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# Design and Development of Automated Colours Sort System for Textile Industries

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**ABSTRACT:** Colors are an essential component of our lives. If we look around and pay attention, we can notice that there are many different colours merging into our life. These colours definitely affect us, but the impact varies from person to person and also depends on the situation. Our daily lives involve colours, and life would be uninteresting and lifeless without them. The senses of sight, touch, and taste in particular, as well as our emotions and general personalities, are strongly influenced by colour. Broadly speaking, colours are used in a variety of operations, such as the choosing of clothing, industrial process control, and others. A method for categorising products based on their quality using colours has recently come into use. In real-time applications, colour is sensed via colour sensors. A unbiased, efficient, and quick colour sorting system is needed by major product producers and service sectors. Online colour sorting is too expensive and labor-intensive for reflectance spectrophotometers, which are used for quality control in colour matching. Color sorting with colour sensors is a desirable alternative. Automated colour sorting based on colour sensors has been tested for use in product sorting, however the system can only work with a limited number of colours; typically, redness or yellowness is employed in such systems. As the colour should be the same with allowable tolerance levels in the textile service sectors, one parameter will not be sufficient. As a result, sorting garments becomes much more complicated technologically. In the project, a colour sensor-based system for use in textile businesses to sort the clothing utilizing colour sorting technology has been conceived, manufactured, and studied. The system was developed utilizing a TCS3200-based colour sensor, a microcontroller, a stepper motor or DC motor, an indication system, and other components.

**KEYWORDS:** - TCS3200 based colour sensor, Microcontroller, DC Motor (12 V), Indication system, IR Sensor.

## I. INTRODUCTION

The colour of a fashion material is an important aspect. In order to meet the requirements of a bulk order from a client who additionally specifies the colour in line with the fashion desire, a sizeable number of clothing must be produced in a certain shade in batch production with a reasonable degree of accuracy. Yet, this is extremely challenging because to the heterogeneity of the raw materials, hides, and skins, and quite frequently, a noticeable variation is unavoidable despite strict quality control in the dyeing process. A fashion material's colour is an essential component. A sizable quantity of garments must be accurately created in batch production in a certain shade in order to satisfy the demands of a bulk order from a client who also specifies the colour in accordance with the fashion desire. Yet, because to the variability of the raw materials, hides, and skins, and very frequently, a visible variance is impossible to prevent despite thorough quality control in the dyeing process, this is incredibly difficult. Image processing and the usage of a colour sensor are both attractive choices. Many papers have been written on the issue, and testing of their suitability for use in determining fruit quality was effective. Moreover, machine vision has been used in the diamond colour grading process. The majority of these studies assign grades based only on colour, frequently the redness or yellowness of the colour. In other words, effective sorting in a three-dimensional colour space is necessary to minimize colour variances within a group. Although research on the effectiveness of machine vision for categorising colours for textile fabrics have also been undertaken, the task grows more challenging. Studies have utilized regression analysis using a

reflectance spectrophotometer to assort leather colours and establish tolerance, but the technology is too expensive to be used in online colour sorting systems. The project involves the conception, production, and research of a colour sensor-based system for use in textile enterprises to classify apparel using colour sorting technology. A TCS3200 based colour sensor, microprocessor, DC motor, indicator system, and other parts were used to create the system.

## II. RELATED WORK

### [1]. Color Decision System based on Deep Learning and Fuzzy Inference System.

The suggested approach is capable of identifying and separating the hue of the multicolored symbol. The method that is used to detect colour signs. Precision, the quicker R-CNN and PSNR are used to identify the colour sign. The effectiveness of the colour sign detection will improve the colour decision's correctness.

### [2]. Semi-Gradient for Color Pixel Reconstruction in a RGBZ CMOS Sensor.

Comparing our technique to conventional interpolation algorithms modified for our RGBZ matrix, the testing results have demonstrated that our approach is state-of-the-art in terms of visual aspect and objective quality metrics.

### [3]. Sensor based Color Sorting System for leather shoe components.

With more than 80% of the samples falling into the same groups with both techniques for the two colours examined, it is clear that there is a reasonable amount of agreement between sorting by colour sensor and that by manual assortment. It is suggested that in order to increase conformity and to expand the study to include additional spectrum hues, alternative statistical approaches for cluster grouping be tested.

### [4]. Measurement of Iodine Levels in Salt Using Color Sensor.

Reading the colour changes that take place in salt is the approach used to calculate its iodine content. Because the measured salt is not added to the test kit solution, the instrument will show ND (Not Detected). The condition is established by the RGB frequency rather than the RGB colour, and if the tool utilises this value, the RGB colour reading tolerances are practically identical.

## III. METHODOLOGY

### EXISTING METHOD

Use of the fuzzy inference system, PSNR, quicker R-CNN, and the RGB and CIE L\*a\*b\* colour spaces is a standard method for determining and interpreting the importance of the colour sign. The colour is simpler to recognise when the RGB and CIE L\*a\*b\* colour spaces are combined. The colour of the sign is then determined using the fuzzy inference approach. A reputed shoe factory in Chennai provided samples of leather shoe components dyed light grey and reddish-brown for use in a handful of studies. Analysing the colour fluctuations that occur in salt is one approach to assess the quantity of iodine present in it. So, colour perception has an important influence on how we live our daily lives.

### PROPOSED METHOD

The prototype model is used to validate the suggested system. The TCS3200 colour sensor is mainly used to determine the colour of the sample and the final product. The sensor recognises colour using a TAOS TCS3200 Red, Green, and Blue (RGB) colour sensor chip. Moreover, it has four white LEDs that illuminate the thing in front of it. Figure 1 displays a shot of a colour sensor and the chip that goes with it. Simply said, a photodiode is a semiconductor gadget that transforms light into electricity. The TCS3200 features a collection of photodiodes with four distinct filters: red, green, blue, and one photodiode without a filter. Red photodiodes are sensitive to red wavelengths, green photodiodes are sensitive to green wavelengths, and blue photodiodes are sensitive to blue wavelengths.



Figure 1. Photo images of (a) TCS3200 Colour Sensors (b) RGB Colour chip

The TCS3200 colour sensor is interconnected with microcontroller by using S0, S1, S2,S3 and OE Pins. Pin S0, S1 are used to scaling the output colour frequency S2, S3 are used to select the input and OE pin is used to enable the chip. Figure -2 is shown the output frequency based on the colour.

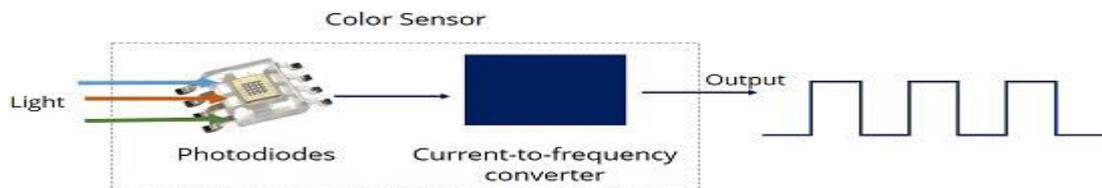


Figure2. Colour sensor Output (vs) Input Colour

Generally, sensors and microcontrollers are used DC power supply as an operating supply. Here TCS3200 colour sensor, Atmega328 microcontroller, 16X2 LCD Display, L298 H bridge chip are used. The rated operating voltage of various components are 5V DC.

### BLOCK DIAGRAM

DC motor and a microcontroller are employed here. The colour sensor is operating and has a power supply that is suitable for the user's side. The crucial factor is the colour that is in front of the sensor. The colour sensor on the user's side provides the input. In order to identify a certain colour based on RGB colour ratios, which is then presented on the LCD display, the microcontroller kit is used. For 360-degree resolution, which will deliver precise results on the clothing hanger, a stepper or DC motor is required. When the findings from both sensors match the ratio, the signaling system changes to indicate that the intended output has been discovered. The product side sensor typically determines the colour of the fabric.

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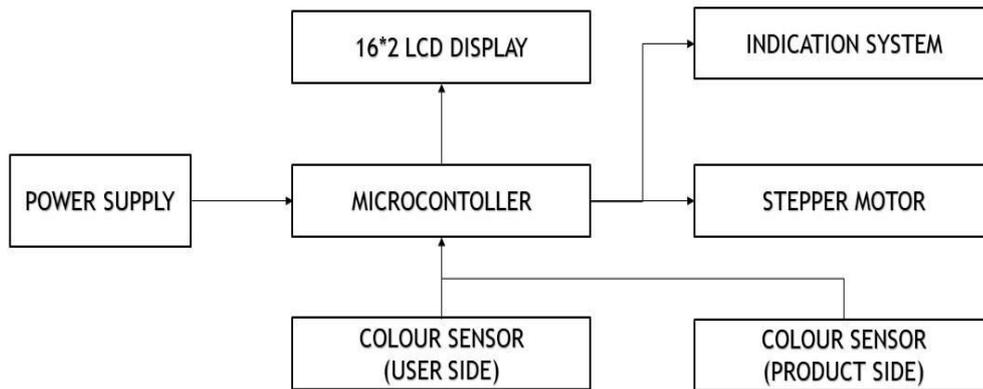


Figure 3. Block diagram

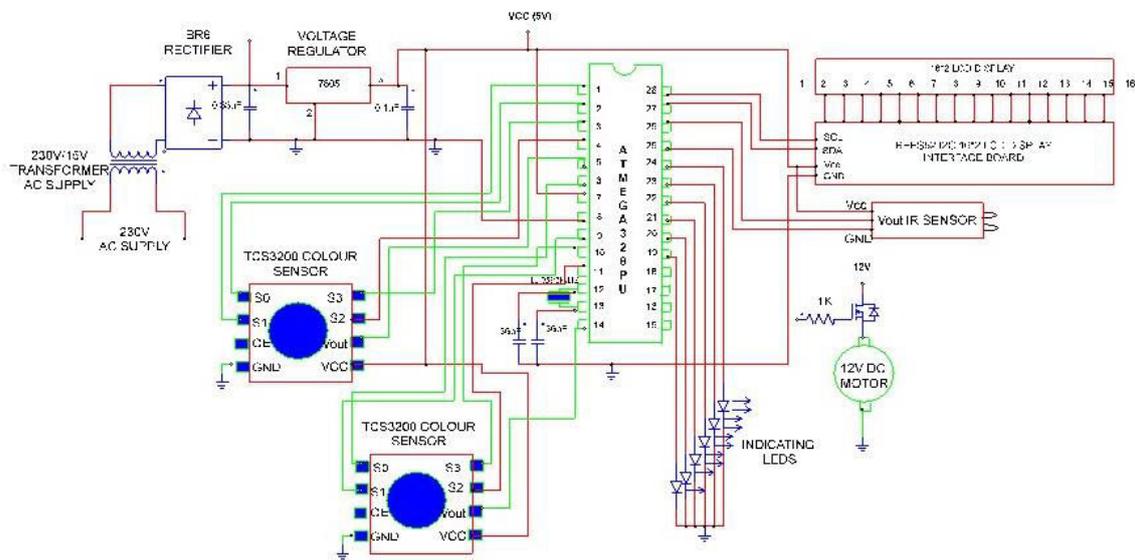


Figure 4. Circuit Diagram

PARAMETER	DESCRIPTION
Transformer AC supply	230V/15V
Rectifier	Silicon Bridge Rectifier
Voltage Regulator	7805
TCS3200 Colour sensor	2
IR sensor	1
Microcontroller	ATMEGA326PU
Indicating LEDS	6
DC Motor	12V
REES52 12C LCD Display Interface Board	16*2

Table1. Set up

#### IV. EXPERIMENTAL RESULTS

The system is operated by using AC supply (230V,50Hz), Required DC is derived from AC supply. Rectifier and Capacitor are used to convert AC to DC and the waveforms are shown in Figure 5.

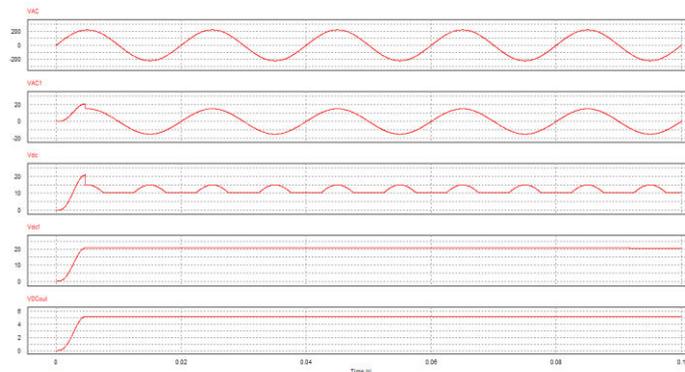


Figure 5. waveform of Power Supply system (a) Input AC voltage (b) Step down transformer output voltage (c) DC Voltage (d) Filtered DC voltage (e) Regulated Output Voltage(5V)

The 230V, 50Hz main supply is connected with 230/15V step down transformer and the 15V AC supply is converted to DC by using rectifier circuit. The output DC voltage contains ripples, Capacitors are used to eliminating the ripples. Stable DC voltage is needed to energise the microcontroller and sensor circuits. The 7805 IC regulator is used to convert 5V supply from high DC voltage. Atmega 328 microcontroller is used to interconnect all the system. The developed process sequence is depicted in flow chart shown in Figure-6. The entire process is starting from sample card colour sensor data input, When the controller received the colour input, the controller is activated to find the colour in product side by using supported system and activate the indicating system. The process is repeat till product search is ending. Figure-7 shows the photo images of developed colour sorted systems.

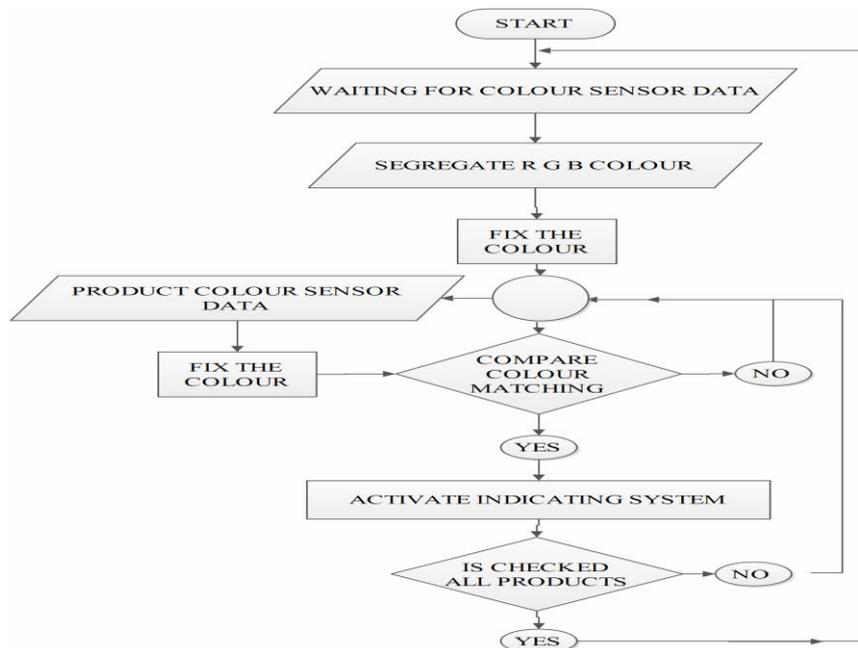


Figure6. Flow Chart of Entire Process

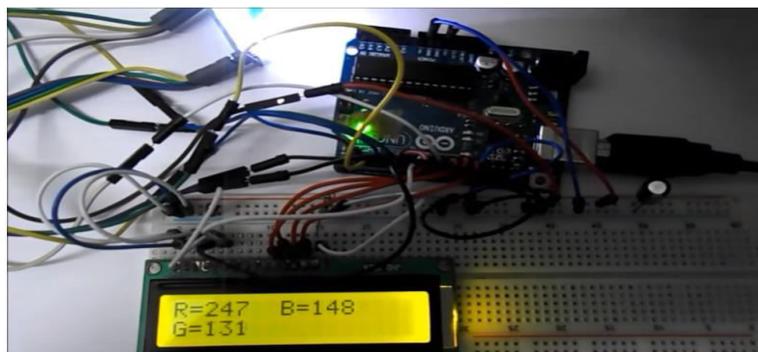


Figure7. Photo images of Developed Model

## V. CONCLUSION AND FUTURE WORK

It is feasible to classify clothing based on colour with a high level of consistency and precision when utilizing a colour sensor-based system, which can be difficult when done manually. Due to its excellent accuracy and sensitivity, the TCS3200 colour sensor is a popular option for colour sensing applications. It can recognize variety of colours and emit a digital signal that a microcontroller can simply handle. The garments may then be sorted according to colour using a DC motor that the microcontroller can manage. To achieve accurate sorting, it is crucial to make sure the colour sorting system is calibrated properly. The system must be able to accommodate changes in illumination, which can alter how the colour of the clothing is seen. A potential field of research and development is the creation of a colour sensor-based system for classifying clothing in the textile sector. Such technology can aid in boosting production and enhancing product quality in light of the rising demand for effective and affordable colour sorting systems. Hence, it can be

concluded that the sorting system has the best performance, based on the references used. Finally, other circumstances like covering wide range in the dresses may be considered as well as the efficiency can also be increased.

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