COLOUR DETECTION

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Abstract

A Color 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 Color Sensing and detection application, which has the capability to detect distinct colors. We have utilized TCS3200 shading sensors for this reason. Prologue to shading sensor, circuit chart and working of the Arduino Color Sensor venture are clarified further. Color sensor systems evolved and reached a high level of technologies in detecting several colors, 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 color sensor system that has the good efficiency and low cost. The system is made to detect ten different colors 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 color blindness. Although this project might not be directly applicable to human retina but it can be integrated with robots and automotive industries.

1. INTRODUCTION

Color 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 colors 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 colors, humans and some animals use information from special cells

situated in the retina. This project focuses on achieving artificial color vision using simple electronic components within the given time. This project is significant for applications that require simple color detection ability for not more than ten different colors. The color 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 color theory and sensor development. While carrying out the project, the usage of an Arduino UNO and programming skills were strengthened.

A Color Sensor is a device that senses or detects colors. A color sensor will use an external means of emitting light and then analyze the reflected light from the object in order to determine its color. Color sensors will give an accurate color of the object. There are a wide range of applications of color sensors like sorting objects by color, textile industry, quality control systems, printer color enhancement etc. Our project aims to bring up a color detecting device which identifies the color as well as gives the name of the color using speakers.

2. RELATED WORK

The color of an object is due to the interaction of the surface of a body with a ray of light and an observer. color 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 color spaces that help in quantifying color attributes numerically, for example, RGB color space. In this project the color space being used is RGB color space. The color values are measured using a combination of an LDR and a LED network. In this chapter the theory of color 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.

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.

In this project we are going to interface TCS34725 colour sensor with Arduino UNO. TCS34725 is a colour sensor which can detect any number of colours with right programming. TCS34725 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 TCS34725 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

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

Colour sensors are generally used for two specific applications: true colour recognition and colour markdetection. Sensors used for true colour recognition are required to "see" different colours or todistinguish 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 awide variety of colours based on their wavelength. This sensor is especially useful for colourrecognition projects such as colour matching, colour sorting, test strip reading and much more.The motivation behind making this

project is to make the life of people easier as much as possible, tosolve the complex problems of this world through which we can make this globe a better place forliving. This world is full of colours which drive me to make a setup which can tell someone about thecolour of a particular thing. So, this is the driving force which makes this imagination turning intoreality.

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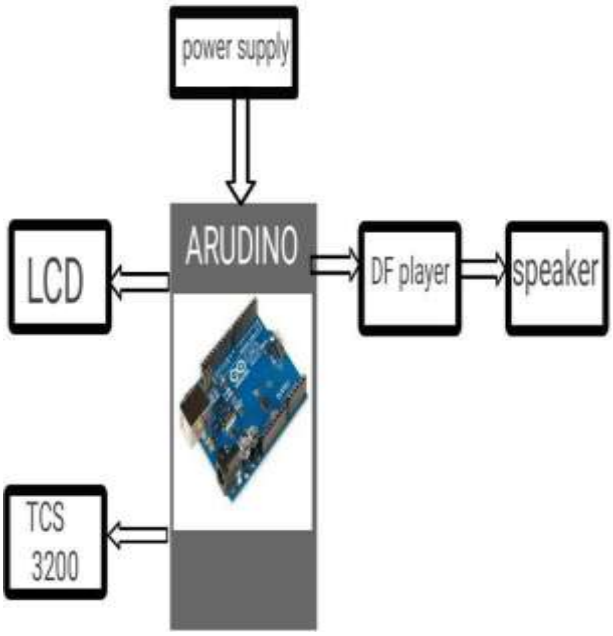
Colours information plays an important role in image and real time colour sensor detection. Which affects the results of video segmentation and correct real time temperature value. According to the colour information in RGB colour space, the dominant colour is determined at first. In the colour image 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.



Schematic Diagram

4. EXPERIMENTAL RESULTS

A simple Colour Sensor using Arduino is developed in this project. The colour sensor module senses the colour in its surroundings. The working of the project is explained here.

As mentioned in the introduction to colour sensor section, the TCS34725 Colour Sensor has filters for Red, Blue, Green and Clear. The intensity of each colour is represented as a frequency. In Arduino, we have fixed the output frequency scale to 100% by applying HIGH to S0 and S1 pins of the colour sensor.

We have to use the S2 and S3 pin on the colour sensor to select the type of photo diode i.e., red, green or blue. Whenever a particular Photo diode is selected, the PULSEIN feature of the Arduino is activated on the pin that is connected to the output of the Colour Sensor. This will help us to calculate the frequency of the output signal. The same process is repeated for all the three photo diodes: R, G and B. The frequency in all the cases is measured using the PULSEIN feature and is displayed on the Serial Terminal. Additionally, this information can be used to identify the colour placed in front of the sensor and display its colour on the LCD and also light up the corresponding LED.

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.

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