Intermediate/Advanced Ev3 Programming

Ultrasonic and touch sensors, and 1 sensor line following

By STEMPowering Girls
stempoweringgirls.org

Ultrasonic Sensor

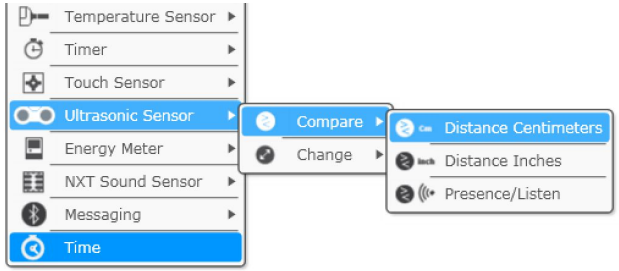
STEMPowering Girls
https://stempoweringgirls.org

Ultrasonic Sensor

This is an ultrasonic sensor. It's used for measuring the distance the robot is from an object, by sending out a sound wave and measuring the "echo" that comes back.

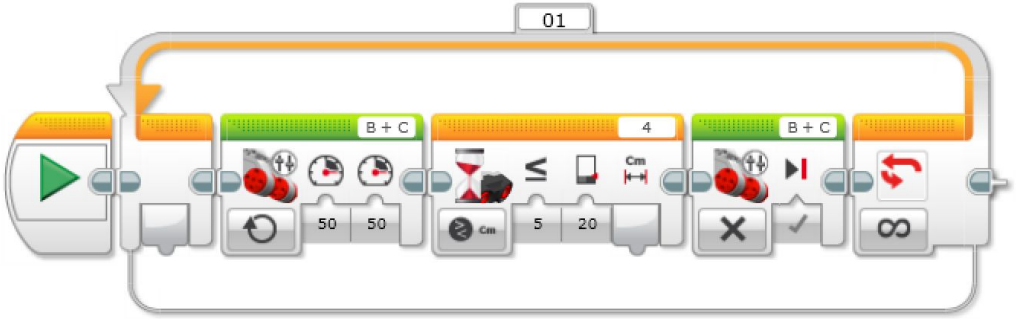
Ultrasonic Sensor

We can use the ultrasonic sensor to stop at a number of centimeters away from something almost like stopping at a color. Create a regular stop at a color program. Then change the setting of the wait block to “Ultrasonic Sensor”, “Compare”, “Distance Centimeters”. Change the number of centimeters to 20, and make the compare setting “Less than or equal to”



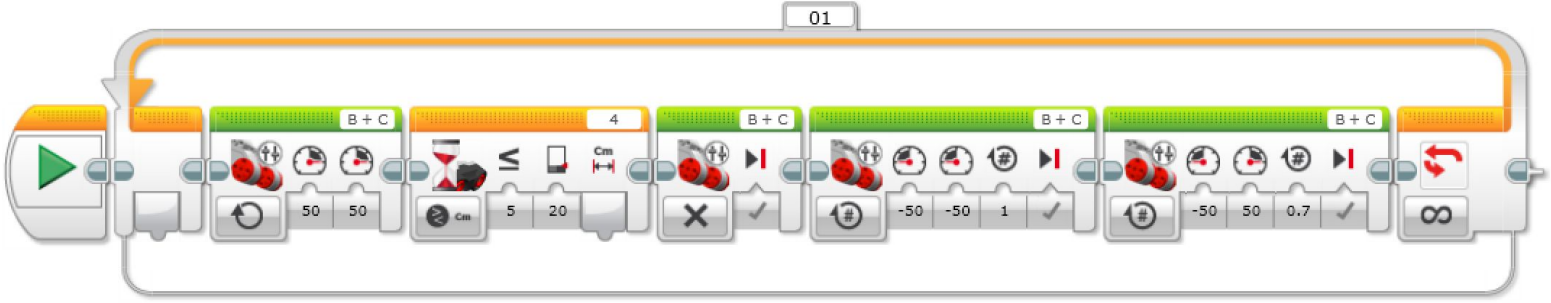
Ultrasonic Sensor

We can also make a program that makes sure the robot never bumps into anything. Create the same program as the last slide, then place the code into a loop.



Ultrasonic Sensor

Then in the loop (after the move to distance program), program the robot to move back and turn 0.7 rotations. This code will keep moving forward until the robot is close to something, and then move back and turn around so that it doesn't hit it.



Touch Sensor

STEMPowering Girls
https://stempoweringgirls.org

Touch Sensor

This is a touch sensor. It activates when the red cross on the front is pushed. This is useful when you want to find/align against a wall but you don't know how far away you are from it.

Based on What we know about the color and ultrasonic sensors,

How do you think we will create a program to stop when the touch sensor is pushed?

Touch Sensor

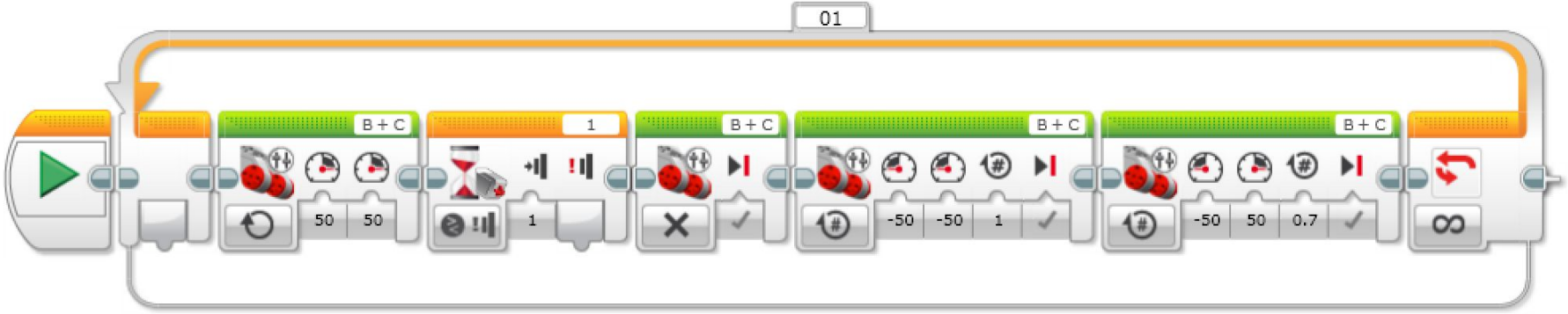
The code would almost be the same, but we would have to change the wait block to “Touch Sensor”, “Compare”, “State”. If you did it correctly, your code should look like this.

Now Try it Yourself!

Like the ultrasonic sensor, we can create a program that moves back and turns every time it bumps into the wall. See if you can create this program.

Touch sensor

Here is the code. Did you get it right?

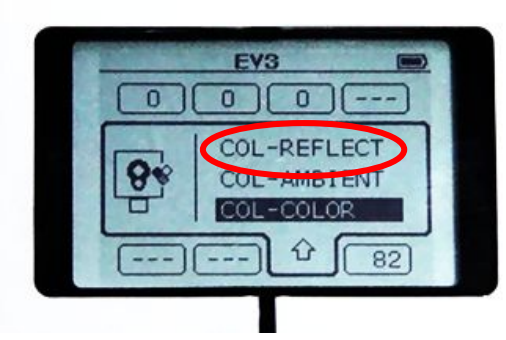


1 sensor
line following

STEMPowering Girls
https://stempoweringgirls.org

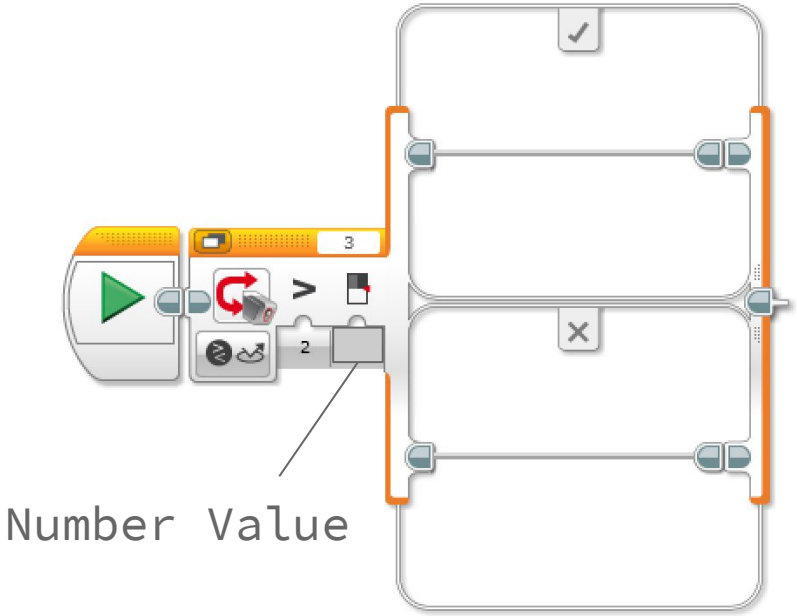
1 SENSOR LINE FOLLOWING

In order to create this program, we need to use something called “Reflected Light Intensity”. It is the amount of light the color sensor detects coming back from the color it senses. First go to port view on the brick and select reflected light intensity. Then place the color sensor in between the black(on the left) and white (on the right). This will give you a number value.



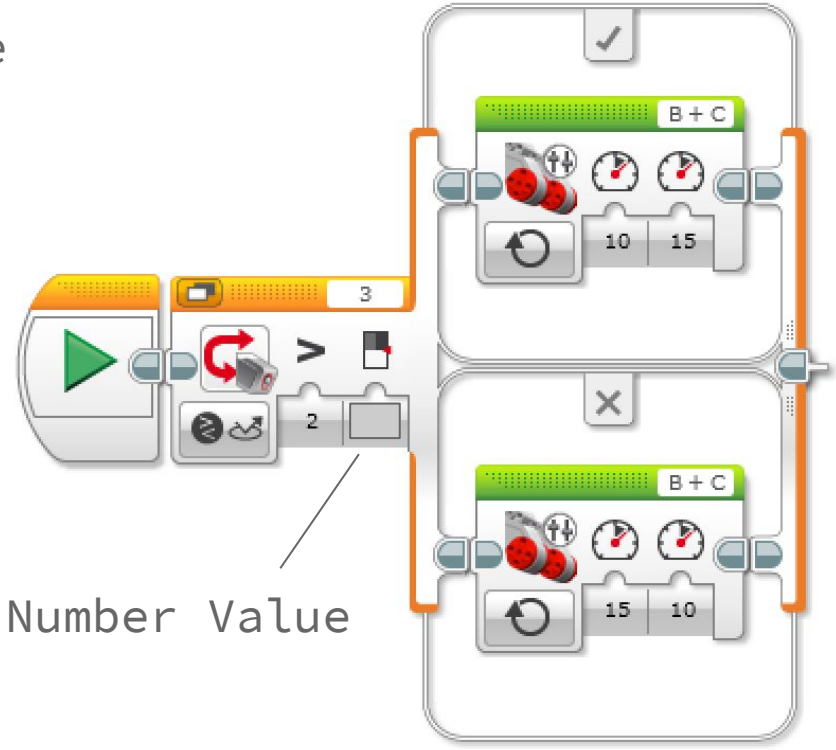
1 SENSOR LINE FOLLOWING

Next, bring a switch statement out and change it to the setting “Color Sensor”, “Compare”, “Reflected Light Intensity”. Change the compare tab to “Greater Than” and the tab with the number 50 to the number value you recorded on your brick.



1 SENSOR LINE FOLLOWING

Add move tank blocks to each of the cases with the setting as “On”. Next, change the powers in the first block to 10;15, and the powers in the second block to 15;10. This means that if the line is getting lighter the robot will turn left. But if the line is getting darker the robot will turn right.



1 SENSOR LINE FOLLOWING

The last step is to put your program in a loop and have it repeat for as long as you want!