# Color Sensing device for Color Blind and Blind people

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Abstract: ***This paper purpose the study on tools aimed to assist blind and blind people in their daily activities. Color-blind people face a numerous sort of problems as they are unable to observe the difference in the color. Whereas, the blind people actually can't see the color at all. Color is one of the essential parts in one's life, so in order to help them improve their daily life and give them a sense of satisfaction a RGB sensing device is developed. Color sensors register data in the form of pulses and base their working on different models like RGB Color model. A large percentage of the visible Colors can be created using these three primary colors. There are so many different color sensors that can sense multiple colors at one time. Thus, depending on the accuracy of the sensor, color sensors are programmed to know only one color or different color types or shades for categorization operations. Through this Paper, the color detection, the basic color theory and the applications of color sensor will be reviewed. Our Paper aims to overcome the difficulties suffered by the color-blind & blind people. Text to Speech Converter Module is also used so that blind people can get the information of the detected color only by just hearing to the speech output of the system. Also, the routine tasks of wearing matching socks, clothes and various others becomes tedious task then, so our project aims to help these people overcome basic day-to-day problems.***

***Keywords: Arduino Uno; RGB; Speech Recognization***

## 1. Introduction

Color blindness (color vision deficiency) affects approximately 1 in 12 men (8%) and 1 in 200 women in the world. This statistic is increasing exponentially year by year. In extreme situations, only shades of grey might be distinguishable. Color plays an important role in the everyday life of a normally sighted person. Normally sighted people use colors as the basis of a number of everyday tasks, for example matching socks, choosing between different clothes. Such activities, however, could prove to be challenging for both blind and blind persons. So, to recognize those colors for color blind and blind persons we need some electronics gadget that can recognize the color and speak the name of that color simultaneously. So, the main objective of this project is to develop such an electronic gadget that recognizes the object color. So, the color blind and blind persons will be able to recognize the color as well as be able to hear the name of color with the help of this gadget. Such a system could give color blind as well as blind people greater independence as they would be able to carry out certain tasks that are unable to perform unaided. The components required for this gadget are Arduino Uno board, RGB colour sensor, connecting wires, LCD screen, text to speech converter module and Arduino IDE software. The gadget will be developed in such a way that it can be used as a portable device. The other advantages of this gadget will be its small size, low power consumption, accuracy and efficiency.

## 2. Design

The goal of this project is to create a device that measures the 'color' of light. As you probably know, the light that typically illuminates human life is actually a wavelength in the visible spectrum. Here we will learn how to design a RGB color sensing device.
Our model will basically consist of following components:

**HARDWARE:**

- Arduino Uno Board
- Power Supply(5 V)
- JHD_16ALCD (16*2 LCD)
- TCS3200 Color Sensor
- Text to Speech converter Module
- AMPLIFIER (if needed)

**SOFTWARE**:

- ARDUINO IDE

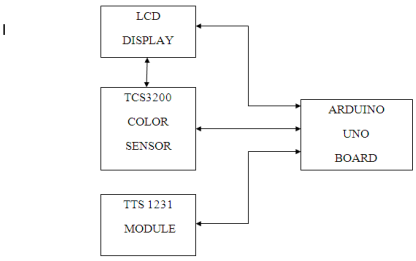



**Figure 1:** Block Diagram

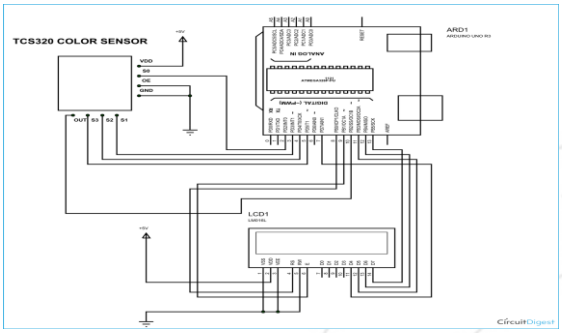



**Figure 2:** Circuit Diagram

LCD is interfaced with the Arduino Board.

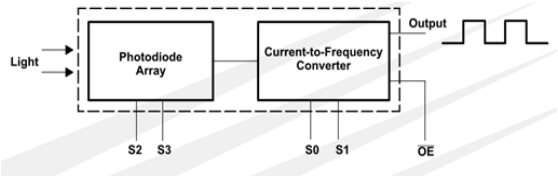
The way color blind people see

**TTS 1231 module**

The TTS mdule will be interfaced with Arduino Uno board.
This TTS Module produces speech (voice) as the output when the led's are on. It reads input as text only in English language and gives the output in a Retro (Robotic) Voice.

**WORKING**

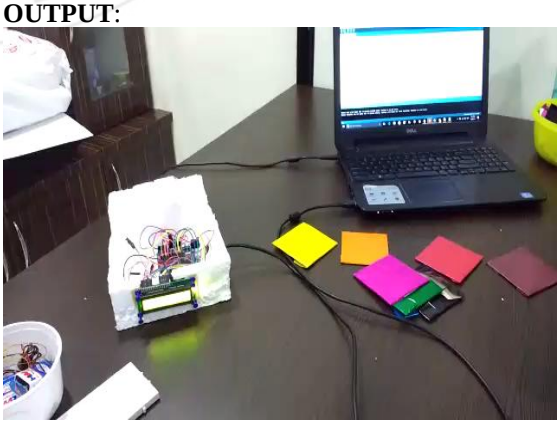
The color to be sensed is decided by the two logic select pins S2 & S3 of the Color sensor. When a red color is sensed both the logic select pins S2 & S3 are kept low. The Color sensor detects the intensity of the color and sends the value to the color sensor module. The light intensity measured by the color Array is sent to the Current to Frequency converter, whose frequency is in relation to current sent by Array.




**TCS3200 COLOR SENSOR**:
As we are aware of that different Colors have different intensities but for a normal use it won't make much difference. The Arduino UNO here sends data to the Color sensor and the data received is shown on the LCD connected to the Arduino. The UNO detects three color intensities separately and shows them on LCD.
The Arduino UNO selects the signal (square) pulse duration because of that, one can get the frequency of square wave sent by module. With the frequency at hand we can match it with color on sensor. The Arduino Uno reads the pulse duration on 10th pin of UNO and stores its value in frequency integer.
We are going to do this for red, green and blue colors recognition. All three-color intensities are shown by frequencies on 16x2 LCD.

**SPEECH OUTPUT SYSTEM:**
When the system identifies a color, it needs to have a way to let the user know of the result. Since the product is directed towards blind people, a screen to display would be useless. The product should be able to communicate the results to the user using some form of audible signal. The simplest way to achieve that would be using a buzzer. So, whenever a color is recognized the gadget will display as well as speak the name of color with help of speech output system.
This will let the blind people understand which color is present in front of them.

**OUTPUT**:



RGB model showing output on LCD.

### I. FUTURE SCOPE

- This gadget can be made more user friendly and cheap thus replacing Enchroma glasses which are way too costlier.
- With help of polyglot many types of languages can be added in the gadget in order to make it available to each and every person living in any part of the world.
- The whole gadget can be converted wirelessly by developing an android app that controls the gadget.
- This gadget can also be used by old people who develops low vision due to aging.

## 3. CONCLUSION

The final solution designed is portable and capable of identifying the color of objects made of a range of materials.

The device is simple to operate, as it can be used with just two buttons. It also makes use of a speech output to interface with the user. A volume control enables the user to adjust the output to a comfortable level and also includes a headphone jack. In order to reach to the above solution described, a number of problems had to be overcome. The main focus has to be given to the connecting wires as even if one wire is loose the whole gadget will fail to work properly. Also, the program has to be written properly in order to make the gadget operate properly. The sensor used should have enough accuracy to give a proper output within the specified ranges. The final solution will not be much expensive and with proper planning can be used for business purposes also.

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