

## COLOUR DETECTION

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### Abstract

A Colour Sensor, as the name recommends, is a gadget that faculties or recognizes hues. A shading sensor makes utilization of an outer wellspring of discharging light (a variety of four light transmitting diodes to be exact) and afterward breaks down the light reflected over from the protest with a specific end goal to decide the question's shading. Shading sensors will give a precise shade of the question. An extensive variety of uses can be done utilizing shading sensors like arranging of items in light of their shading, quality evaluation frameworks, shading improvement in printers and so on. In this project, we intend to design an Arduino Colour Sensing and detection application, which has the capability to detect distinct colours. We have utilized TCS3200 shading sensors for this reason. Prologue to shading sensor, circuit chart and working of the Arduino Colour Sensor venture are clarified further. Colour sensor systems evolved and reached a high level of technologies in detecting several colours, mostly in robotics. Many factors can affect the success of this device like efficiency. It is so important when you are looking for accurate results but it could fail if the cost is high. The purpose of this project is to create a colour sensor system that has the good efficiency and low cost. The system is made to detect ten different colours and differentiate between them. It has been implemented as a breadboard using LEDs, an LDR, Op Amps and an Arduino UNO. This paper will be explaining the components, working principle, connections, calculations, results and the errors. The motivation of this project is the ongoing research in many parts of the world to alleviate colour blindness. Although this project might not be directly applicable to human retina but it can be integrated with robots and automotive industries.

### 1. INTRODUCTION

Colour is the perceptual property of an object that appears to the observer when an incident ray of light hits the surface of the object. Recognizing different colours of objects is important in our day-to-day life

in order to enhance understanding of our environment and interact with it. To detect and identify colours, humans and some animals use information from special cells situated in the retina. This project focuses on achieving artificial colour vision using

simple electronic components within the given time. This project is significant for applications that require simple colour detection ability for not more than ten different colours. The colour sensor developed in this project is a low-cost sensor made from simple electronic components that can be readily found; hence it can be developed and applied easily. Because it can be an ideal option for a simple industry application and it can be integrated with robotics vision. Moreover, this project is highly significant for the students to enhance knowledge on the area of colour theory and sensor development. While carrying out the project, the usage of an Arduino UNO and programming skills were strengthened. A Colour Sensor is a device that senses or detects colours. A colour sensor will use an external means of emitting light and then analyse the reflected light from the object in order to determine its colour. Colour sensors will give an accurate colour of the object. There are a wide range of applications of colour sensors like sorting objects by colour, textile industry, quality control systems, printer colour enhancement etc. Our project aims to bring up a colour detecting device which identifies the colour as well as gives the name of the colour using speakers.

## **2. RELATED WORK**

The colour of an object is due to the interaction of the surface of a body with a ray of light and an observer. colour categories are related to objects, materials, light sources, etc., based on their physical properties such as light absorption, reflection, or emission spectra. There are different colour spaces that help in quantifying colour attributes numerically, for example, RGB colour space. In this project the colour space being used is RGB colour space. The colour values are measured using a combination of an LDR and a LED network. In this chapter the theory of colour sensing, the differentiation and the different components that are used are discussed and finally, few other projects that are of relevance to this project are summarized and presented.

## **3. IMPLEMENTATION**

Building a device which detects a particular colour of an object which is placed Infront of the device. The device then automatically displays the name of the colour as well as tells the name of the colour through a speaker.

The project seeks to follow the following steps:

1. To design a system that detects colour for children.
2. Colour sensors are used to precisely match colours, to identify near colour matches on different surfaces. They can

identify invisible markers on products, which is ideal for error proofing package lines.

3. A colour sensor can be a simple and inexpensive way to detect the presence of markings on a package.

The main objective of our project is the methodology for identifying the shades of colours with an exact precision along with their names. Building a device which detects a particular colour of an object which is placed Infront of the device. The device then automatically displays the name of the colour as well as tells the name of the colour through a speaker.

Colour sensors are generally used for two specific applications: true colour recognition and colour mark detection. Sensors used for true colour recognition are required to "see" different colours or to distinguish between shades of a specific colour. They can be used in either a sorting or matching mode. Guide for TCS230/TCS3200 Colour Sensor with Arduino. The TCS3200 colour sensor can detect a wide variety of colours based on their wavelength. This sensor is specially useful for colour recognition projects such as colour matching, colour sorting, test strip reading and much more.

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this globe a better place for living. This world is full of colours which drive me to make a setup which can tell someone about the colour of a particular thing. So, this is the driving force which makes this imagination turning into reality.

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Colours information plays an important role in image and real time colour sensor detection. Which affects the results of video segmentation and correct real time temperature value. According to the colour information in RGB colour space, the dominant colour is determined at first. In the colour image segmentation, the primary step is to settle on colour space. The colour model we all know contains RGB, HSI, HSV, CMYK, CIE, YUV, and so on. The RGB model is that the most ordinarily used for hardware colour model while the HSI model is that the most ordinarily used colour model for colour

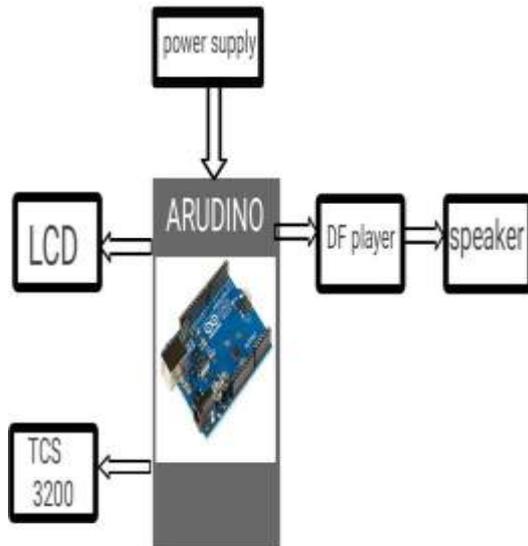
processing. They're often utilized in image processing technology.

#### 4. EXPERIMENTAL RESULTS

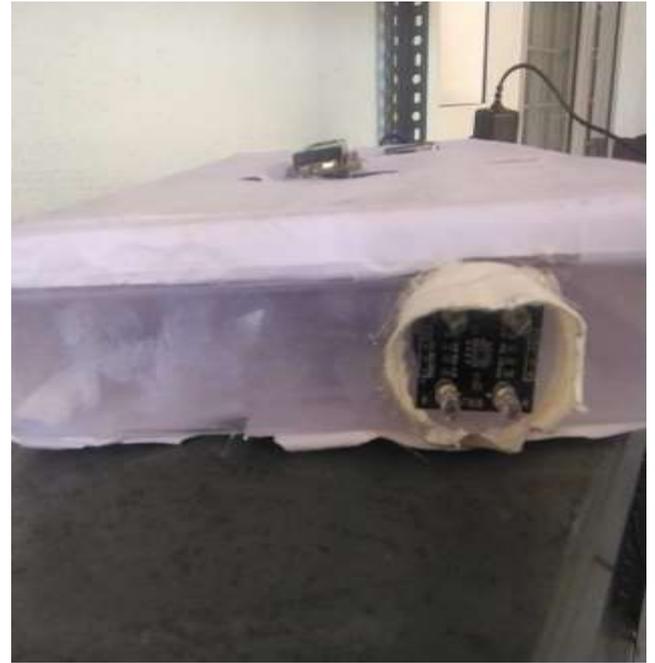
In this project we are going to interface TCS3200 colour sensor with Arduino UNO. TCS3200 is a colour sensor which can detect any number of colours with right programming. TCS3200 contains RGB (Red Green Blue) arrays. As shown in figure on microscopic level one can see the square boxes inside the eye on sensor. These square boxes are arrays of RGB matrix. Each of these boxes contain Three sensors, one is for sensing RED light intensity, one is for sensing GREEN light intensity and the last in for sensing BLUE light intensity. Brain of the circuit is Arduino Uno R3 board having ATmega328 or ATmega328P microcontroller (MCU). It has 14 digital input/output (I/O) pins and six analogue input pins, 32k flash memory, 16MHz crystal oscillator, USB connection, power jack, ICSP header and reset button. Working of the project is simple because this is a basic circuit for interfacing a TCS3200 sensor. When red colour is kept near the sensor, it automatically detects the colour with the help of photodiode arrays and then RGB colour intensity value is displayed in Arduino serial monitor window along with colour name. At the same time, a red LED glow in the RGB LED. Similarly, the remaining two colours

(green and blue) are shown in Arduino serial monitor window and the respective colour LED glows in RGB.

All the components are connected and incorporated into a frame. The connections are made and the system is booted up. Initially, all the coding has to be fed to the Arduino so it is connected to a computer. Using the Arduino IDE, all the required code is written and uploaded to the board. The results can be viewed through the serial monitor present in the IDE. The key functionality in this phase is provided by the setup () function of the Arduino IDE. It is used to initialize the fundamental values of all the components to ensure that everything proceeds seamlessly. The setup () function utilizes two pre-defined functions, that are provided by the IDE. They are ·Pin Mode () – It is utilized to dole out a usefulness of either info or yield to the pins of the shading sensor digital Write () – It is utilized to decide the voltage that must be provided to the pins of the shading sensor. After the design is complete, the process moves to the next stage.



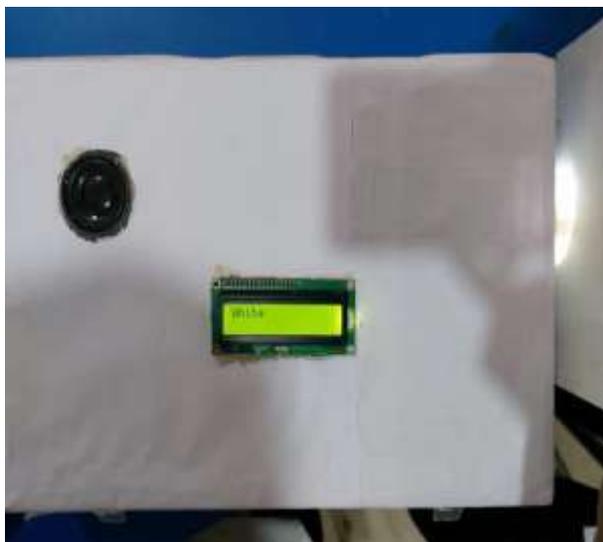
Schematic Diagram



Business Model

**5. CONCLUSION**

A cost-effective, user-friendly colour detection embedded system is implemented successfully whose accuracy of detection is found to be 93%. The embedded system is expected to assist the visual impaired in colour detection which in future will be improvised for object detection with audio feedback. The main objects of the project are to provide a device to people who are affected with “Monochromacy”. the colour detective sensor is helpful for children to learn the names of different colours. It is also helpful for old people and blind people to identify colours as it tells the name of colour through the speaker.



Prototype



## 6. REFERENCE

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