WORKSHOP 1
OZOBOT INTRODUCTION
OZOBOT MOVES AND READS CODES

What students will learn
- What kind of a robot is Ozobot?
- How does Ozobot sense its environment and move in it?
- How can you give commands to Ozobot?

Topics
- Robotics: line-following and color sensing
- Physics: optics
- Computer science: visual coding

Materials
- Ozobots (1 per group of about 3 students, make sure they are calibrated on paper and charged)
- blank white paper, a few sheets per group
- markers in colors black, red, light blue and light green (we recommend you use either Sharpie's wide chisel tip or Crayola markers), one set per group
- one copy of printout #1-1 per group, and one copy of either printout #1-2 or #1-3 depending on the students age (#1-2 is for ages 6-8 and #1-3 for ages 9-12)
- printout of OzoCodes reference chart (www.ozobot.com/gamezone/color-language)

Time
20 min

Ozobot skill level
Beginner

Note to teacher:
Please take a look at the teacher's guide before holding this workshop. In particular, please review the sections on how to calibrate Ozobot (p.5) and how to use codes (p.7)

OZOBOT INTRODUCTION

1. What can Ozobot do?

Ozobot is a miniature robot, the smallest of its kind, and there are a lot of things Ozobot can do. Ozobot's most elementary ability is to follow lines. You can draw a line, place Ozobot on it and it will follow the line.

Pick markers in black and other colors and draw lines (1/4", 6mm in width) on a white piece of paper. Turn Ozobot on by pressing the button on the side. Place Ozobot on the line.

What do you see and how does it work?
You can see that Ozobot follows the lines even if they bend or cross. How does the robot do this? Turn Ozobot over and see what's underneath. On the bottom, you can see 5 openings with lights shining out of them. An optical sensor lives in each of these openings. These sensors are Ozobot's eyes. Each of the sensors sees how bright the paper underneath is. This way, Ozobot can see where the white and where the colored parts are and therefore knows where the line is.

What happens if Ozobot sees the different colors?
Ozobot's LED light shines in the same color as the line it is driving on. If you look at its sensors again, you will notice that the middle sensor is bigger than the others. Actually, the middle one is a color sensor. It can detect red, green and blue colors. And, since every color can be mixed using these three colors, Ozobot can see all of them. The one exception is black. It's impossible for Ozobot to shine a black colored line, so Ozobot is using a nice blue instead when driving on black lines.

2. Give commands to Ozobot

It's fun to see Ozobot follow the lines we draw and we can certainly control the robot this way, but there are also other ways to give commands to Ozobot. Since Ozobot can see colors, we can use color sequences to tell Ozobot what to do.

Take a look at printout #1-1 and place Ozobot on the line where indicated. Observe Ozobot's behavior. What does Ozobot do after driving over a color sequence?

As Ozobot drives along the line, the color sensor detects changes in color. When Ozobot sees the sequence blue/red/blue for example, Ozobot knows to make a u-turn. Ozobot has been programmed at the factory to know many different color sequences (i.e. codes) and execute specific moves whenever Ozobot encounters any of them. Take a look at the OzoCode reference chart to see some of the codes.
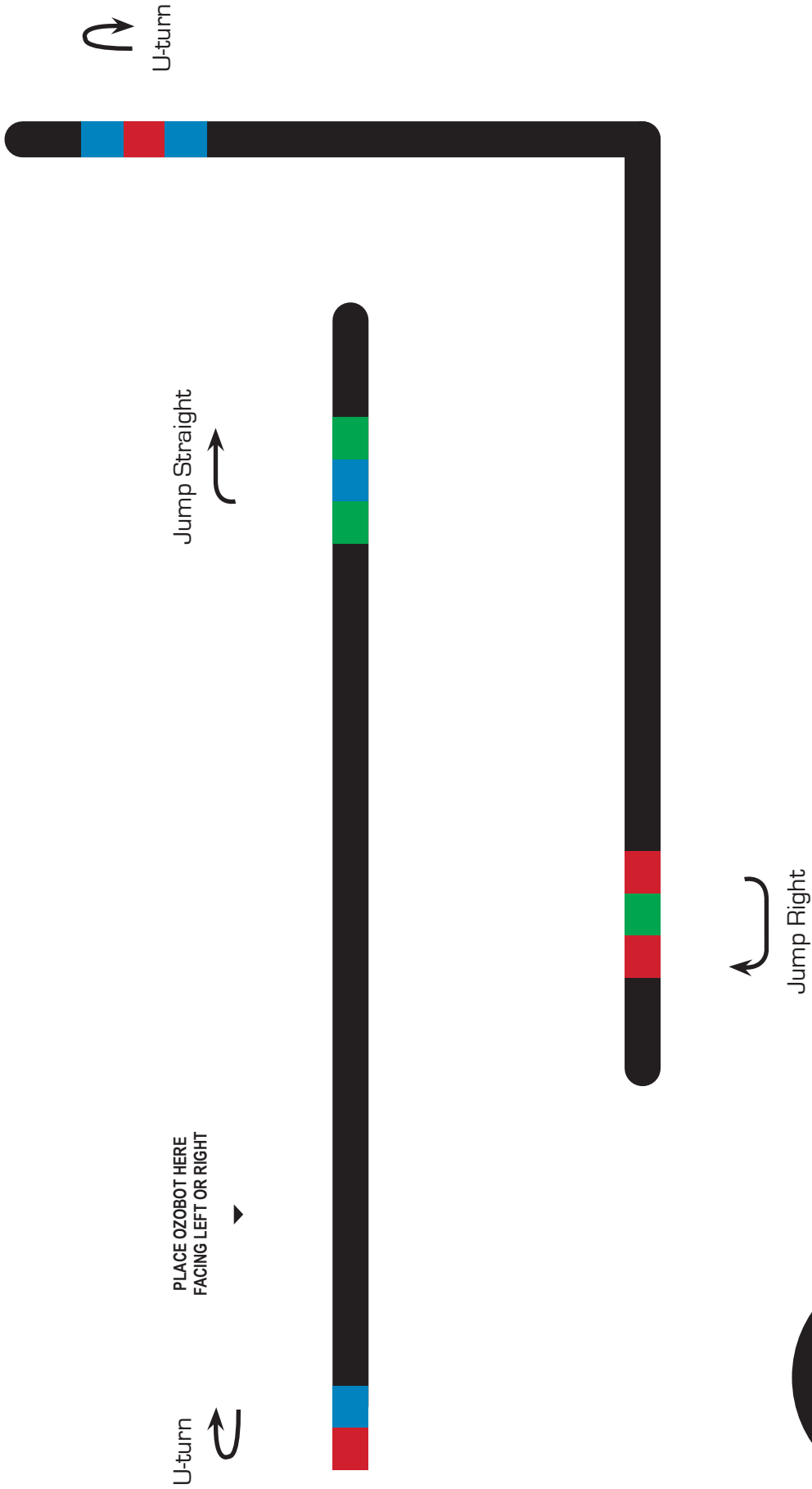
3. Help Ozobot to deliver a package

Use printout #1-2 to help Ozobot get from the post office to your house, or printout #1-3 if you would like even more of a challenge. Ozobot is at the post office, but needs to deliver a package to your house. But wait, there is a river in between and no paths can go through the river.

Your task is to draw a black path anywhere on the paper but not on the river. You also have to use ALL of the codes indicated on the printout. But you can use each of them at only once! Think ahead and make sure to leave a white area for a code when you are drawing a line because you will not be able to draw the color segments right on top of a black line. Also, it is important to draw the path about 1/4in (5mm) thick and to make the individual color blocks square or round with the same width/ diameter of about 1/4in (5mm).

And one last thing: make sure that Ozobot traverses the river slowly and speeds up after crossing the river. If you are doing the challenge, you can wait to speed up until Ozobot has crossed the second river. Also ,on prinout #1-3, Ozobot will have to go to the shop to drop off another package after leaving the post office, but before reaching your house.

Once you have drawn the paths and used all the codes, turn Ozobot on and place Ozobot on the path at the post office. Does Ozobot arrive at your home? If you found you have made a mistake, take another copy and arrange the paths and codes differently. Have fun!

ozobot

U-turn

Jump Straight

Jump Right

PLACE OZOBOT HERE
FACING LEFT OR RIGHT

U-turn

USE TO CALIBRATE

ozobot

Home

CODES TO USE

U-Turn [1x]
Slow [1x]
Jump Left [1x]
Fast [1x]

POST OFFICE

Home

SHOP
OPEN

CODES TO USE

Zig-Zag [1x]
U-Turn [1x]
Fast [1x]
Jump Right [1x]
Slow [1x]

POST OFFICE

ozobot

Home

POST OFFICE

Note: This is an example of one of the solutions. There are actually several different ways of solving this problem.

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ozobot

Home

Note: This is an example of one of the solutions. There are actually several different ways of solving this problem.

SHOP
OPEN

CODES TO USE
Zig-Zag (1x)
U-Turn (1x)
Fast (1x)
Jump Right (1x)
Slow (1x)

POST OFFICE