COMPARING EV3 & HITECHNIC COLOR SENSORS

By Sanjay and Arvind Seshan
LESSON OBJECTIVES

- Learn the differences between the HiTechnic and LEGO Color Sensors
HOW THEY WORK

EV3 Color Sensor

- Digital sensor detects color intensity of the light that
- Color Mode – 7 colors, no color
- Reflected Light Intensity and Ambient Light Intensity modes

HiTechnic Color V.2

- A single white LED (light emitting diode) to illuminate the target and
- Color Mode with 18 colors
- RGB, Passive and Raw modes
POSITION AND ANGLE

EV3 Color Sensor

- Sensor must be positioned at a right angle to surface it is examining
- According to EV3 documentation, Color Sensors work best between 4-12mm (1/2 - 1 1/2 studs) off the surface you are detecting
- Any higher or lower and the readings are not as accurate

HiTechnic Color Sensor

- The Color Sensor V2 works best when it is positioned higher
- It is recommended that you install the sensor at an angle (see image)
COMPARING STANDARD MODES

- Both Sensors in Color-Measure mode return a value for the color (a color number)
- The HiTechnic Sensor identifies 18 colors (values from 0-17)
- The EV3 Color Sensor identifies 7 colors plus no color (0-7)
COMPARING RGB MODES

- To compare RGB values, we downloaded the EV3 RGB Block from David Gilday
- The HiTechnic Sensor identifies red, green, blue, and white values
- The EV3 Color Sensor identifies red, green, and blue
- The white output is similar to the reflected light intensity mode in the EV3 Color Sensor block.
Tests

- Over the next few slides, we will go over some tests we conducted with both the sensors.

- The results will help you understand which sensor to use in which condition.

- We do not conduct any tests for angle and position as both LEGO and HiTechnic specify these in their documentation.
The performance of the EV3 and HiTechnic sensors are not the same

The RGB values with the EV3 are different compared to the HiTechnic Sensor. A possible reason for this is that the color sensor was designed to work best on LEGO colors.

The HiTechnic color sensor did not accurately identify Brown LEGO

<table>
<thead>
<tr>
<th>LEGO Color</th>
<th>EV3 Color Sensor</th>
<th>HiTechnic Color Sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Color Number</td>
<td>Red</td>
</tr>
<tr>
<td>White</td>
<td>6</td>
<td>161</td>
</tr>
<tr>
<td>Red</td>
<td>5</td>
<td>105</td>
</tr>
<tr>
<td>Yellow</td>
<td>4</td>
<td>140</td>
</tr>
<tr>
<td>Green</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>Blue</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>Black</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>Brown</td>
<td>7</td>
<td>24</td>
</tr>
</tbody>
</table>

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Neither sensor worked well in bright sunlight. They misidentified most colors.

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</thead>
<tbody>
<tr>
<td></td>
<td>Red</td>
<td>Green</td>
<td>Blue</td>
</tr>
<tr>
<td>White</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Red</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Yellow</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Green</td>
<td>3, 1</td>
<td>17</td>
<td>68</td>
</tr>
<tr>
<td>Blue</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Black</td>
<td>1</td>
<td>12</td>
<td>17</td>
</tr>
<tr>
<td>Brown</td>
<td>7</td>
<td>26</td>
<td>15</td>
</tr>
</tbody>
</table>
Position: The EV3 sensor works best when mounted horizontally and close to the target. If you need to sense something further away, the HiTechnic Sensor may be better.

Number of Colors Detected: In Color Mode, the HiTecnic Sensor does detect a larger number of colors.

Modes: The HiTechnic Sensor offers some extra modes including an RGB and Raw Mode. To get RGB Mode for the EV3, you will have to install David Gilday’s custom block.

Lighting: Both the sensors were not great in sunlight.

LEGO Colors: Overall, we felt that the EV3 Sensor was more accurate in detecting LEGO colors.
CREDITS

- This tutorial was created by Sanjay Seshan and Arvind Seshan
- More lessons at www.ev3lessons.com

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