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Get Better With TCS3200 Color Sensor Module

T.K. HAREENDRAN (HTTPS://WWW.ELECTROSCHEMATICS.COM/AUTHOR/HAREENDRAN/)

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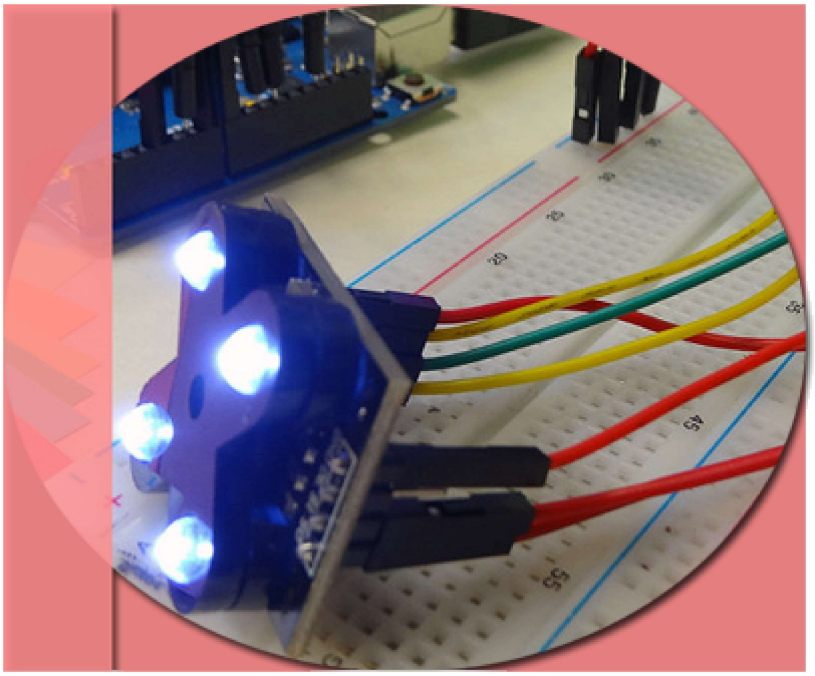
> *"The purest and most thoughtful minds are those which love color the most"* – John Ruskin, The Stones of Venice.

Colors… Would it be red or green today? Maybe blue — Blue is a deeply sneaky color, my favorite. The days of no color were simply too hard to bear. I needed color everyday! What about you?



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After a fantastic ride to nothingness, finally the TCS3200 color sensor module (from ebay.in) launched at my little lab just now. Enjoy building projects using this little module, I think you will be surprised with the results. The module is a complete color detector, including a TAOS TCS3200 RGB sensor chip and 4 white LEDs. It can detect and measure a nearly limitless range of visible colors, practically suitable for test strip reading, sorting by color, ambient light sensing and calibration, and color matching, to name just a few. It has an array of photodetectors, each with either a red, green, or blue filter, or no filter (clear). The filters of each color are distributed evenly throughout the array to eliminate location bias among the colors. Internal to the device is an oscillator which produces a squarewave output whose frequency is proportional to the intensity of the chosen color.

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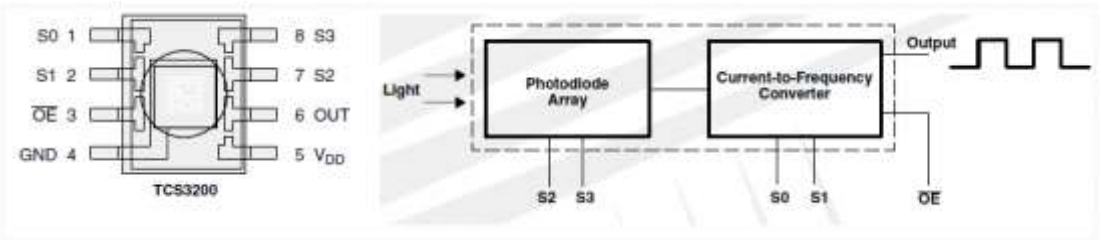
TCS3200 Color Sensor Module

TCS3200 Color Sensor

Itis a programmable color light-to-frequency converter that combines configurable silicon photodiodes and a current-to-frequency converter on a single monolithic CMOS integrated circuit. The output is a square wave (50% duty cycle) with frequency directly proportional to light intensity (irradiance). In the TCS3200 sensor, the light-to-frequency converter reads an 8 x 8 array of photodiodes. Sixteen photodiodes have blue filters, 16 photodiodes have green filters, 16 photodiodes have red filters, and 16 photodiodes are clear with no filters. The full-scale output frequency can be scaled by one of three preset values via two control input pins. Digital inputs and digital output allow direct interface to a microcontroller or other logic circuitry. Output enable (OE) places the output in the high-impedance state for multiple-unit sharing of a microcontroller input line.



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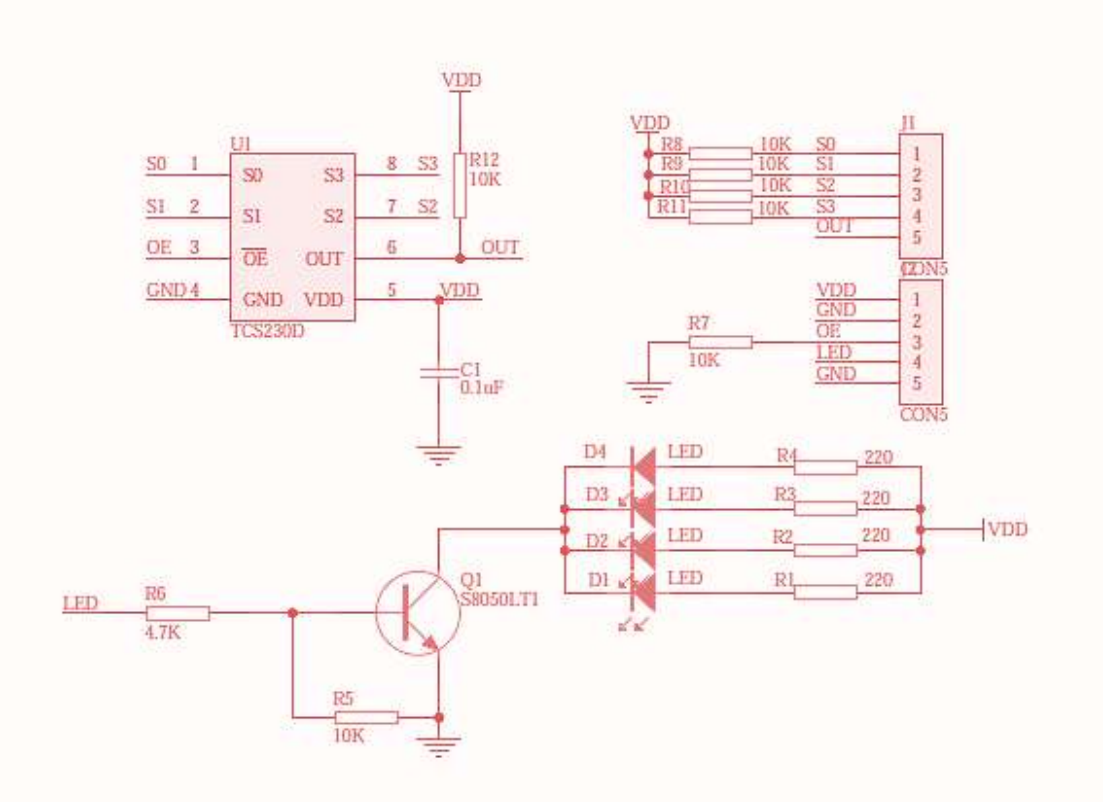
TCS3200 Color Sensor and its functional block diagram

The four types (colors) of photodiodes are interdigitated to minimize the effect of non-uniformity of incident irradiance. All photodiodes of the same color are connected in parallel. Pins S2 and S3 (photodiode type selection) are used to select which group of photodiodes (red, green, blue, clear) are active. Similarly, the output frequency scaling selection can be carried out through pins S0 and S1. TCS3200 (available in SOIC-8 package with part number TCS3200D) is designed for singlesupply operation, and can be powered from dc 2. 7 to 5.5 volts.

TCS3200 Color Sensor Module

TCS3200 color sensor module is infact a standard breakout board with TCS2300D sensor at its heart, and 4 LEDs as support lamps. If you want to turn on these LEDs, you could connect the 'LED' pin on the 10-pin TCS3200 color sensor module to 5 volt (or a digital pin) to drive them. Basic schematic diagram of the TCS3200 color sensor module is given below for your quick reference.



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TCS3200 color sensor module basic schematic diagram

As stated, TCS3200 has four photodiode types, and you can choose the different type of photodiode by different combinations of S2 and S3. Besides, you can configure the squarewave output frequency to different scaling factors by

different combinations of S0 and S1. Look at the quick reference table shown below:

Terminal Functions

TERMINAL NAME	TERMINAL NO.	I/O	DESCRIPTION
GND	4		Power supply ground. All voltages are referenced to GND.
$\overline{OE}$	3	I	Enable for f_o (active low).
OUT	6	O	Output frequency (f_o).
S0, S1	1, 2	I	Output frequency scaling selection inputs.
S2, S3	7, 8	I	Photodiode type selection inputs.
V_{DD}	5		Supply voltage

S0	S1	OUTPUT FREQUENCY SCALING (f_o)
L	L	Power down
L	H	2%
H	L	20%
H	H	100%

S2	S3	PHOTODIODE TYPE
L	L	Red
L	H	Blue
H	L	Clear (no filter)
H	H	Green

		MIN	NOM	MAX	UNIT
Supply voltage, V_{DD}		2.7	5	5.5	V
High-level input voltage, V_{IH}	V_{DD} = 2.7 V to 5.5 V	2		V_{DD}	V
Low-level input voltage, V_{IL}	V_{DD} = 2.7 V to 5.5 V	0		0.8	V
Operating free-air temperature range, T_A		−40		70	°C

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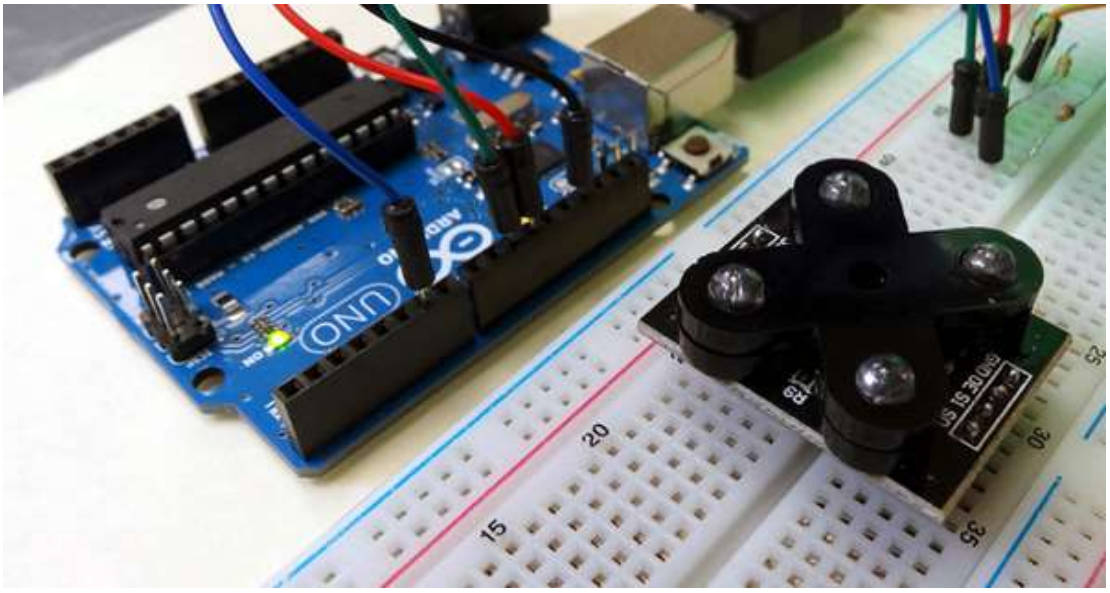
Color Sensors – How do they work?

Color Sensors have the ability to recognize color by using LEDs and integrated RGB filters to give accurate color readings. For example, if the sensor were to be held over a red piece of paper, it would recognize its exact RGB value and could process this reading with the help of a suitable microcontroller. Most color sensors contain a light transmitter and three separate light receivers. The light is reflected off of the target such as a red piece of paper and returns to the sensor. The receivers are tuned to look for a specific wavelength of light working out its Red, Green and Blue (RGB) values, record the components of the reflected light and its intensity.

TCS3200 Color Sensor & Arduino



(https://www.electroschematics.com/wp-content/uploads/2015/05/CS-6.png)

TCS3200 Color Sensor & Arduino

In real-world, a color sensor can be connected with an Arduino to recognize all of the RGB as well as magenta, yellow and cyan color information. Interfacing the TCS3200 module with Arduino should not present undue difficulties. Make sure that the correct wiring of all interface connections is observed, before the pre-flight check. An interesting online diy guide demonstrating the possi bilities of TCS 3200 may be found at **www.toptechboy.com (http:// www.toptechboy.com/arduino/lesson-15-super-coolarduino-color-sensor-project/)**. That is not all, you can find many valuable information and sample sketch offers at: **www.dfrobot.com (https://www.dfrobot.com/wiki/index.php?title=TCS3200_Color_Sensor_(SKU:SEN0101)&oldid=27839)**.

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manish

Please tell me how to interface this color sensor with fire bird 5. which pin should to connected to where in fire bird bot

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