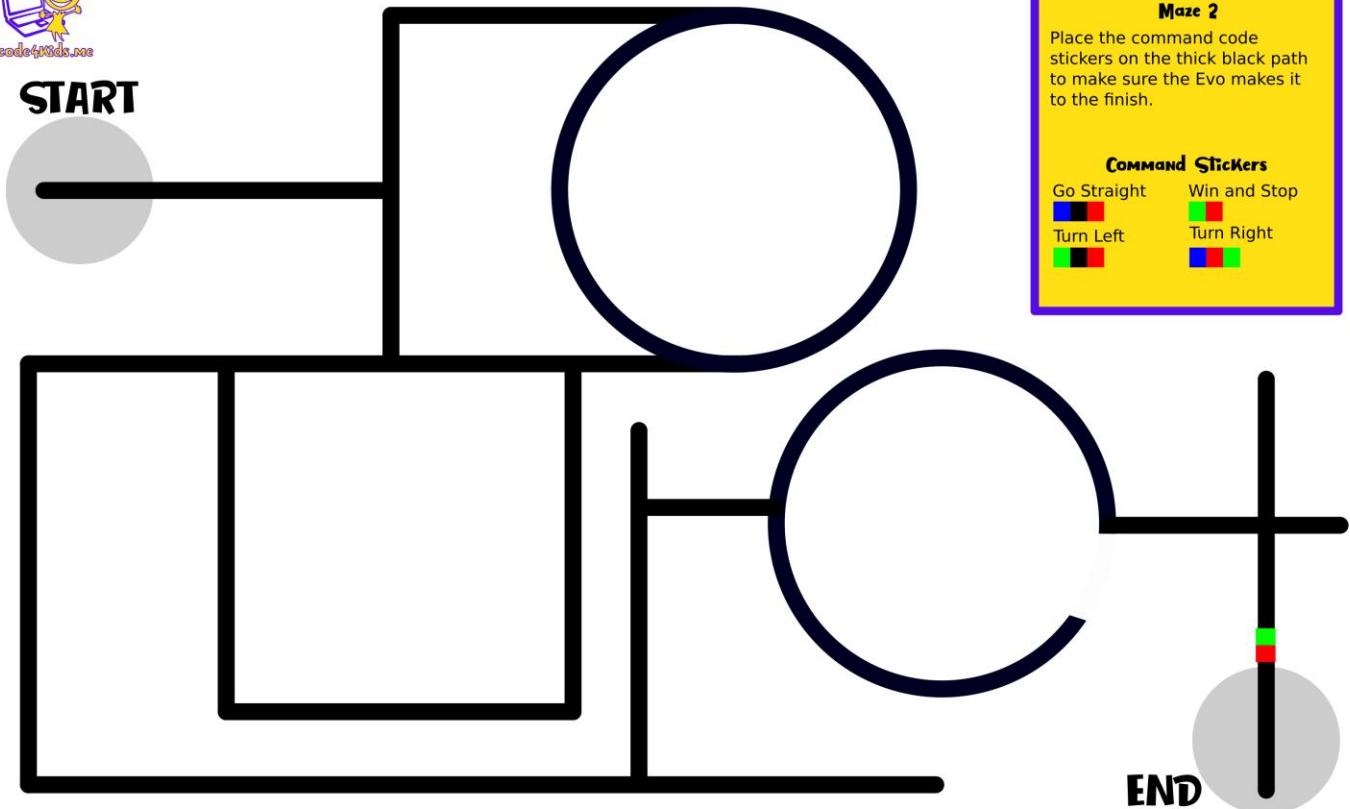
Go Straight	Win and Stop
Turn Left	Turn Right

END

SOLUTION



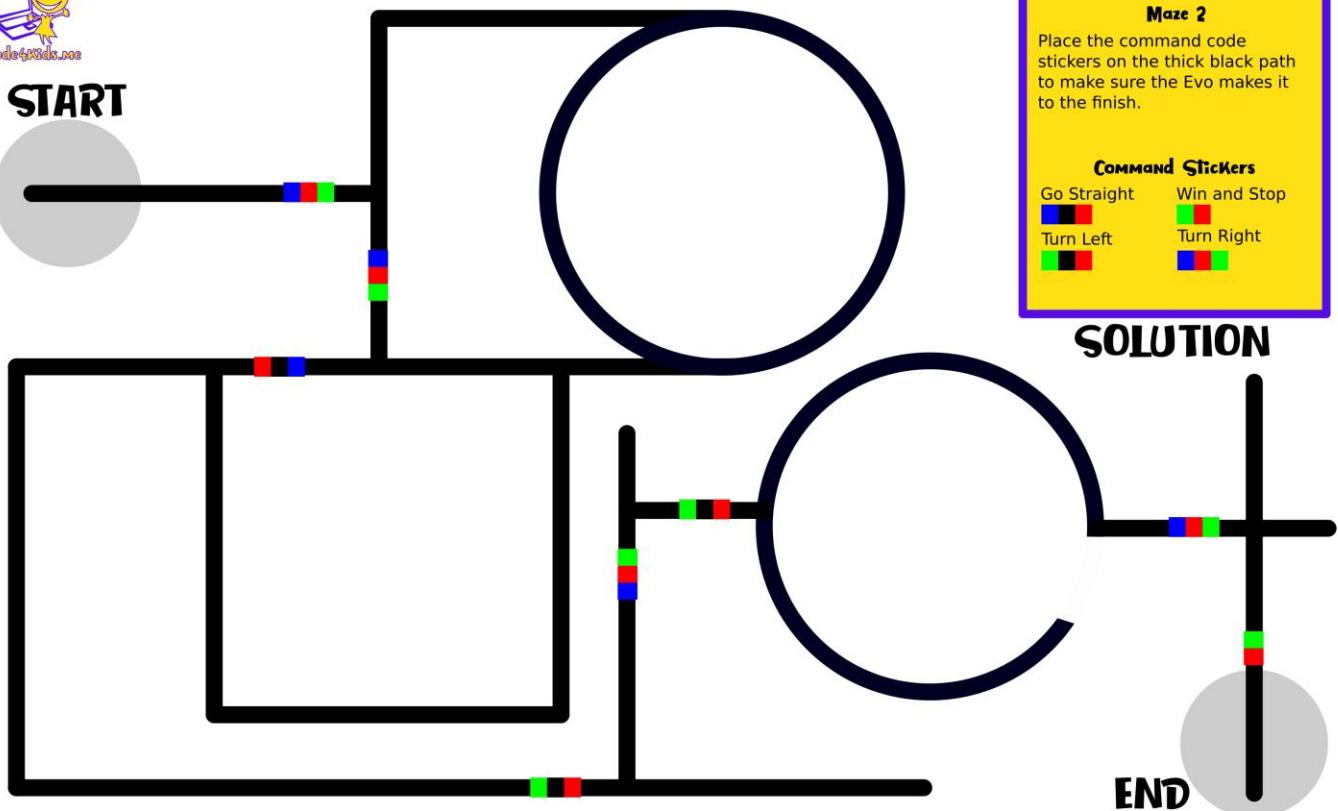
START



END



START



SOLUTION

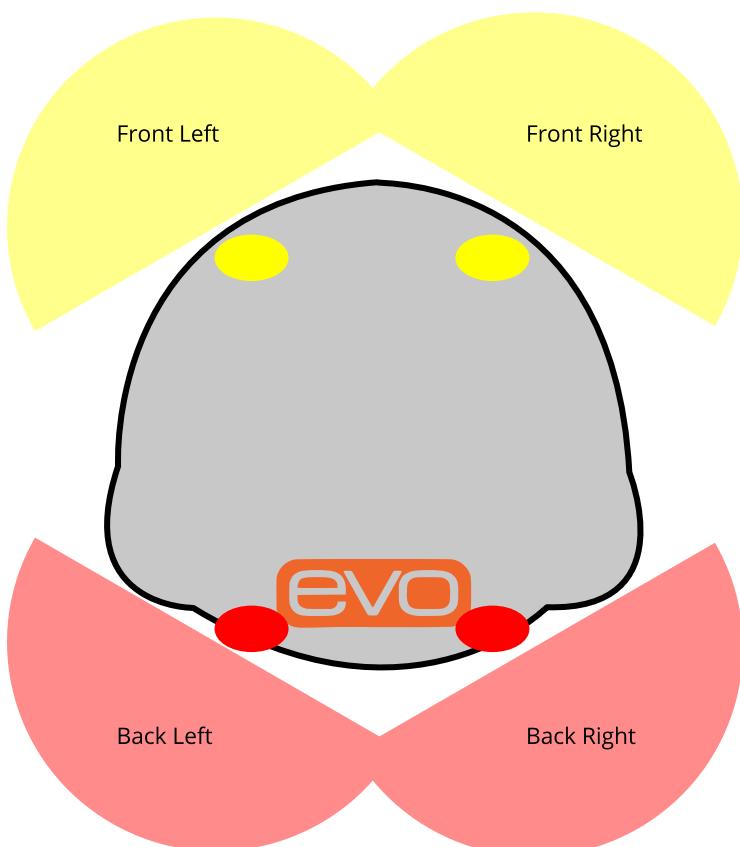
END

Cardboard Maze



- Build a maze with cardboard
- Draw lines for Evo to follow
- Make a "Finish" with a "Win" or equivalent ColorCode sticker at the end of the maze
- Use ColorCode stickers to guide Evo through the maze to the finish

Sensor Nudging



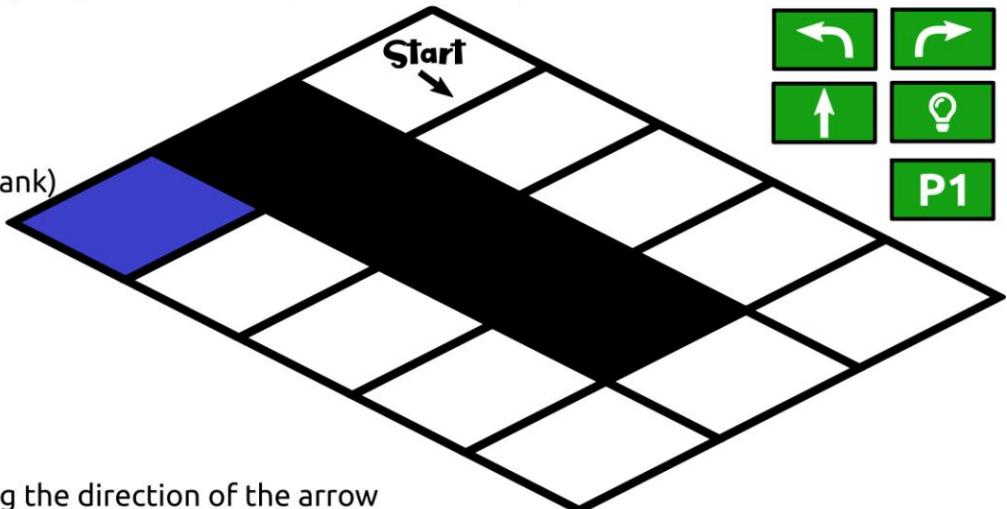
Use your fingers to block certain proximity sensors and "nudge" the Evo in the direction you wish it to go. Nudge the Evo all the way through your Cardboard Maze.

- Forward = block both Back sensors
- Backward = block both Front sensors
- Turn Left = block the Front Right sensor
- Turn Right = block the Front Left sensor

Real Life Lightbot 2-1 (program mode) - Functions/Procedures

Supplies:

10 white posterboard
1 blue posterboard
1 yellow posterboard
4 black posterboard (or leave blank)
Stack of "forward" cards
Stack of "light on" cards
Stack of "turn right" cards
Stack of "turn left" cards
Stack of "P1" cards



Instructions:

1. Instructor goes to start, facing the direction of the arrow
2. Explain the goal is to get instructor to the blue tiles and "turn on the light" by choosing the commands ahead of time (program mode). Also, the black tile can't be crossed - it's a wall
3. Explain that we now have a limited number of instructions (8 in Main, 4 in Procedure 1 or "P1")
4. Explain that we can run the whole group of commands in P1 multiple times - that's a re-usable procedure or function
5. Kids pick a command from the stacks of command cards and places it in order (left to right) on the ground in either the Main group or P1 group
6. When the kids want to "run the program," use two volunteers - one to be on the Main group and one in the P1 group. Start with Main, and the volunteer calls out and walks to show which command they're on (ex: "straight, straight, Procedure 1"). When Main reaches a P1 card, stop and hand over control to the P1 volunteer. They then call out and walk to show which command they're on inside P1. When P1 is finished, Main takes over again and continues.
7. When they "turn on" a blue tile, flip it over to reveal a yellow "light on" tile attached the back - VICTORY!!!

Solution: Main...



Procedure 1 (P1)



Volunteers would then read...

Main: P1 <stop to allow P1 person to read>

P1: Forward, Forward, Forward, Forward <stop to allow Main person to read>

Main: Right, Straight, Straight, Right, P1 <stop to allow P1 person to read>

P1: Forward, Forward, Forward, Forward <stop to allow Main person to read>

Main: Light On

Lightbot Level 2

Level 2-1: A 3D puzzle consisting of a 4x2 base layer, a 3x1 middle layer, and a 2x1 top layer. A blue platform is on the first column of the base layer.

MAIN palette:

P1	G	↑	↑
G	P1	💡	

PROC1 palette:

↑	↑	↑	↑
---	---	---	---

Available commands (bottom row):

- ↑
- 💡
- ↶
- ↷
- G
- P1

Control buttons (top left):

- ←
-
- 音量 (volume)

Control buttons (top right):

- PLAY
- ?

Level 2-2: A 3D puzzle consisting of a 4x2 base layer, a 3x2 middle layer, and a 2x1 top layer. A blue platform is on the second column of the middle layer.

Star icon: ★

Challenge: Use 12 or fewer commands

Using 12 commands

MAIN palette:

P1	↷	P1	↷
P1	G	P1	↷
P1	💡		

PROC1 palette:

↑	↑
---	---

Available commands (bottom row):

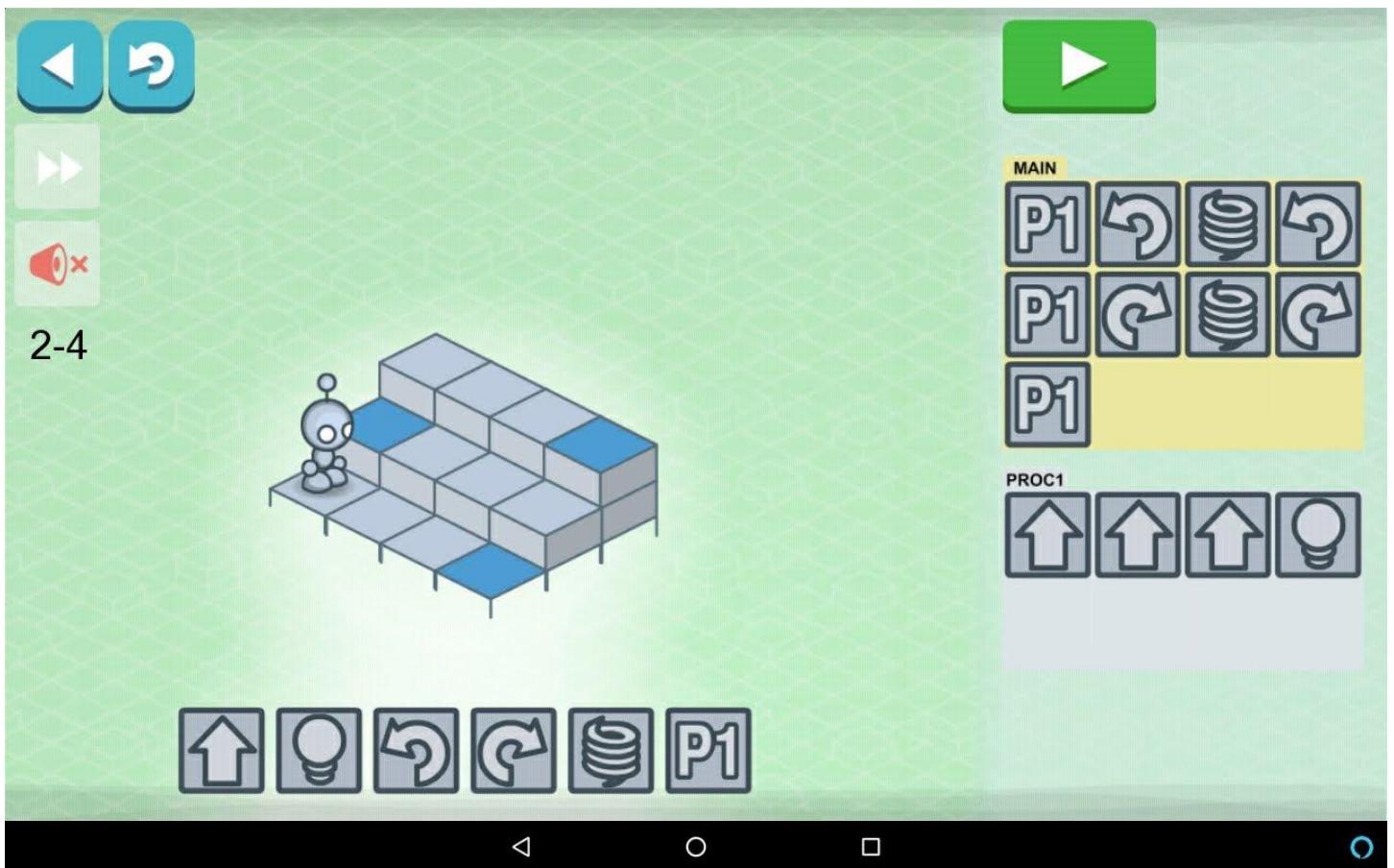
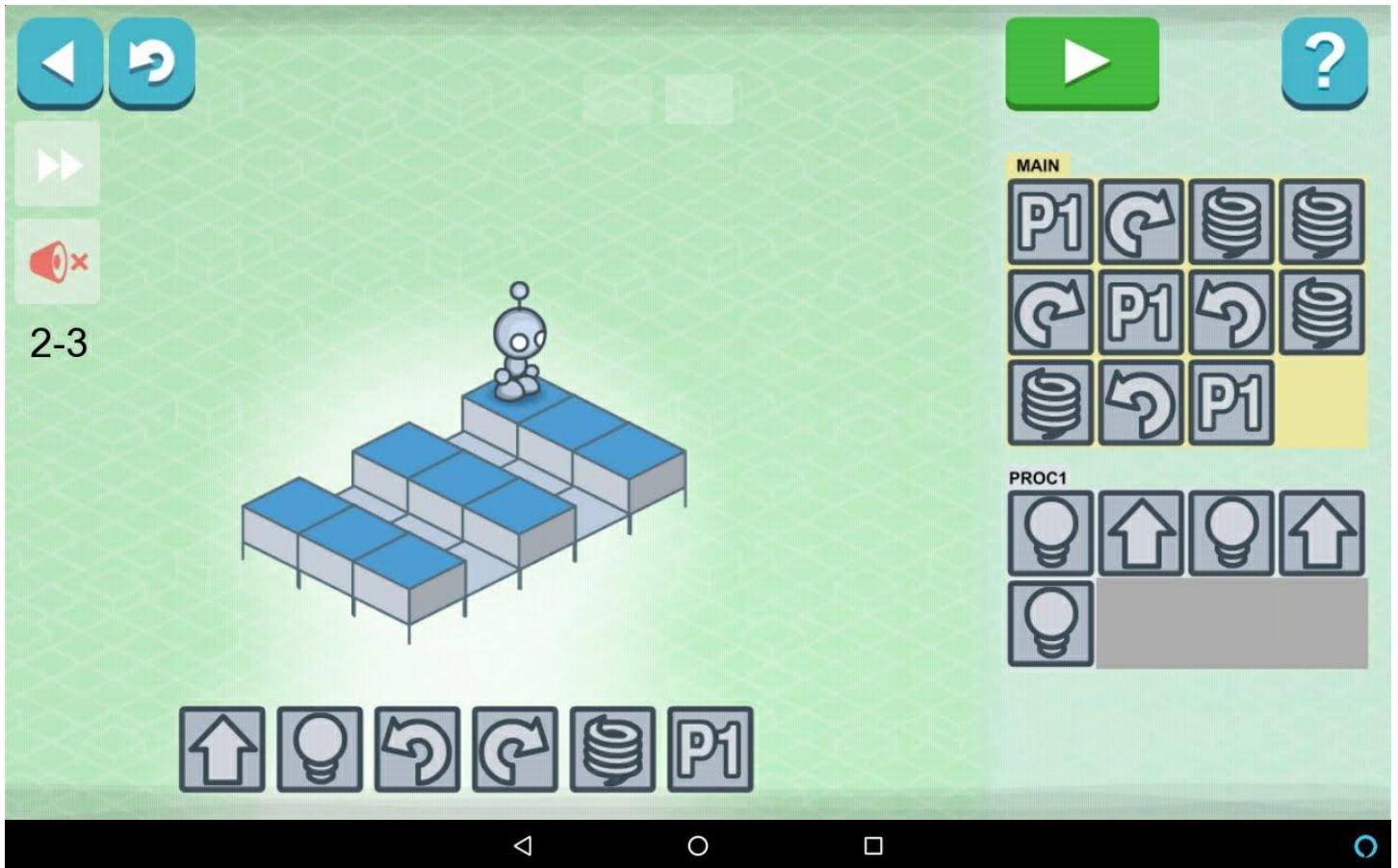
- ↑
- 💡
- ↶
- ↷
- G
- P1

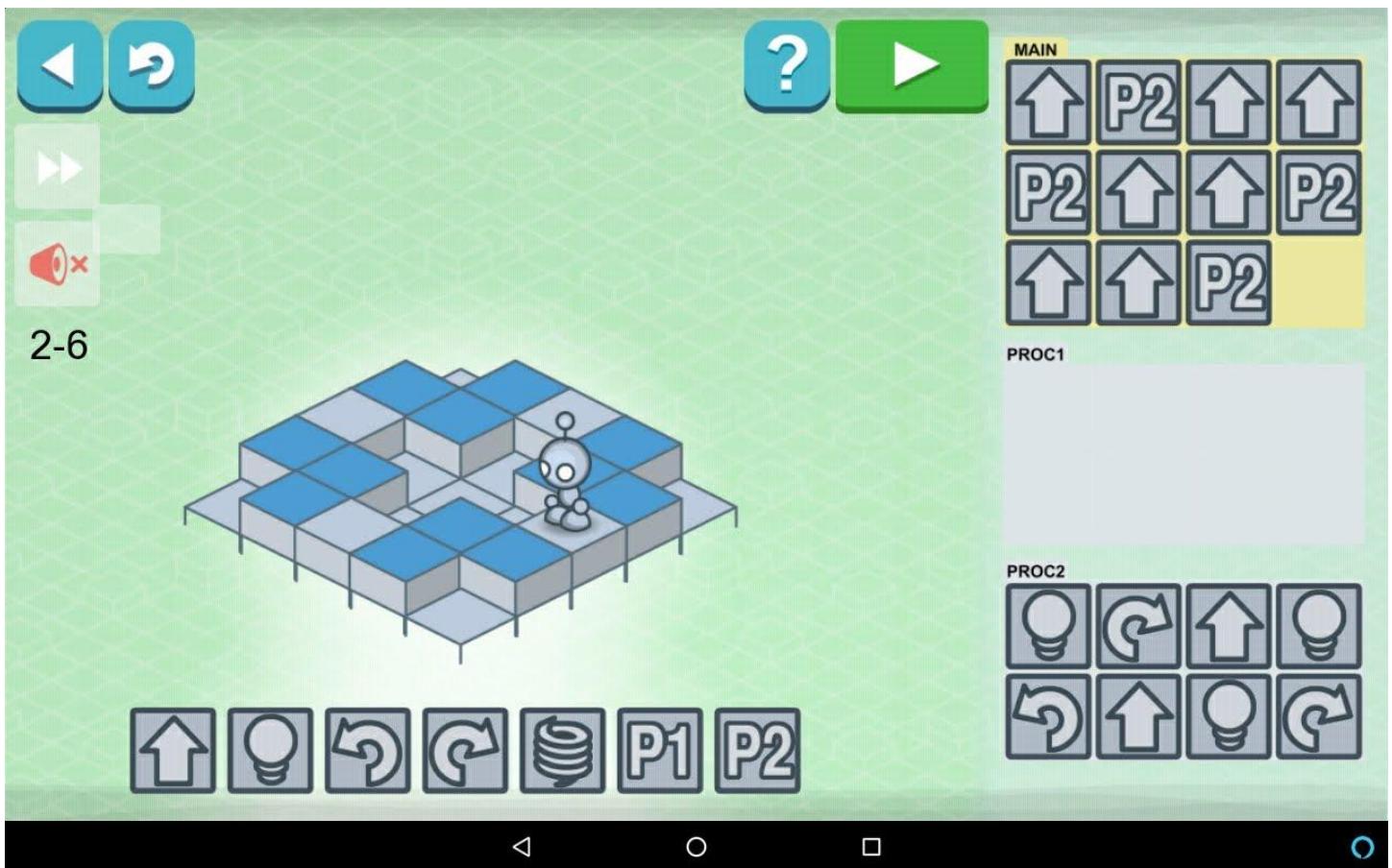
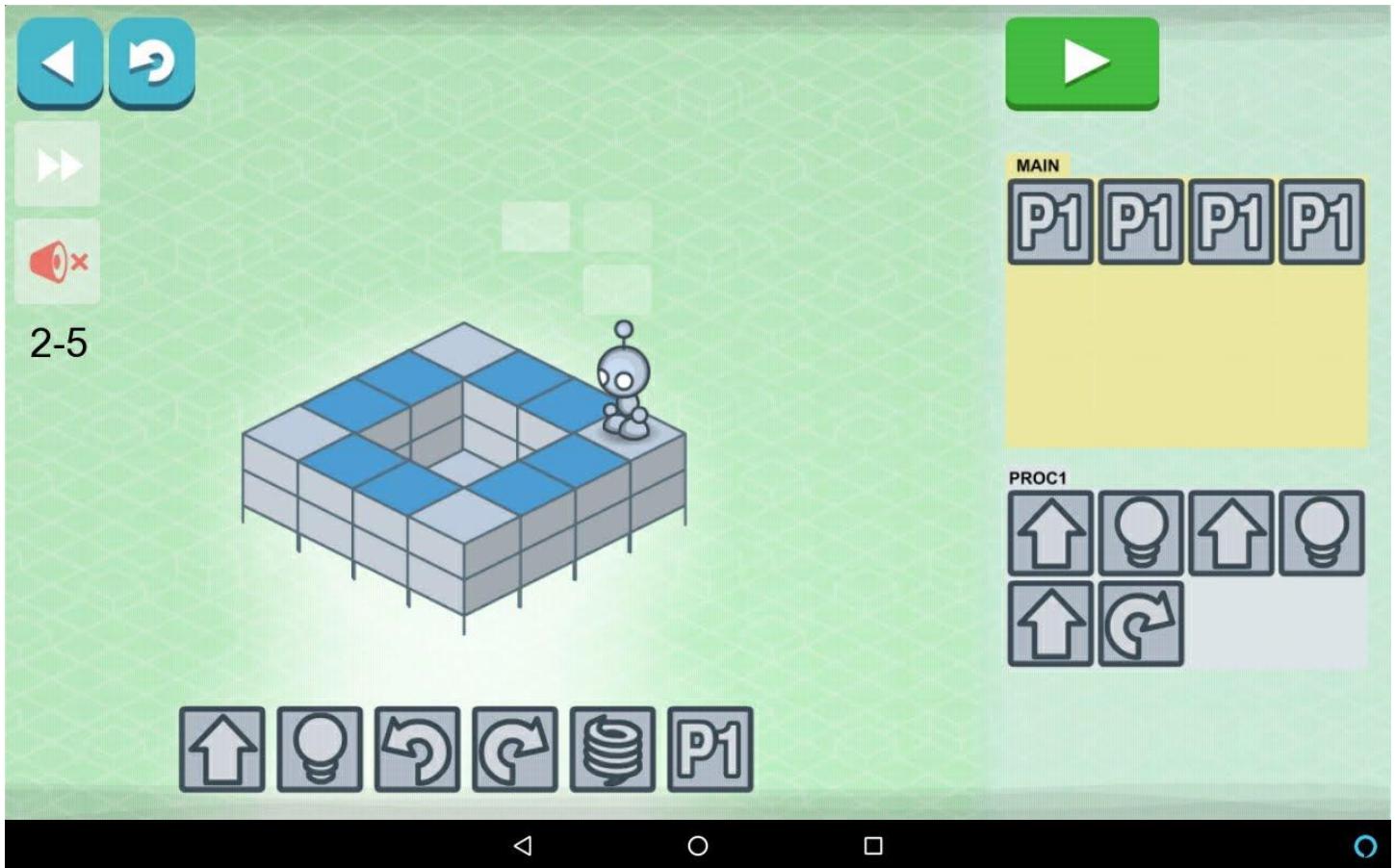
Control buttons (top left):

- ←
-
- 音量 (volume)

Control buttons (top right):

- PLAY





◀ ▶ ⏪ ⏴ ⏵ ⏹ ⏺ ⏻

MAIN
P1 P1 P1 P2
C P2

PROC1
P2 P2 C

PROC2
↑ ↑ L

Use 12 or fewer commands
Using 12 commands

2-7

↑ L C C C P1 P2

◀ O □ ⌂

◀ ▶ ⏪ ⏴ ⏵ ⏹ ⏺ ⏻

MAIN
P1 S L S
L S C P2
C P2

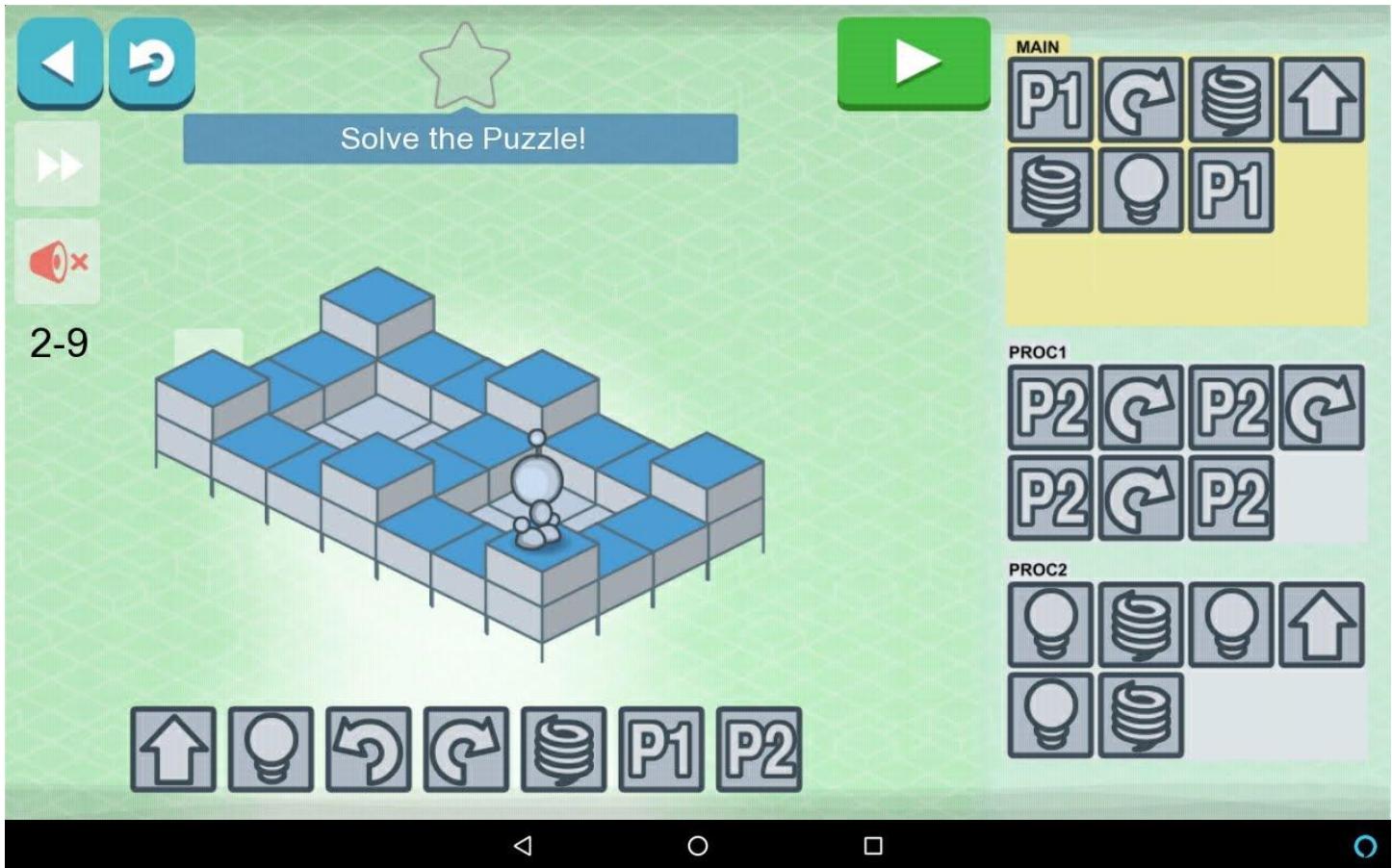
PROC1
P2 C P2 C
P2 C P2 C

PROC2
L S L S
L S

2-8

↑ L C C C P1 P2

◀ O □ ⌂

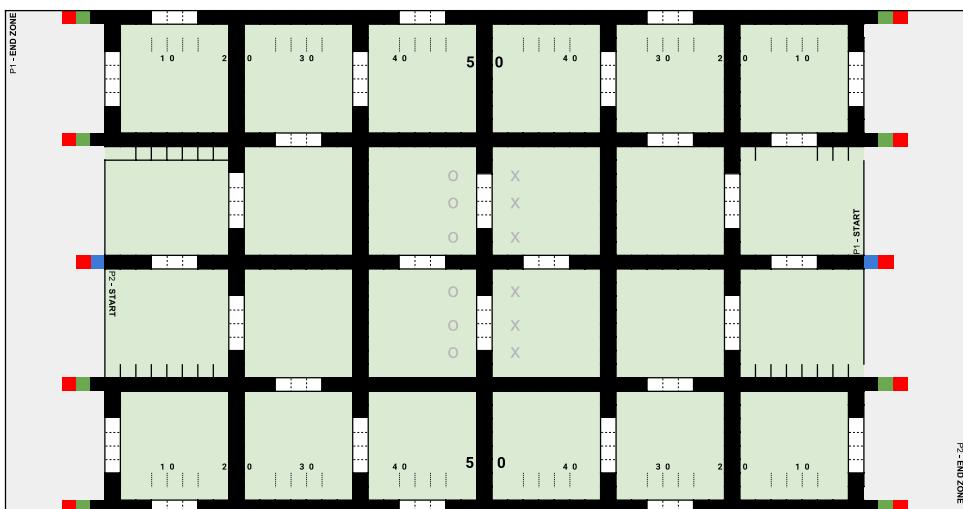


Ozobot Football

Each player takes turns filling out the board strategically with color patterns that will direct the paths of the bots. Each player should not spend more than 15-30 seconds making each move.

Once the board is complete, each player places their ozobot on the labeled start near the endzone facing towards the 50 yard line. On the count of three, let your bot go!

If the bots tackle, reset them by placing them anywhere before the 20 yard line, facing the 50 yard line. The first bot to reach the end zone opposite of where they started wins!



Day 3: Wednesday

Supplies

- | | |
|---|--|
| <ul style="list-style-type: none">• Tablets and Evo's for each kid• Obstacles for each kid• Laptop to show Blockly code• Slot Car racing | <ul style="list-style-type: none">• Name tags from Day 1• Cardboard Mazes• Demo Supplies:<ul style="list-style-type: none">◦ BrushBot kits |
|---|--|

Goals for Day 3

- Use OzoBlockly to program the Evo with a visual programming language
- Learn how to use loops to program repetitive behavior
- Learn how to reuse code with functions
- Learn how to store information with variables

Start Time	Est. Time	Description
8:45	25	Registration
9:10	5	Review Yesterday + Questions?
9:15	20	Demo: BrushBots [inspiration, tactile] Help kids build own BrushBots to learn about electronics See if they can make it through Cardboard Maze
9:35	10	OzoBlockly Demo [visual, code] Show them how to load up the editor, make the Evo go in a square, launch the program Launch with Bluetooth + Calibrate and Flash (which we'll be using in camp)
9:45	30	Evo Obstacle Course with OzoBlockly [tactile, visual, code] Program your own Evo to do the obstacle course with code, not manual control Extra credit: program Evo to go through Cardboard Maze
10:15	15	Evo Dance Party [creative, visual, code, auditory, social] Deconstruct the Evo "Fashion Runway" app that's pre-loaded – see lights, sounds, turns Make your own Evo dance and show the group Extra Credit: Load "Dance Lesson" app and customize it for your own dance
10:30	30	Snack Make an obstacle course with your food OR Show a robot dancing
11:00	30	Loop Activities – repetitive behavior [visual, tactile, code] <ul style="list-style-type: none"> • Go in a square pattern forever (Extra Credit: do it with only 4 blocks) • Go in a square pattern twice, saying the direction you're about to go/rotate AND add a spin at each corner of the square (Extra Credit: do it with only 7 blocks) • Same as above, but add a celebration with movement, sound, and lights at end
11:30	30	Function and Variable Activities – complex behavior and reusable code [visual, tactile, code] <ul style="list-style-type: none"> • Slot Car Racing + function to celebrate at end of race • Slot Car Racing + use variable and function to set different light color each lap
12:00		GO HOME

BrushBots

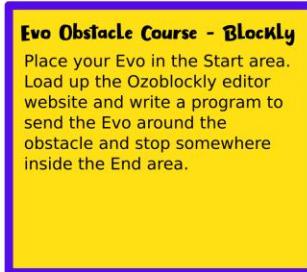
- 1.Cut off the handle of the toothbrush, leaving only the head with the bristles
- 2.Cut foam tape in half to make two long rectangles
- 3.Attach the large yellow battery to one side of foam tape, then attach it to the top of the toothbrush
- 4.Remove the cover and tape the small round motor to the top of the yellow battery
- 5.Twist the exposed metal ends of the two black wires together
- 6.Twist the exposed metal end of one red wire to one of the metal loops on the switch
- 7.Twist the other red wire's exposed metal to the other metal loop on the switch
- 8.Turn on the switch and enjoy!



Evo Obstacle Course with Blockly



START



END

Sample Solution (Mode 2)

```
move [forward] [10 steps] [speed medium]
move [forward] [10 steps] [speed medium]
rotate [right]
move [forward] [10 steps] [speed medium]
rotate [right]
move [forward] [10 steps] [speed medium]
move [forward] [10 steps] [speed medium]
```

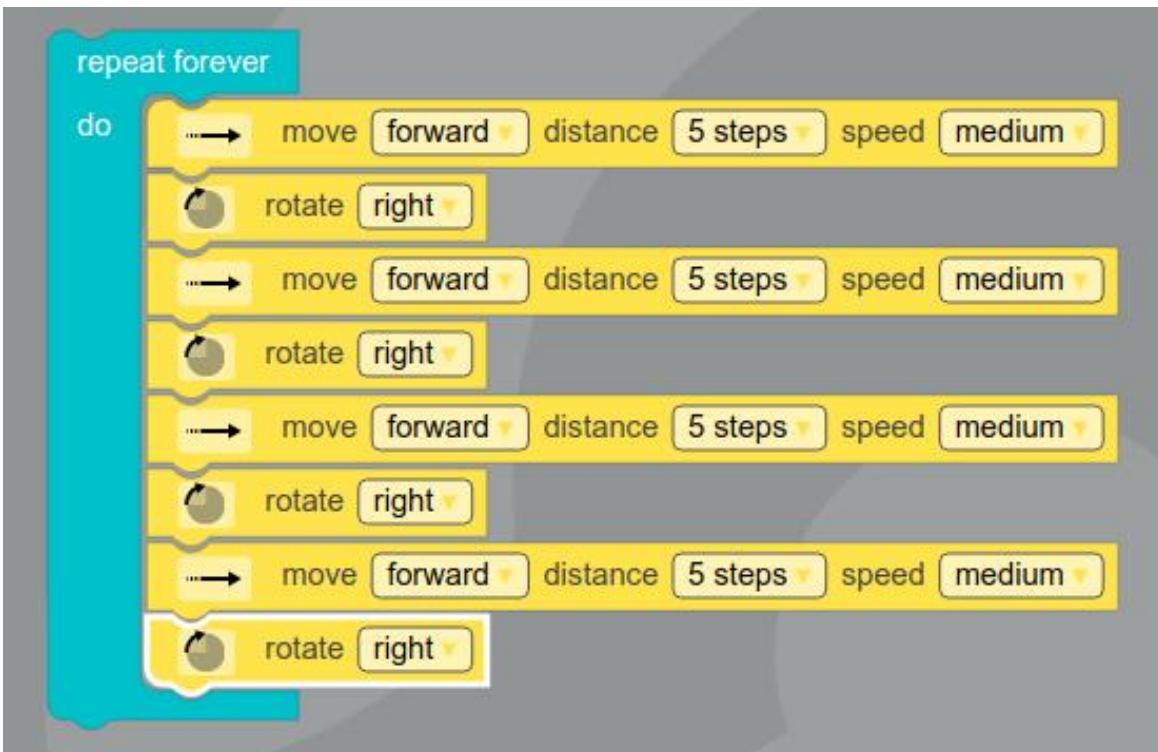
Fashion Runway

```
repeat (4) times
  do
    set top light color [green]
    move [forward v] [4 steps] [speed medium]
    set top light color [red]
    rotate [right v]
```

Dance Lesson

```
set top light color [cyan]
[1 second(s)]
repeat (2) times
  do
    set top light color [pink]
    repeat (2) times
      do
        say direction [right v]
        rotate [right v]
        rotate [left v]
        play [happy v]
        say direction [left v]
        rotate [left v]
        rotate [right v]
        play [laugh v]
        move [forward v] [2 steps] [speed medium]
        move [backward v] [2 steps] [speed medium]
        move [backward v] [2 steps] [speed medium]
        move [forward v] [2 steps] [speed medium]
    set top light color [cyan]
    ~~~ [skate medium forward v]
    ⌂ [spin left v]
    ~~~ [skate medium backward v]
    ⌂ [spin right v]
  disco
```

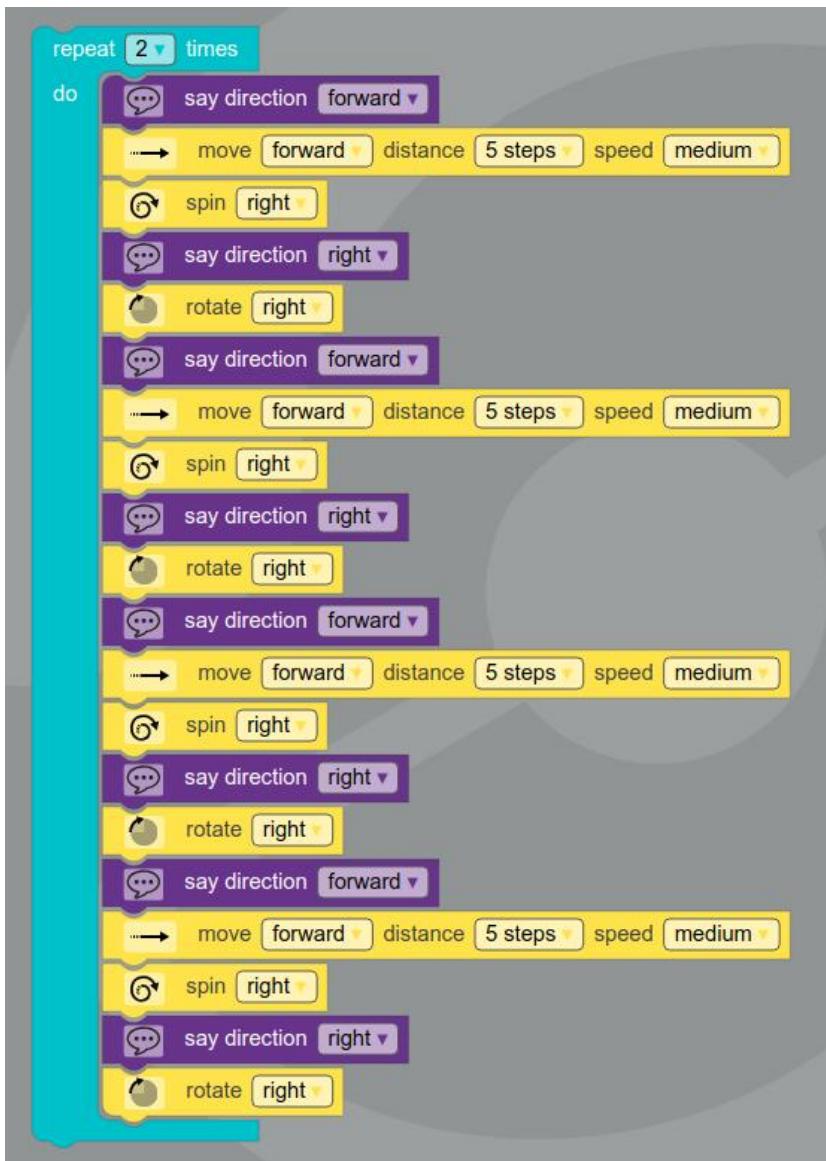
Loop #1: Square Forever (Mode 2)



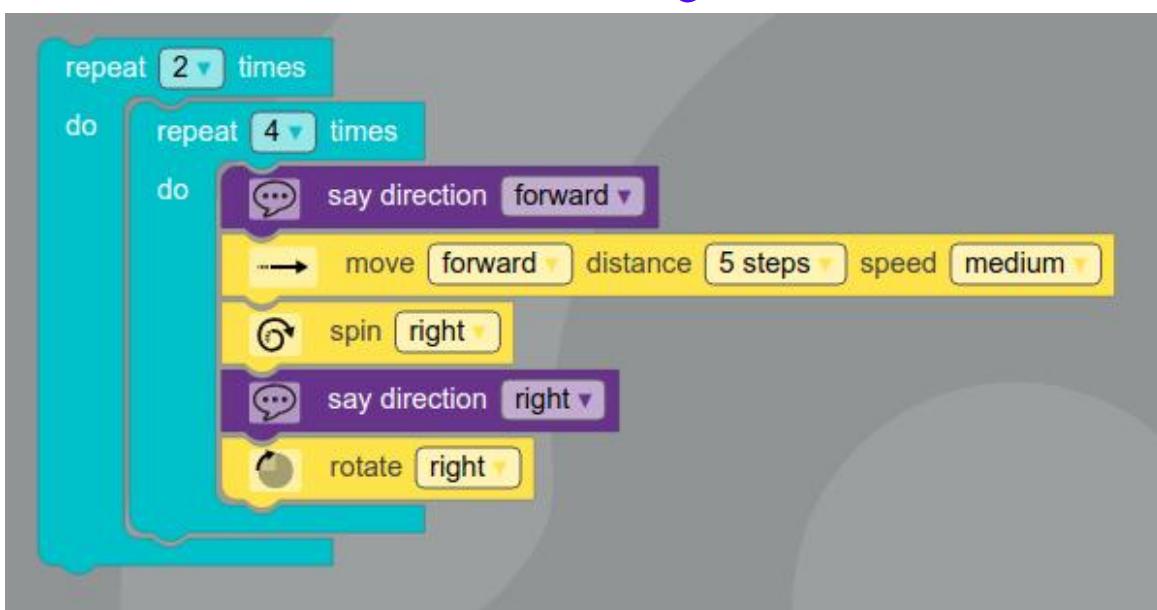
Extra Credit: Using 4 Blocks (Mode 2)



Loop #2: Square With Spin (Mode 2)



Extra Credit: Using 7 Blocks (Mode 2)



Slot Car Racing Course

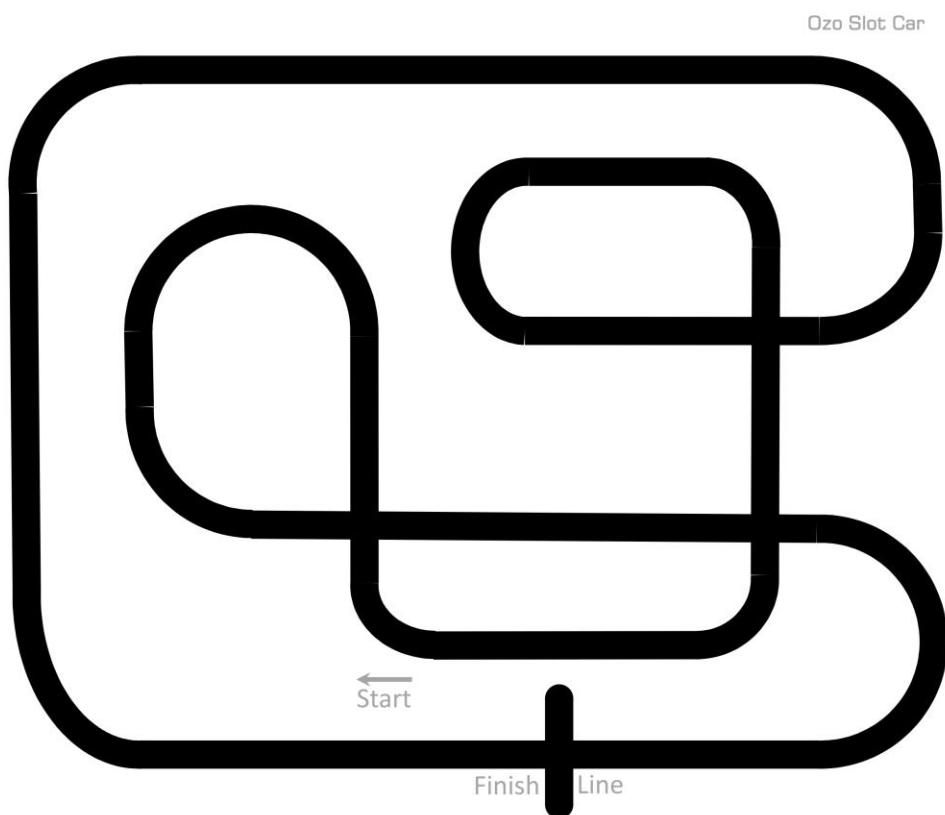
Instructions (Level 1)

1. Use Mode 3 (Intermediate)
2. Set Evo to “very fast” speed
3. Place Evo at “Start” heading in the direction shown by the arrow
4. Anytime Evo encounters an intersection, go straight (just like a slot car)
5. After 5 laps, celebrate with a 360 spin to the right and blinking the front LEDs green five times

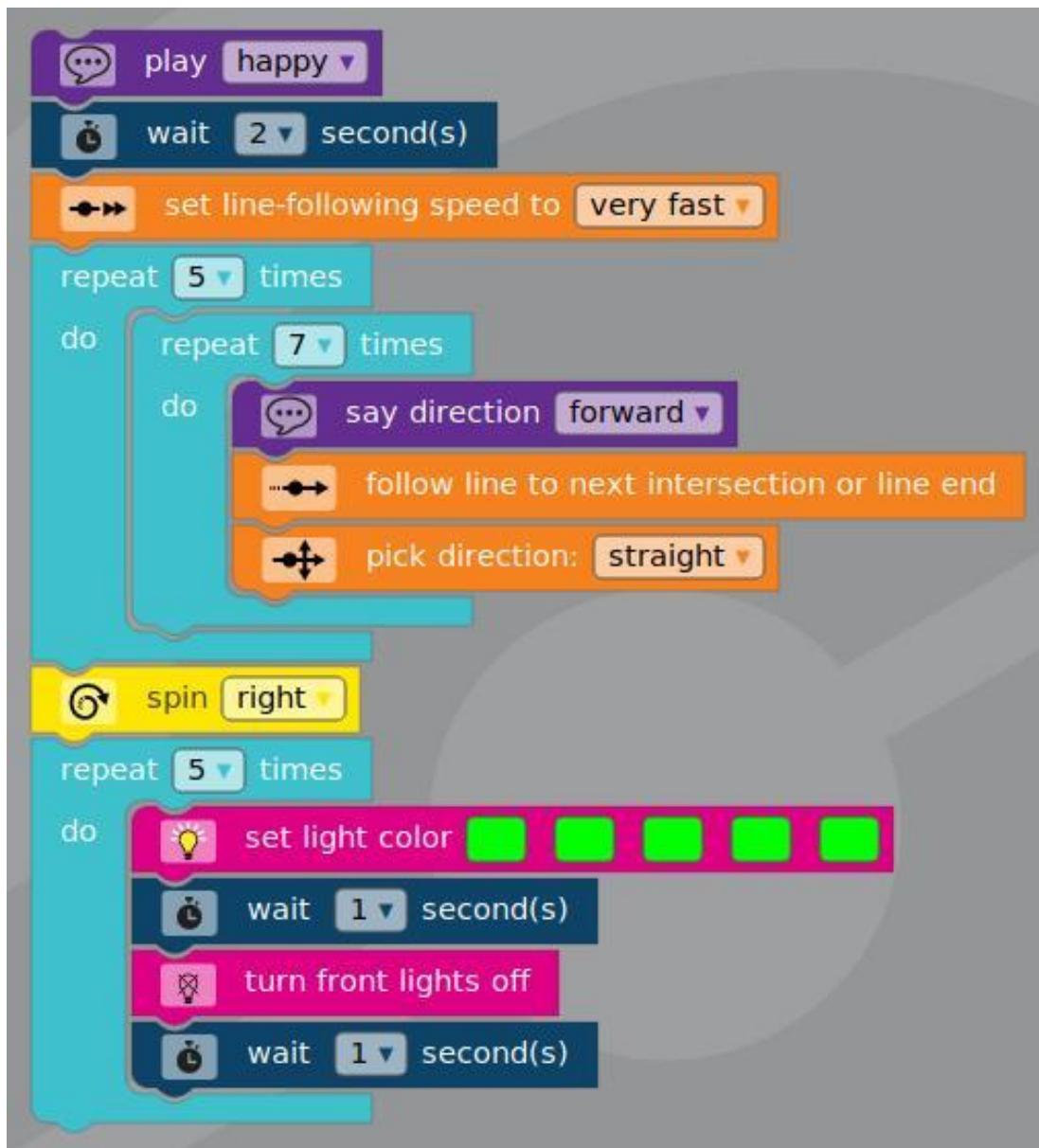
Instructions (Level 2)

1. Use Mode 3 (Intermediate) for movement and Mode 4 (Advanced) for variables and functions
2. Set Evo to “very fast” speed
3. Place Evo at “Start” heading in the direction shown by the arrow
4. Anytime Evo encounters an intersection, go straight (just like a slot car)
5. Use a variable to track the current lap number, and say the current lap number aloud at the start of each lap
6. Use a function to set the top LED color based on the current lap number variable
#1 Red, #2 Orange, #3 Yellow, #4 Green, #5 Blue
7. After 5 laps, create a function to do a celebration of your own design

PROGRAMMING OZOBOT WITH BLOCKLY



Slot Car Level 1 Solution



Slot Car Level 2 Solution

The image shows two Scratch scripts side-by-side.

Main Program Script:

- Starts with a `play [happy v]` sound block.
- `set [LapNum v] to [1]`
- `wait [2 sec]`
- `repeat (5 times)`
 - `do [Set Light for Lap]`
 - `say [number] [LapNum v]`
 - `repeat (7 times)`
 - `do [say [direction] [forward v]`
 - `follow line to next intersection or line end`
 - `pick direction: [straight v]`
 - `change [LapNum v] by [1]`
- `spin [right v]`
- `repeat (5 times)`
 - `do [set light color [red v] [red v] [red v] [red v] [red v]]`
 - `wait [1 sec]`
 - `turn front lights off`
 - `wait [1 sec]`

'Set Light for Lap' Script:

- `to [Set Light for Lap]`
- `if [LapNum v = 1]`
 - `do [set top light color [red v]]`
- `if [LapNum v = 2]`
 - `do [set top light color [orange v]]`
- `if [LapNum v = 3]`
 - `do [set top light color [yellow v]]`
- `if [LapNum v = 4]`
 - `do [set top light color [green v]]`
- `if [LapNum v = 5]`
 - `do [set top light color [blue v]]`

Day 4: Thursday

Supplies

- | | |
|--|--|
| <ul style="list-style-type: none">• Tablets and Evo's for each kid• Foam marshmallows for road for each kid• Use Cardboard Maze boxes to block the infield for Giant Race• Blank sheets for Sumo Evo and Blockly Garbage Truck• Blockly Billiards sheets | <ul style="list-style-type: none">• Name tags from Day 1• Demo Supplies:<ul style="list-style-type: none">◦ Sphero BOLT |
|--|--|

Goals for Day 4

- Program the Evo to drive on its own using its color and proximity sensors
- Create your own program to make the Evo do whatever you want!
- Have fun on the final day!

Start Time	Est. Time	Description
8:45	25	Registration
9:10	5	Review Yesterday + Questions?
9:15	5	Demo: Apps + Visual + JavaScript with Sphero BOLT <ul style="list-style-type: none"> This is what you'll learn at the next level camp!
9:20	10	Real Life Proximity Sensor <ul style="list-style-type: none"> Cody walks around, kids tell him how far out his arms should be to detect his way through the room Verbally talk through "If left arm, turn right" and "If right arm, turn left" and "If both arms u-turn"
9:30	10	Discuss Driver-Less Cars [social, auditory] <p>What kind of sensors do they need? How many different scenarios can you think of (ex: pedestrian walks across street, other car veers into lane, construction on road, rainy)?</p>
9:40	30	Evo Driver's Ed: Wavy Way [tactile, visual, code] <p>Program your Evo to navigate a wavy road using the sensors STORY: Cody using machine vision to automate chip manufacturing Extra Credit = Evo at higher speed, add obstacles</p>
10:10	20	Snack <p>Make a driver-less car on a road</p>
10:30	20	King of the Hill <ul style="list-style-type: none"> All Evos on one foam board, try to push each other off Giant Race <ul style="list-style-type: none"> Put all the foam boards together to make an oval and everyone race at the same time
10:50	40	Sumo Evo OR Free Style Programming [tactile, visual, code] <p>Program your Evo to fight based on sensors Extra ideas are included in the packet. Can be done on your own or in a group</p> <p>++ Blockly Garbage Truck: put Marshmallows on paper with black border and program Evo a pattern to knock as many off the edge as possible. Turn around when it detects black color.</p> <p>++ Blockly Billiards: program Evo to stay in bounds (black line) and drive around to find color "pockets" in order - fastest time wins!</p>
11:30	30	Dismiss the robots, pair phones/tablets from home if they brought them Decorate your foam board to tell the story of the week – take it home or leave it here and we'll hang it up at the church
12:00		GO HOME

Driver's Ed: Wavy Way



START

Driver's Ed - Wavy Way

Place foam marshmallows tightly spaced on the light gray wavy lines to form a road. Use Ozoblockly to get the Evo to the End.

- + Use the sensors to know which way to turn
- + Program the lights as "turn signals" when turning
 - Red = Turn Left
 - Blue = Turn Right
 - Green = Go Forward
- + When Evo sees Black color underneath, end the program and play the "Disco" lights and say the color at the finish.
- + If Evo runs into a barrier, update your program and try again!

Extra Credit: Increase the Evo's speed

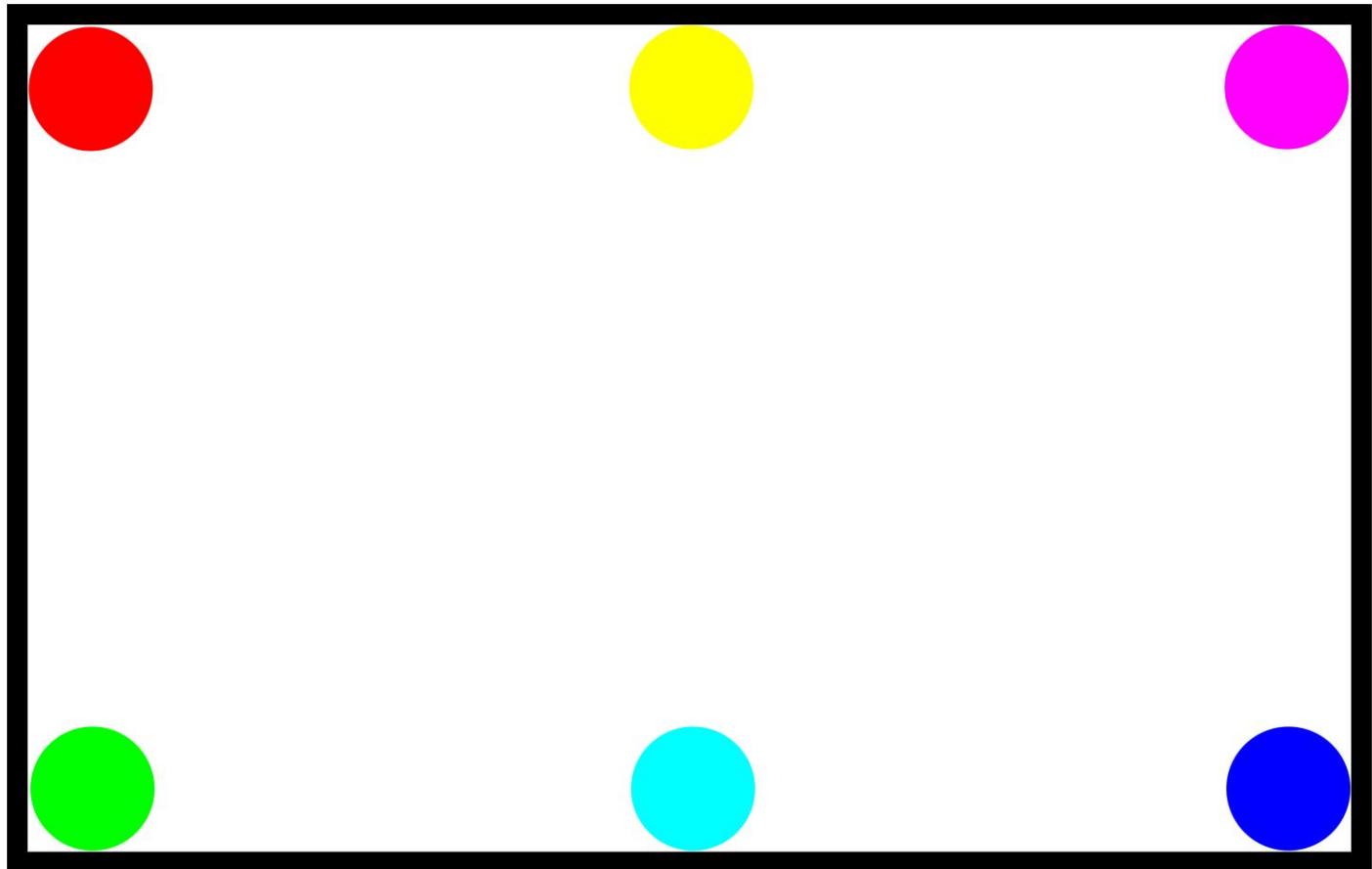
Extra Credit: Add barriers inside the roadway

Driver's Ed: Wavy Way Solution

```
repeat [while [get surface color ≠ [black]]]
  do
    if [read proximity sensor [left front] > [10]]
      do
        set light color [blue blue blue blue blue]
        rotate angle: [-45] deg speed: [30] mm/s
    else if [read proximity sensor [right front] > [10]]
      do
        set light color [red red red red red]
        rotate angle: [45] deg speed: [30] mm/s
    end
    set light color [green green green green green]
    move [20] mm speed: [30] mm/s
  end
end
say color [get surface color]
disco
```

Blockly Billiards (TODO: Cyan Color)

Place your Evo in the middle. Program it to turn or back up when it hits detects black. Choose an order of colors and program the Evo to seek out those colors in that order. When Evo has found all the color "pockets" have it do a dance and make some noise!



Blockly Billiards Sample Solution

```
declare array [Rotations] of length [5]
declare array [Colors] of length [6]

repeat [while [black? v] = [true?]] [do [Check For Black]
    if [get surface color v] = [cyan?]
        set [Current Color v] to [cyan]
    end
    do [Get Next Color]
        move [20] mm speed: [30] mm/s
    end
end]
```

The screenshot shows a Scratch script titled "Setup". It starts with two declarations: "declare array [Rotations] of length [5]" and "declare array [Colors] of length [6]". The main loop begins with "repeat [while [black? v] = [true?]] [do [Check For Black]". Inside the loop, there is an "if" block: "if [get surface color v] = [cyan?]". If the condition is true, it sets the variable "Current Color" to "cyan". Following this, there is a "do" block labeled "Get Next Color" which contains a "move" command: "move [20] mm speed: [30] mm/s". The loop ends with "end".

to Setup

```

in array Colors set element [0] to value surface color [yellow]
in array Colors set element [1] to value surface color [red]
in array Colors set element [2] to value surface color [green]
in array Colors set element [3] to value surface color [cyan]
in array Colors set element [4] to value surface color [blue]
in array Colors set element [5] to value surface color [magenta]

set Current Color to 0

set top light color get element [Current Color] from array Colors

say color get element [Current Color] from array Colors

in array Rotations set element [0] to value true
in array Rotations set element [1] to value true
in array Rotations set element [2] to value true
in array Rotations set element [3] to value false
in array Rotations set element [4] to value true

```

to Check For Black

```

if get surface color = black
do move distance: [-60] mm speed: [30] mm/s

```

to Get Next Color

```

if get element [Current Color] from array Rotations = true
do
  rotate left
  rotate angle: [30] deg speed: [30] mm/s
  set Current Color to [Current Color] + 1
  if Current Color ≥ get length of array Colors
    do
      disco
      play laugh
      terminate program and switch to idle
    end
  end
end

set top light color get element [Current Color] from array Colors
play happy
say color get element [Current Color] from array Colors

```

Blockly Garbage Truck

Place your Evo in the middle. Dump the foam marshmallows all over the paper. Program the Evo to move around in a pattern so it pushes as many marshmallows off the paper. Turn around when the Evo detects the black border.

Sumo Evo

Place two Evos facing each other near the middle. Program them to attempt to push the other off the paper using sensors. When you detect the black border, you might want to try to turn around and escape!

