

# Stduino Color Sensor

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## Manual



This manual explains the Stduino Programming Environment and how to use it. As the Stduino Programming Environment develops, this manual may be edited or revised. You can find the full manual below.

■ Installing Stduino Software

[http://artec-kk.co.jp/stduino/docs/en/Stduino\\_setup\\_software.pdf](http://artec-kk.co.jp/stduino/docs/en/Stduino_setup_software.pdf)

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## 1. About Your Color Sensor

### 1.1. Overview

Your model TCS3414CS Color Sensor can measure both the chromaticity of ambient light and the color of solid objects.

### 1.2. Specifications

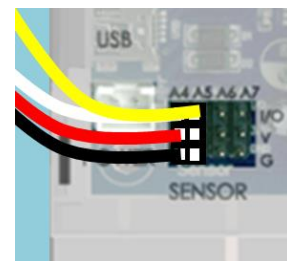
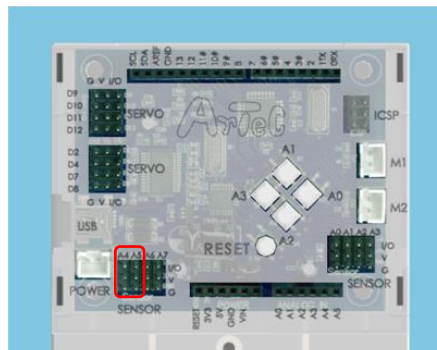
|                    |               |
|--------------------|---------------|
| Sensor             | TCS3414CS     |
| Operating Voltage  | 3.3-5V        |
| Interface          | I2C           |
| Measuring Distance | Approx. 10 mm |

## 2. Connecting to Studuino

- ① Use the four-wire 30 cm Color Sensor connecting cable (product 086882, sold separately).
- ② The white end of the cable plugs into your Color Sensor, while the black end connects to your Studuino.
- ③ Your sensor uses both connectors A4 and A5 (though it will fit into other connectors, they cannot be used).
- ④ When using your sensor, activate the on-board LED by flipping the switch on the circuit board.



Color Sensor



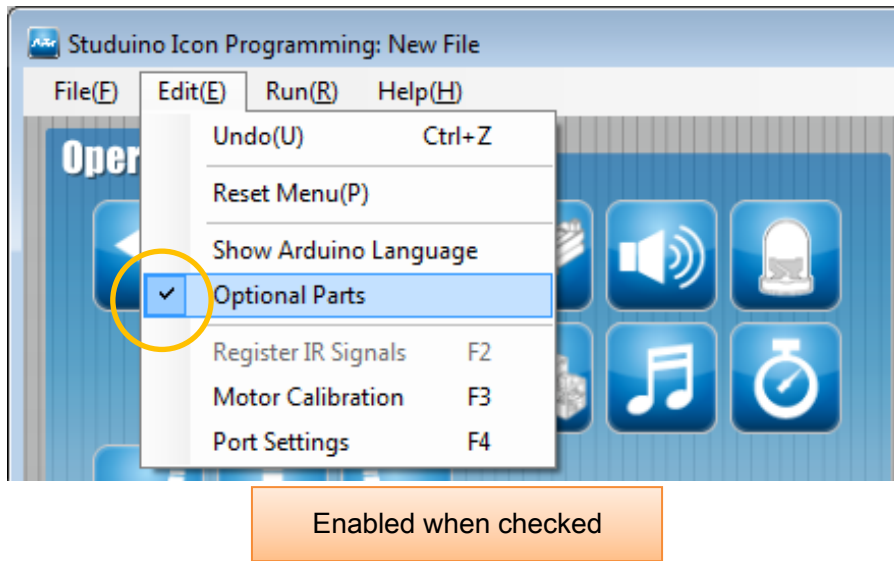
Make sure the cables are inserted correctly!

The white wire connects to A4 and the yellow wire to A5.

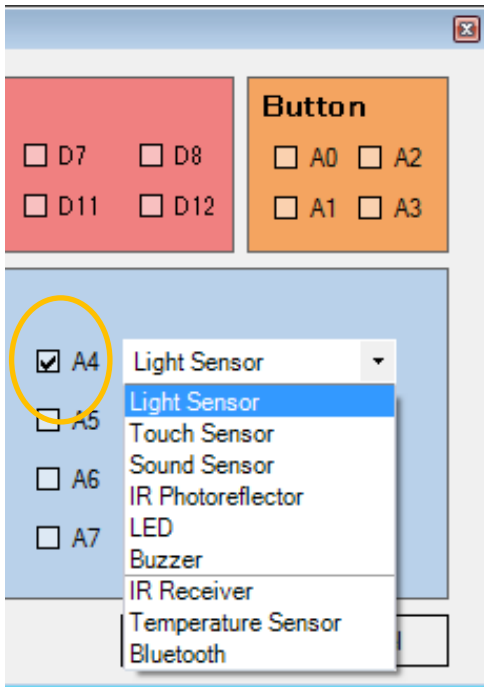
### 3. In the Studuino Icon Programming Environment

Familiarize yourself with the basics of the Studuino Programming Environment by reading the [Studuino Programming Environment Manual](#) and the [Icon Programming Environment Guide](#).

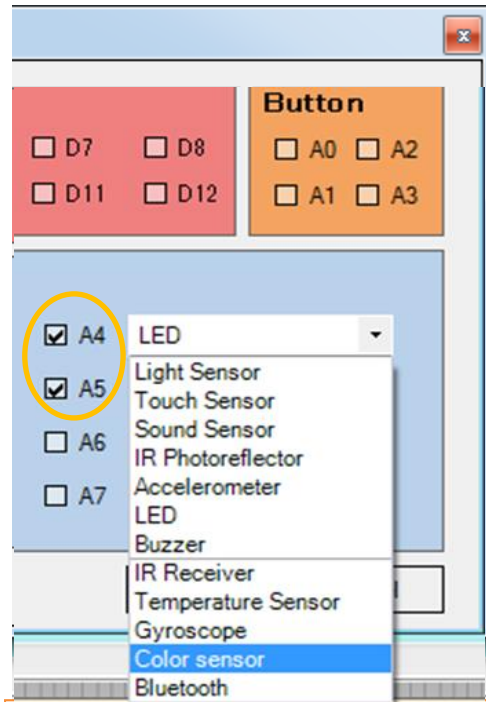
From the Edit menu click Optional Parts. A check will appear beside this option when enabled.



Your Color Sensor uses the I2C port (A4, A5). Under Port Settings check the boxes for ports A4 and A5 in the Sensor / LED / Buzzer section. You will need to check both of these boxes to use the sensor.



Unavailable when only A4 is checked

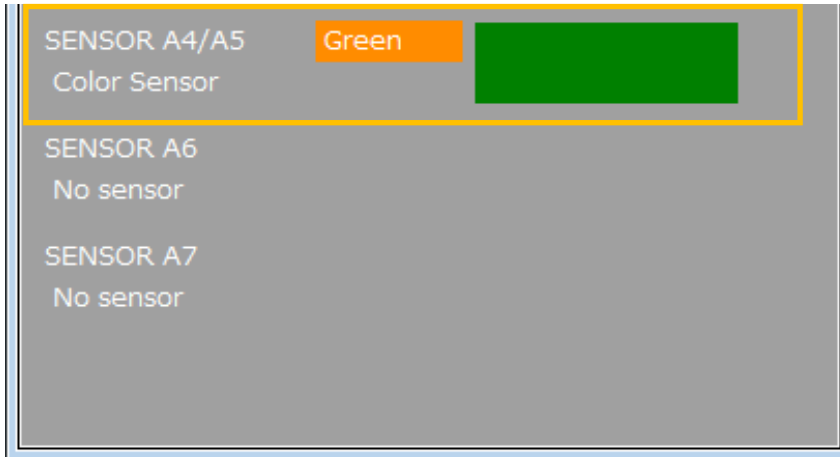


Available when both boxes are checked

Place the icons shown below and choose A4/A5 Color Sensor. You will see a series of check boxes with options for unspecified (undetectable) and the colors red, green, blue, white, yellow, green and black for your Artec Blocks.



### 3.1. Using the Sensor Viewer



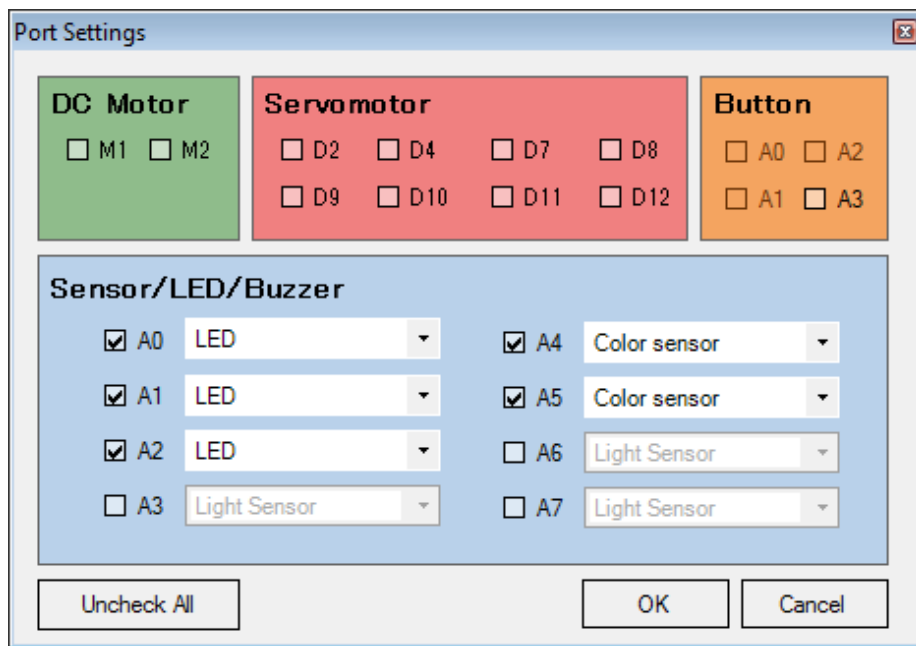
The detected color will be shown in the Sensor Viewer.

### 3.2. Sample Program

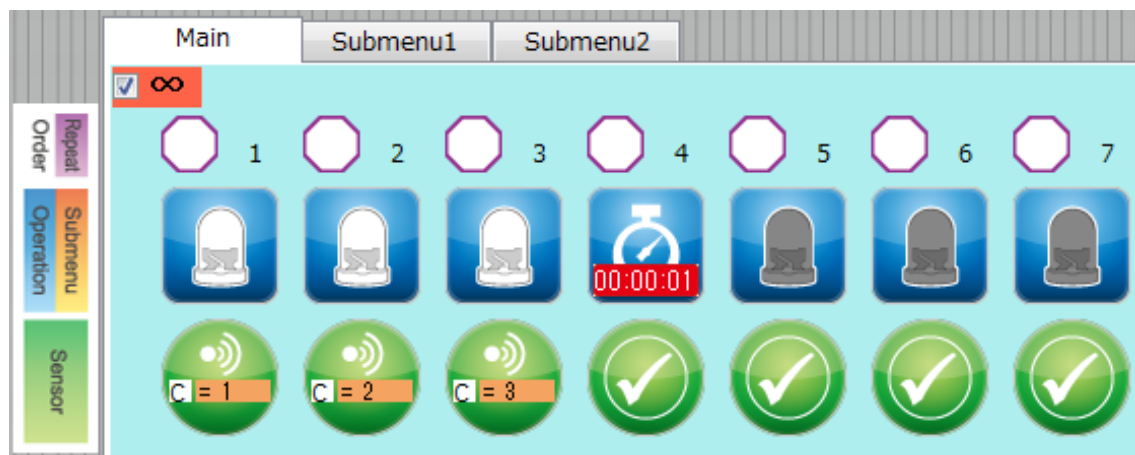
Familiarize yourself with the basics of the Studuino Programming Environment by reading the [Studuino Programming Environment Manual](#) and the [Icon Programming Environment Guide](#).

Place a red, blue, or green Artec block close to the Color Sensor and the corresponding LED will light up.


- ① Connect red, blue, and green LEDs to connectors A0, A1, and A2 and your Color Sensor to connectors A4 and A5.




- ② Check the Repeat Indefinitely box, place icons, and set them as shown below.




No. 1

 **Switch**  
 ON  
 OFF


**Connector**  
A0 ▾

 **Condition**  
A4/A5 Color sensor ▾





Action: LED, Switch ON, Connector A0  
Condition: Color Sensor: Red

No. 2

 **Switch**  
 ON  
 OFF

**Connector**  
A1 ▾


 **Condition**  
A4/A5 Color sensor ▾




Action: LED, Switch ON, Connector A1  
Condition: Color Sensor: Green




No. 3

 **Switch**  
 ON  
 OFF

**Connector**  
A2 ▾

 **Condition**  
A4/A5 Color sensor ▾




Action: LED, Switch ON, Connector A2  
Condition: Color Sensor: Blue

No. 4

 **Time**  
0 hour  
0 min  
1.0 sec

Action: Brake: 1 sec.  
Condition: None

No. 5



Switch

ON

OFF


Connector

A0 ▾

Action: LED, Switch OFF, Connector A0

Condition: None

No. 6



Switch

ON

OFF


Connector

A1 ▾

Action: LED, Switch OFF, Connector A1

Condition: None

No. 7



Switch

ON

OFF

Connector

A2 ▾

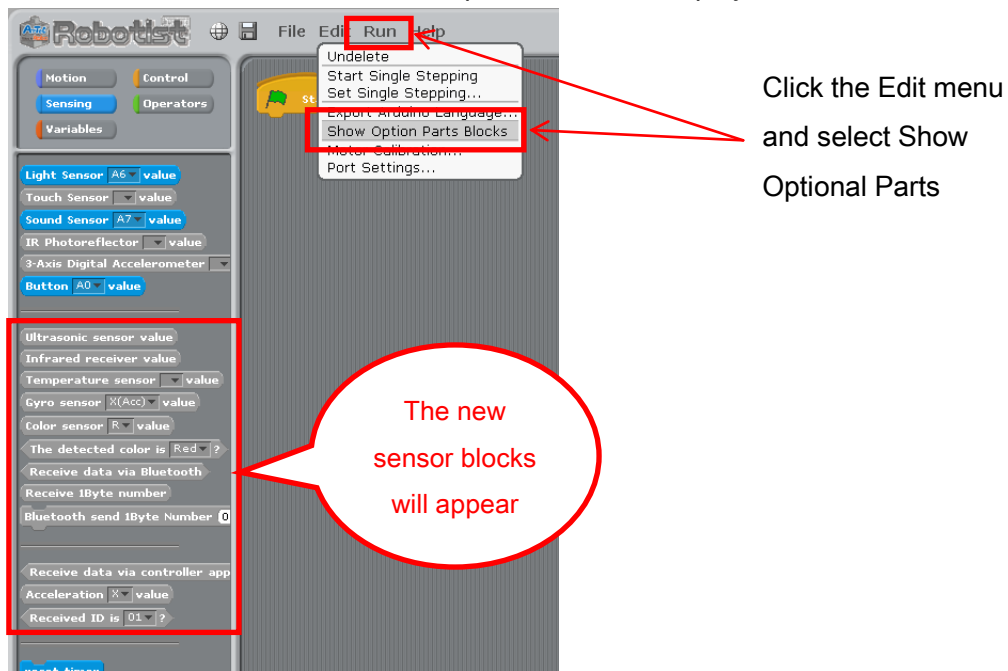
Action: LED, Switch OFF, Connector A2

Condition: None

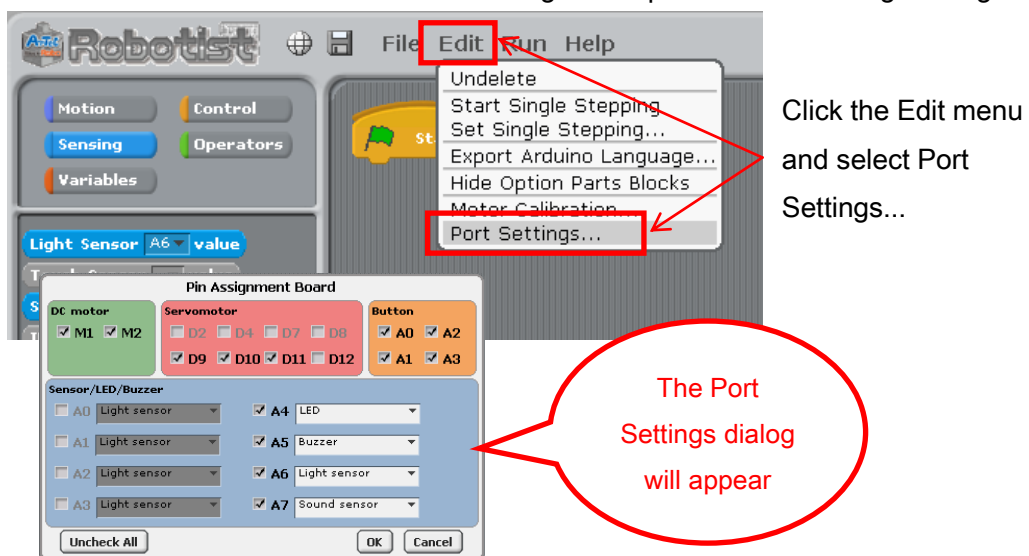
#### 4. In the Studuino Block Programming Environment

To use your Color Sensor in the Block Programming Environment you will need to make sure the Color Sensor block is available and active. Follow the steps below to do this:

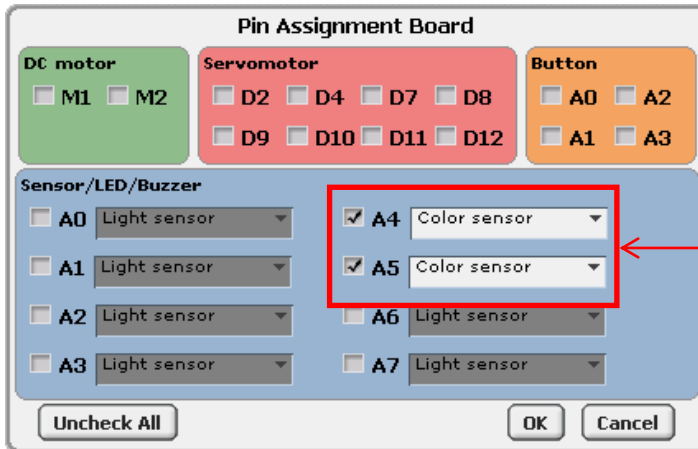
- ① From the Edit menu, choose Show Optional Parts to display the new sensor blocks.



- ② Click the Edit menu and choose Port Settings... to open the Port Settings dialog.



- ③ Under the Sensor / Buzzer / LED section of the Port Settings dialog, check boxes A4 and A5 and use the combo box to select the Color Sensor. Click OK.

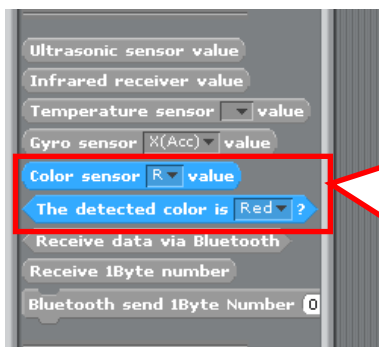


Choose Color Sensor for A4 and A5

★ Programs made in the Block Programming Environment which use both an Infrared Receiver and I2C device (Accelerometers, Gyroscopes, or Color Sensors) are too large for your Studuino's memory. The below message will appear if you attempt to select both an Infrared Receiver and an I2C device in the Port Settings dialog.



- ④ The Color Sensor blocks will become active.



You can now use the Color Sensor blocks

## 4.1. Color Sensor Values

Your Color Sensor uses the measured color composition (red, blue, green) of an object to detect their values, color coordinates, and the color of the object. The Color Sensor block returns these values. Color composition values for red, green, and blue are from 0-100 and color coordinates are shown in whole numbers. The detected color will be shown as a block of red, green, blue, white, yellow, green, or black. You can check these values using the Sensor Board in Test mode.

| Sensor Board               |       |
|----------------------------|-------|
| [A0] Not connected         | *     |
| [A1] Not connected         | *     |
| [A2] Not connected         | *     |
| [A3] Not connected         | *     |
| [A4/A5] Color sensor (R)   | 0     |
| [A4/A5] Color sensor (G)   | 0     |
| [A4/A5] Color sensor (B)   | 0     |
| [A4/A5] Color sensor (C)   | 0     |
| [A4/A5] Color sensor (X)   | 0.3   |
| [A4/A5] Color sensor (Y)   | 0.4   |
| [A4/A5] The detected color | Black |
| [A6] Not connected         | *     |
| [A7] Not connected         | *     |

The color values of the object will be shown here

In the Sensor Board, color composition (red, blue and green) are shown by the R, G and B values and the color coordinates are shown by X and Y. These five values are evaluated to find the color of an object.

## 4.2. Sample Program Using the Color Sensor

The picture below shows an example program using a Color Sensor. It uses an LED to show the color detected by the Color Sensor. The red LED is connected to A0, the green LED to A1, and the blue LED to A2.

The screenshot shows the Robotist software interface. On the left, the 'Sensing' tab is active, showing the 'Color sensor' block with 'R' selected. The main workspace contains a 'Start program' block followed by a 'forever' loop. Inside the loop, there are three 'if' blocks: 'The detected color is Red?', 'The detected color is Green?', and 'The detected color is Blue?'. Each 'if' block contains three 'LED' blocks for A0, A1, and A2, with 'on' or 'off' settings. On the right, the 'Sensor Board' window shows the following data:

| Sensor Board               |     |
|----------------------------|-----|
| [A0] LED                   | *   |
| [A1] LED                   | *   |
| [A2] LED                   | *   |
| [A3] Not connected         | *   |
| [A4/A5] Color sensor (R)   | 5   |
| [A4/A5] Color sensor (G)   | 3   |
| [A4/A5] Color sensor (B)   | 1   |
| [A4/A5] Color sensor (C)   | 11  |
| [A4/A5] Color sensor (X)   | 0.5 |
| [A4/A5] Color sensor (Y)   | 0.4 |
| [A4/A5] The detected color | Red |
| [A6] Not connected         | *   |
| [A7] Not connected         | *   |