

INTERMEDIATE PROGRAMMING LESSON



CALIBRATING COLOR SENSORS

By Sanjay and Arvind Seshan



Lesson Objectives

- 1) Learn why you need to calibrate your color sensors
- 2) Learn what calibration is
- 3) Learn how to calibrate your color sensors

Why Calibrate?

When you use your EV3 Color Sensor in Light Sensor Mode (e.g., reflected light mode), you should calibrate it (not for Color Mode)

Calibration means “teaching” the sensor what is “Black” and what is “White”

- This makes White read as approximately 100 and Black read as approximately 0
- It may still read over 100 or below 0. This is not an error.

Run your Calibrate Program whenever light conditions change once before you run your other programs.

If you have 2 Color Sensors, the same calibration will apply to BOTH sensors. You don't have to make a different calibration program for each color sensor. Make it using 1 sensor on one of the ports and the values will apply to both.

- If you have sensors that are very different from each other, you will need to write your own custom calibration that stores separate calibration for each sensor (this is not covered in this lesson).

Steps/Pseudocode for Calibration

Challenge: Write a program that will calibrate your EV3 Color Sensors for black and white.

Pseudocode:

Reset the existing calibration values

Display that the user should place the robot on “black” and press ok

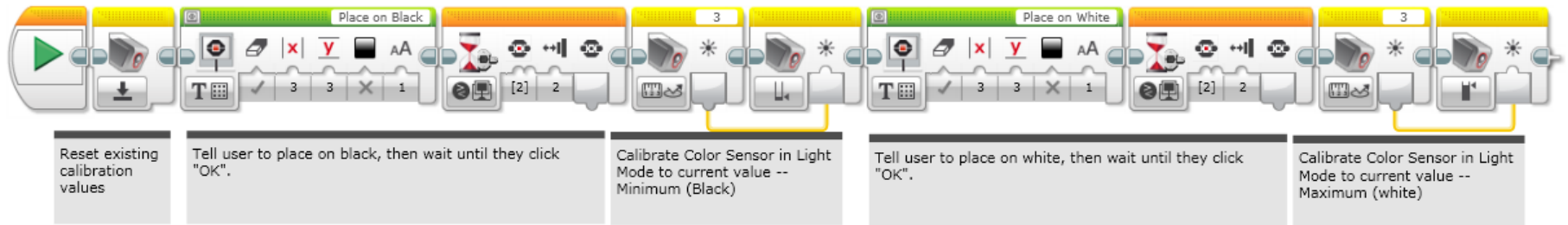
Read the Color Sensor Block in Light mode and save it to the Color Sensor Block in Calibrate mode.

Repeat above steps for calibrating “white”.

Calibrate Program Solution

The goal of this program is to teach the robot what black and white values should read. At the end of this program, the color sensor (in light mode) should read around 100 on white and 0 on black.

Note 1: This program is set to use sensor 3.
Note 2: If you use two color sensors the calibration values for one sensor will be used for the other also.



- When you run the above Calibrate Program, you will be asked to place the robot on a BLACK section of the mat and then hit center EV3 button.
- Then you will be asked to place the robot on WHITE and hit center EV3 button.

Discussion Guide

1. When do you need to calibrate your color sensor?
 - When it is used in reflected light mode
2. If I have two color sensors, do I need to calibrate each one?
 - Only one calibration value is stored on the brick and applies to all sensors. If you calibrate a second sensor, it will overwrite the first calibration.
3. What are you doing when you calibrate?
 - You are teaching the sensors what “black” and “white” mean
4. Should you calibrate for other colors (e.g. green) if you want to follow a green line?
 - No, you always calibrate for black and white.
5. How often do I need to calibrate?
 - Just once before you run all your other code. The values are saved to the brick.

Credits

This tutorial was created by Sanjay Seshan and Arvind Seshan

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