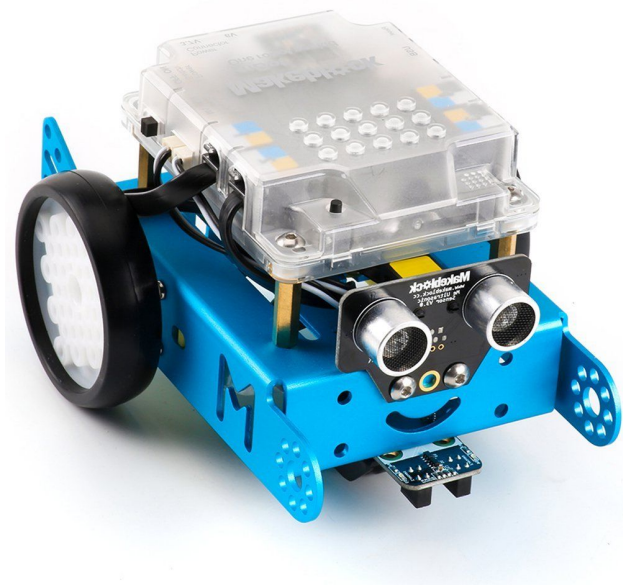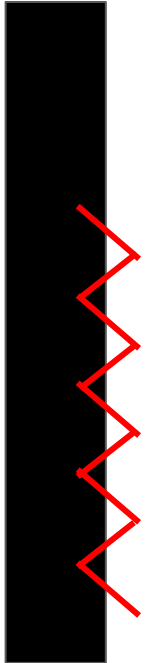# Line Following

Created by FRC
3792 Army Ants

Intro

In this project, you will learn how to use the line follower sensor, if statements, and loops.

The final code will be able to follow a straight or curved line, even a figure eight!
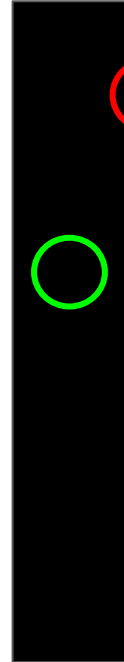
Logic

The robot needs to follow the edge of the line, zigzagging back and forth across the line.

When the sensor sees white, the robot needs to turn left in order to stay on top of the edge of the line.

When the sensor sees black, the robot needs to turn right to stay on top of the edge of the line.

What direction does the robot need to turn if the sensor is positioned over the blue circle? The green circle? The red circle?

If Statements

The **If** block allows the code to ask a yes or no question.

"Does the light sensor see black?" is a yes-or-no question. "What color does the light sensor see?" is not a yes-or-no question.

➢ What are other examples of yes-or-no questions that you might use in programming your mbot?

The yes-or-no question is called the condition.

If Statements

If the condition is met, the robot will run the code inside the block.

Note: the if statement will only run once; if the sensor state changes later, it will not affect the robot's actions.

In the example above, the condition (the yes-or-no question) is "does the line follower sensor see black?" If the answer is yes, the robot will drive forward.

➢ Write a program that makes the robot turn left if the line follower sensor sees white.

Loops

Loops allow a section of code to be repeated multiple times. It's like putting a song on repeat!

In Scratch, you have 3 options for loops:

➤ **Forever:** the code inside the loop will never stop running

➤ **Repeat a certain number of times:** you tell the loop how many times to repeat

➤ **Repeat until a condition is met:** this is like a if statement built into a loop

Loops

Here is an example of a loop. In this case, the robot will move forward and stop 4 times.

Note: it's important to tell the robot what to do after the loop stops too! What happens if you don't?

➢ Make the robot complete 4 right turns.
➢ Make the robot move forward forever.
➢ Make the robot drive forward until the line follower sensor sees black.
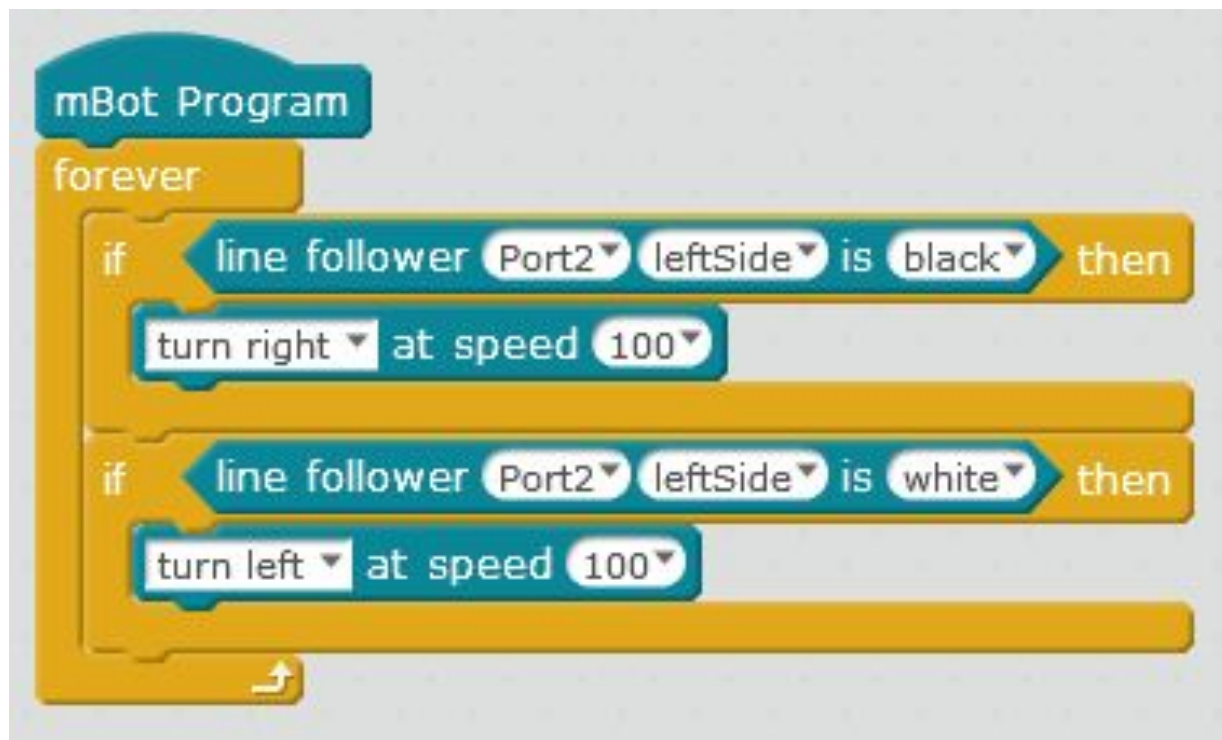
Put it all together

To follow the line the robot needs to:

➢ Turn left when the line follower sensor sees white.

➢ Turn right when the line follower sensor see black.

➢ Repeat this code forever.

You'll need to use if statements and loops to complete this code.

Example

Challenges/Questions

1. Draw some different lines using a black marker on white paper.
    a. What lines is the robot good at following? Which lines does it have trouble with?
2. Change the speed of the turning.
    a. What do you notice about the robot's motion?
    b. Is the robot's motion smoother when it's moving faster or slower?
3. Draw a circular path.
    a. Can you make the robot complete exactly one lap?
    b. Can you change the code so that the robot follows on the inside of the line instead of the outside?