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Development of Solid Colour Shade Detection and Matching Machine

Gurdeep Singh

Department of Fashion Technology, National Institute of Fashion Technology, Gandhinagar, Gujarat, India

ABSTRACT

The color shade of dyed fabric or printed fabric color defect plays a major role in determining the quality of fabric color. Hence there is a need for inspection of color shade for its quality. Conventionally inspection for quality of color and defect in color shade is carried out either manually in mainstream of industries or by using color matching cabinet technique. In this paper, the focus is on the inspection of the variations in color strength and color shade of single uniform color using various LAB space models on computer generated image samples without any manual help for clarification. RGB colors sensor process is used various fields for analyzing different applications such as medical sciences, biological sciences. Various color sensor image types have been used to detect shade variation. This work is analyzed and compared two types of color sensor original frequency RGB and current frequency RGB color space, RGB color sensor and the comparative result is given. Methods/Statistical Analysis: We examined and analyzed the RGB original value and RGB detected current value sensor with color space using techniques such as pre-processing, segmentation, clustering for detecting shade of color, Results/Finding: In detecting the solid color, color becomes an important feature to identify the shade variation color and matching. We have considered RGB color sensor and used for garment enhancement and segmentation for extraction of the variation garment sample which are used to identify the shade mismatch level. Conclusion: RGB color sensor has given better clarity and RGB detection value which is suitable for fabric shade detection than computer color matching and color match cabinet.

KEYWORDS: *Fashion Technology, RGB color senser, fabric Shade detection, matching specimen machine*

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INTRODUCTION

The Indian textile and apparel industry is extremely huge and diverse, employing 35 million people and accounting for 27 per cent of the country's exports. The fashion business plays a pivotal role as a key driver of the national budget and has grown to be the foremost significant contributor to the country's budget over nearly three decades of its existence. The industry recorded a stimulating growth during a protected market environment; it faces a series of challenges notably in areas such as:

Price competitiveness.
Faster lead times.
High raw material base.
Better Quality.

In order to understand perfect garment quality and price , one must realize all the activities including purchase of materials , sewing, packing, transport, overheads, etc. & one must think just about all of those exercises altogether about their quality, measures, focal points and hazard factors. Likewise, he should realize the way to tackle Arvind Knits active wear. Ltd. | Gurdeep Singh, MFT, NIFT 10 the problems when happened and to require appropriate substitute choice promptly in time. We should know that there are consistently vacillations within the expenses of crude materials and adornments, charges of stitching, handling, completing the method of, sewing and pressing, charges of transport and

movement. Subsequently, we should always have update information about the foremost recent costs and charges, most upto-date techniques, strategies and quality frameworks, advertise costs and accessibility, transportation (street, ocean, air) and cargo charges, then forth we must remember that the standard depends on price; price depends on quality. Every product will have different price consistent with its quality. We don't make just one quality of garments. Also, we making the clothes not just for one customer. While we do the garment costing, the customer's index, quality & quantity and payment terms, to be taken into consideration.

PROBLEM FORMULATION:

INITIAL IDEA

Simplification of shade variation of garments during concept sample development stage to generate value for research & development in new technology by development of solid color shade detection and match through machine vision.

RESEARCH PROBLEM

During spreading and cutting process at the cutting panel stage, there are certain variances that are not taken into consideration because of its negligible effect during the ticketing and numbering production stage; there is a random shade variation in garment from concept development stage to production stage. The main problems here in shade variation are given below-

you probably did not find out the entire roll colour variation. Its more difficult task for worker

After the cutting the panel are mismatch. It's far possibilities of coloration variation in garment.

Continuously running shade this is distinctive cad marker for special close marker.

Earlier sewing line feeding time panel manual checking and matching its bypass to stitching line

Human eye didn't prefect match

No check-points for color variation

A department like sampling takes more time than the usual because of absence of Research & Development.

OBJECTIVE OF RESEARCH

To develop shade of variation with extrapolation of existing methods which can attempt to reduce rejection of garment & generate value for investment for Research & Development in new technical machinery

OBJECTIVE OF THE PROJECT:

The objectives of graduation project is firstly to realize practical exposure and secondly technology of knowledge on reality projects and/or assignments. This graduation project is aimed towards blending the class room principles with industry application. This project also helps students to learn and improve their interpersonal communication skills with colleagues, peer group and workers. The main Objective of Graduation Project is –

"To development of solid colour shade detection and matching machine"

SUB-OBJECTIVE OF THE PROJECT Sub-objectives of the project will be all the secondary objectives which are required for achieving Primary or main objective of the research.

- To find out factors of which are not there in past researches & previously technology.
- To minimize the shade variation in garment production stage for better quality.
- To find manufacturing profitability in implementing new machine, this will also reduce rejection, labour & Cost

REVIEW OF LITERATURE: - A review of literature may be a self-contained unit -- an end in itself -- or a preface to and rationale for engaging in primary research. A review may be a required a part of research proposals and usually, the aim of a review is to research critically a segment of a published body of knowledge through summary, classification, and comparison of prior research studies, reviews of literature, and theoretical articles or Journals.

Everything Starts with Light

Color is a crucial feature in visual information reaching the human eye or an artificial sensory system. The color information is based on the electromagnetic (EM) radiation reflected, transmitted, or irradiated by an object be observed. Distribution of this radiation intensity is signified as a wavelength range. In the standard approach, color is seen as human sensation to this spectrum on the wave length range 380–780nm In a common use of the term and as an attribute of an object, color is treated in many ways in human communication. Color has importance in many different discipline es and there are a number of views to the color: in biology, color vision and colorization of plants and animals; in psychology, color vision. The new technological development in illumination and in camera and display technology requires new way of managing colors. RGB or other three-dimensional color representations are not enough anymore the light-emitting diodes (LED) are coming into illumination and displays rapidly. There, the color radiation spectrum is so peaky that managing it requires a more accurate color representation than RGB (Source: Advanced Color

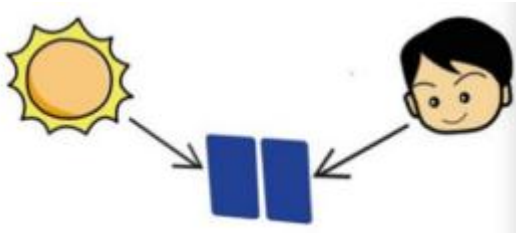
Image Processing and Analysis_ 2013 Christine FernandezMaloigne Xlim-SIC Laboratory University of Poitiers 11 Bd Marie et Pierre Curie Futur scope France

PHYSICAL ATTRIBUTES OF COLOR

A. The color of an object can be defined as an object's physical attribute or as an object's attribute as humans see it. The first one is measurable attribute, but what humans see we cannot measure, since it happens in the human brain. In both definitions, the colour information is carried to the colour detector within the sort of electromagnetic waves

B. If the detector is human eye, seeing color of an object is based on how human eye senses the electromagnetic signal reaching the eye and how this sensory information is forwarded to the brain. In the artificial color vision systems, the signal reaches the detector and the detector response is related to the wavelength sensitivity of detector. Figure

Fig. 1.3 The light source, color objects, and human visual system are needed to generate the perception of color



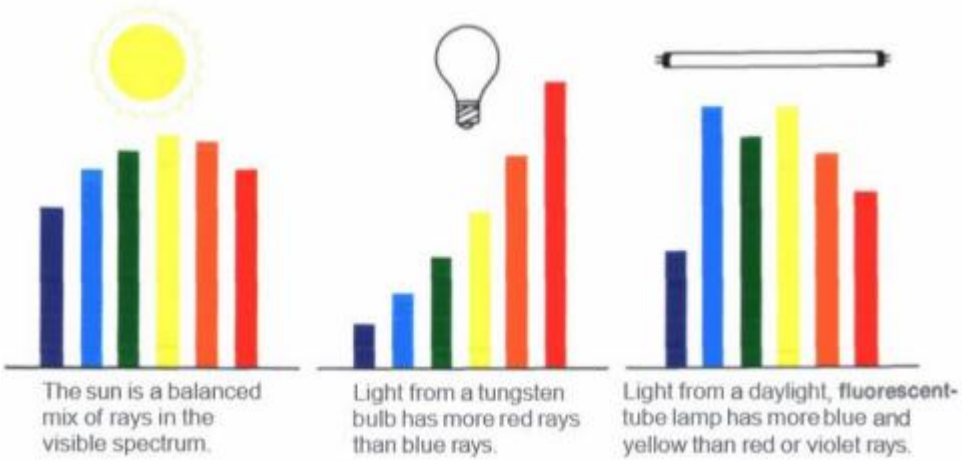
(Source: Advanced Color Image Processing and Analysis_ 2013 Christine Fernandez-Maloigne Xlim-SIC Laboratory University of Poitiers 11 Bd Marie et Pierre Curie Futur scope France

RESEARCH JOURNALS ABSTRACT

Color identify is a very complex procedure, with set patterns and guidelines followed by the industry, and it is difficult to find out shade variation for every process there are some inbuilt while shade, elaborate. How We See Objects Light rays from any source travel altogether directions. Some of these rays hit the three we are looking. Some of these rays bounce off the object and are reflected back to our eyes, and still others are absorbed by the object itself. Only the light that reaches our eyes enters the light-sensitive cells there, and sends messages to the brain.

How the Eye Sees Color?

1. The human eye is much like a camera. It has a lens, a light-sensitive layer called a retina, and an eyelid that acts as a shudder.
2. Although we don't know everything about how the eye sees color, we do know that human vision relates to three colors: Red Green Blue
3. Research indicates that the brain translates wavelengths of light into color sensation, as a function of nerve connections and of the brain.
4. Now, let's look at two systems for creating color.



(Source: Study material: US_plugins_acrobat_en_motion_education_colorTh eory.pdf Kodak is a trade mark of Eastman Kodak Company. ©EastmanKodakCompany,2007 ME-39

Different Types of Light Sources

Colored objects will look different under different light sources. This is because each light basis has a slightly different mixture of the highlighted rays. This is particularly important to photographers who use this information daily in adjusting to different lighting situations

Calculation of the color strength of uniform single color

Calculation of color strength which is second parameter in our presented work is based on HIS color model. It requires single uniform color samples. In this RGB input color model is converted to HSI [color model because of the RGB, CMY and other similar color models do not well suit for describing color in terms that are practical for human interpretation. Hue may be a color attribute that describes a pure color, where as saturation gives a measure of degree to which pure color is diluted by white light and brightness is a subjective descriptor that is practically impossible to measure. It embodies that achromatic notation of intensity and the factor in describing color sensation. Image in RGB color format

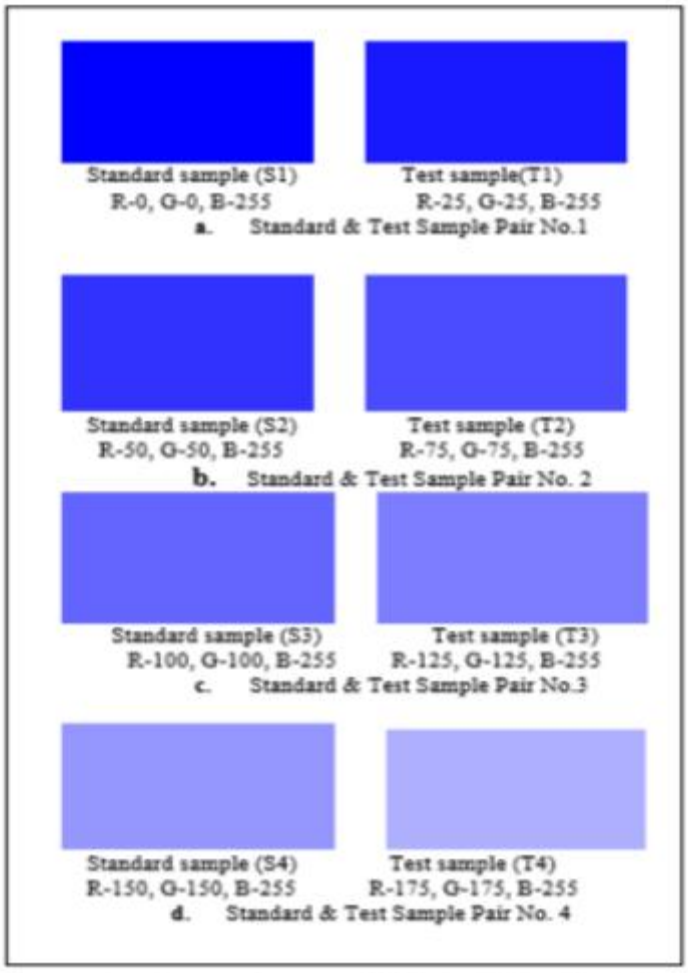


Fig. 3 Example of computer generated Blue Color Samples

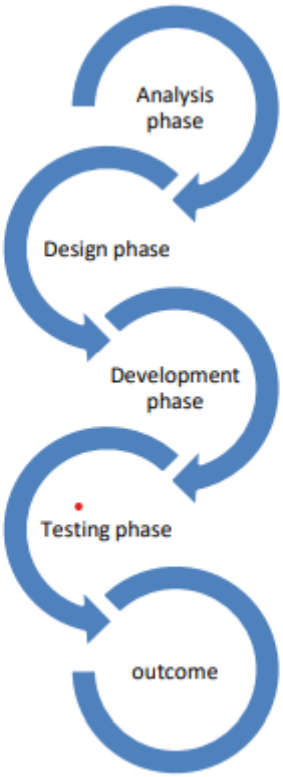
Preparation Of Data Base: Computer Generated Samples:

Source: Study material: Measurement of Colour Shade Variation & Colour Strength for Uniform Colour using LAB Space Model for Computer Generated Images Suhas R. Desai1, Vishal Patil2 E&TC Department SGMCOE, Mahagaon, India (International Journal Of Engineering And Computer Science ISSN:2319-7242 Volume 6 Issue 11 November 2017, Page No. 22848-22853 Index Copernicus value (2015): 58.10 DOI: 10.18535/ijecs/v6i11.0

METHODOLOGY

STEPS OF METHODOLOGY:

To development of solid colour shade detection and matching machine with extrapolation of existing methods which will try to reduce shade variation & generate value for investment for Research & Development in new technical machinery.



DATA ANALYSIS PHASE

Color detection methods maybe a very young technology, its usage runs across various number of applications, within the apparel industry its complete setup has yet not been deployed.

During our primary research we have found that using simple circuit boards like Arduino and raspberry pi, we will innovate a technology completely suitable for the aim.

Key Research Areas

1. Fabric color detection
2. shade variation
3. matching exact same color for all parts
4. segregating pieces as per the dimension and color
5. printed fabric all over shade variation

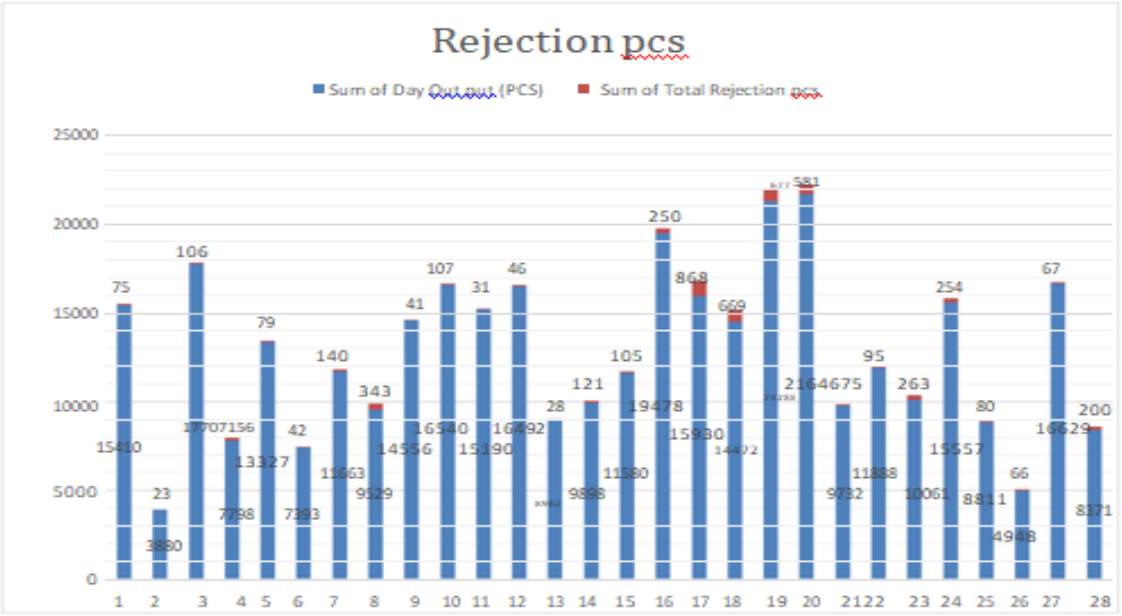
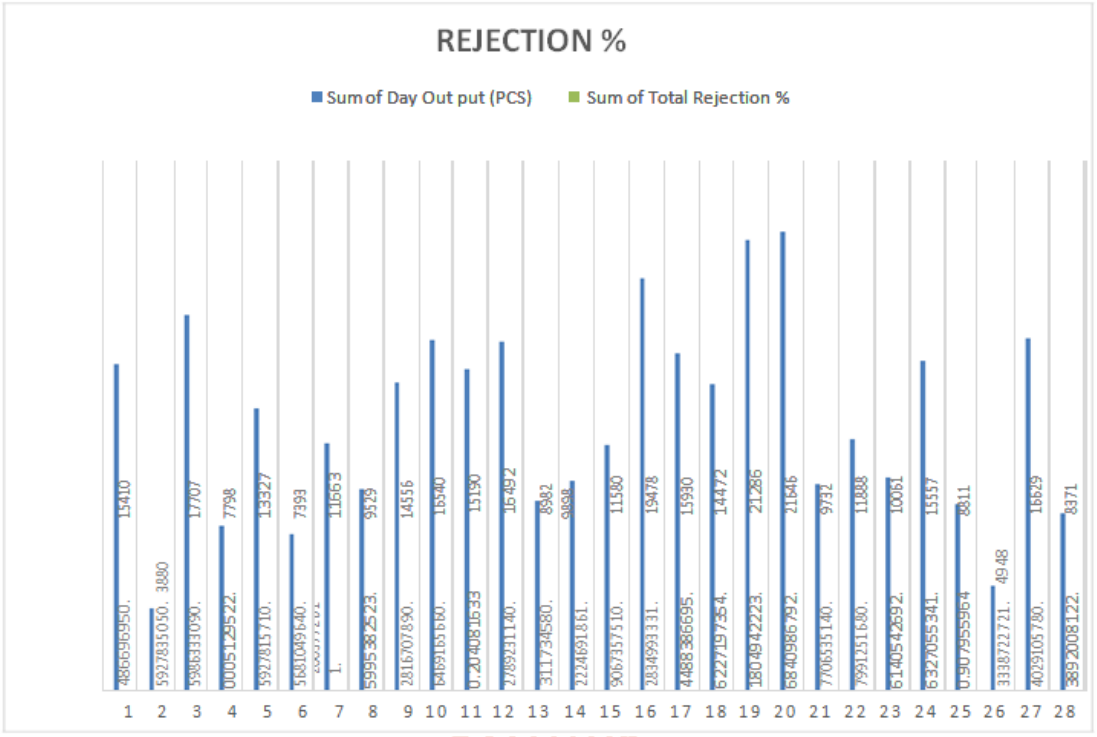


Chart description -Chart is represent the Jan to Feb total no of output pcs and total rejection every single line wise shade variation. the one to twenty-seven number are representing the line wise output production and rejection pcs



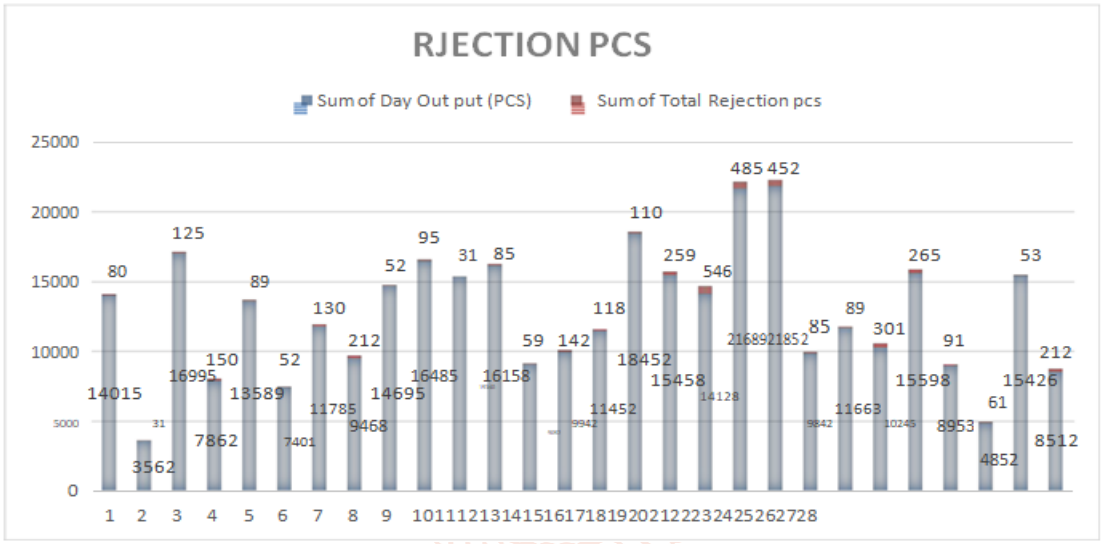
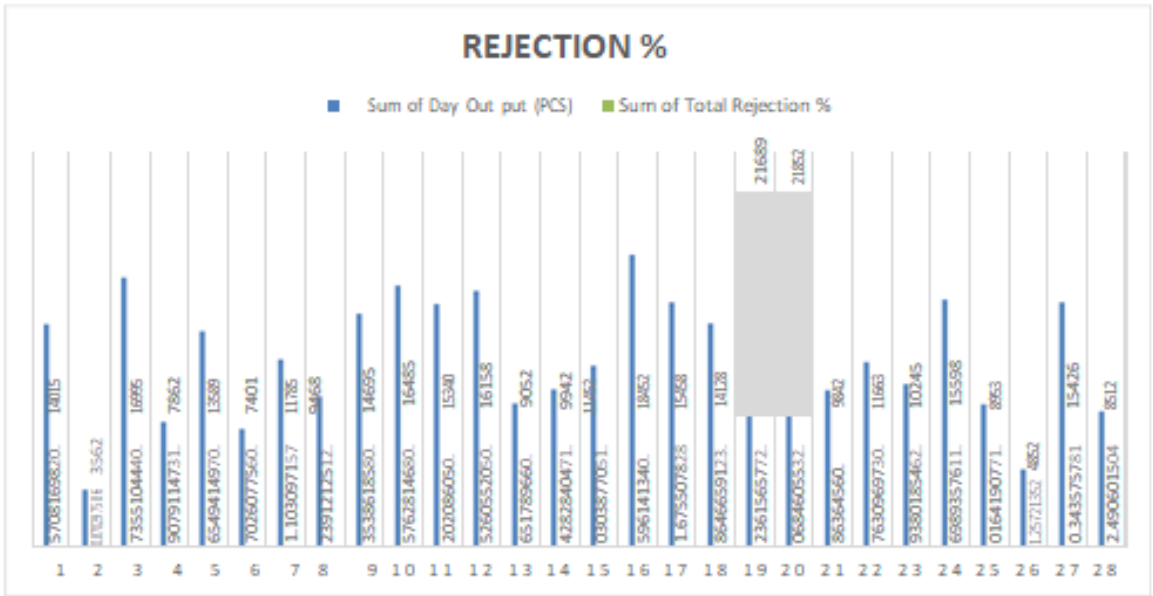
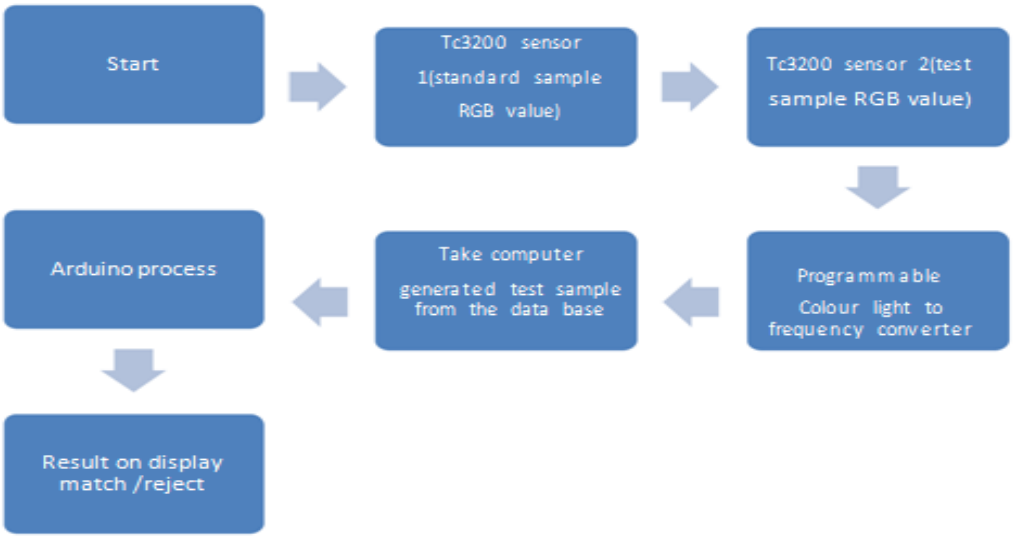


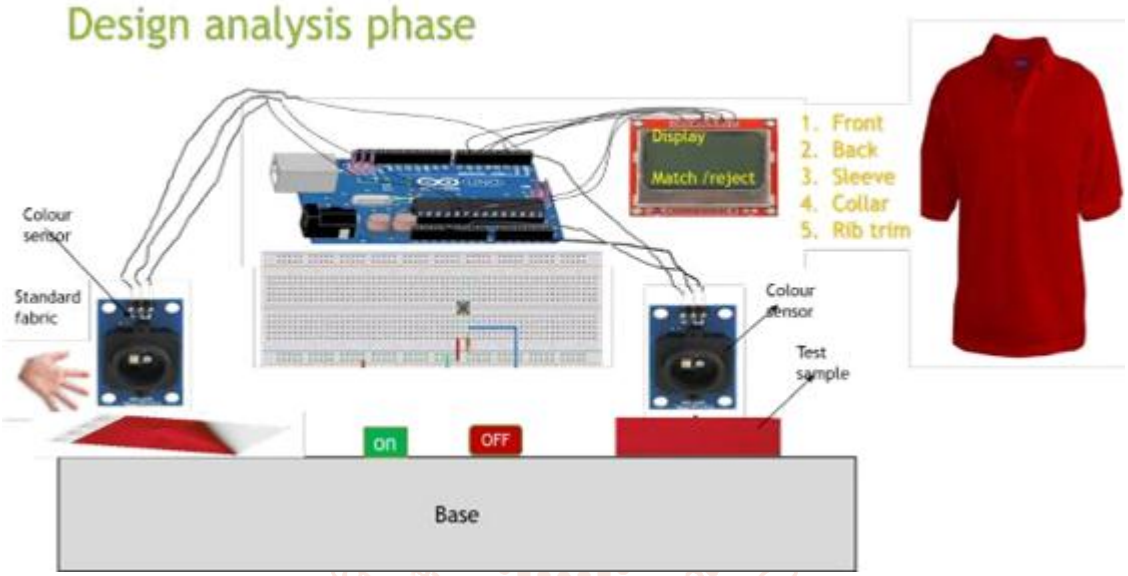
Chart description -Chart is represent the Jan to Feb total no of output pcs and total rejection every single line wise shade variation. the one to twenty-eight number are representing the line wise output production and rejection pcs



2 DESIGN PHASE



3 DESIGNS DEVELOPS



DEVELOPMENT PHASE

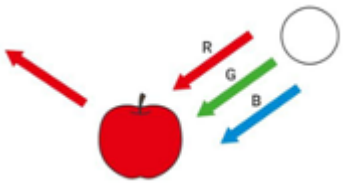
Color Sensor tcs3200

A color sensor is also a kind of "photoelectric sensor" which emits light from a transmitter, then detects the light reflected back from the detection object with a receiver. A color sensor can detect the received light intensity for red, blue and green respectively, making it possible to work out the color of the target object.

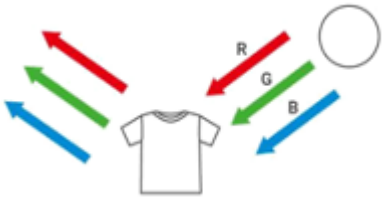
There are wo sorts of color sensors. One illuminates the object with broad wavelength light and differentiates the three sorts of colors within the receiver.

The other type illuminates the object with the three types of light (red, blue, and green) independently.

In both scenarios, the received light intensity of red, blue and green are detected, and the ratio of light received is calculated



If light containing the red, blue, and green wavelengths is shown on a red object, only red light will be reflected.

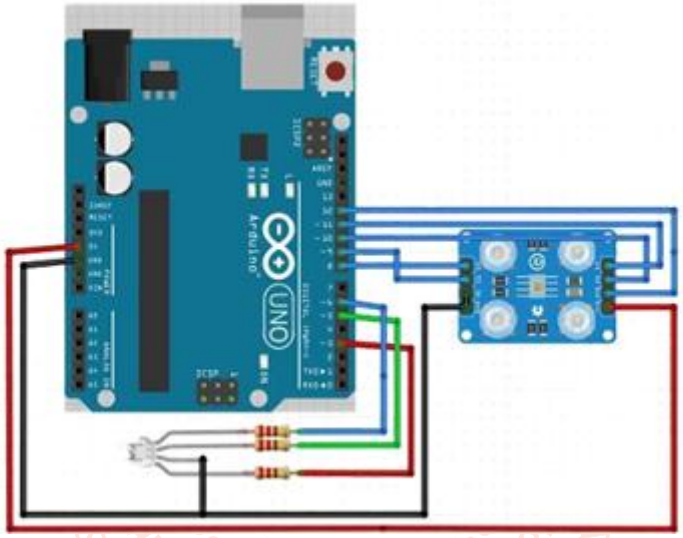


For a white object, all three colors of red, blue, and green are reflected.

Arduino with colour sensor

Using Arduino uno and TCS3200 color sensor, we started a color detection program capable of identifying RGB colors value, with the assistance of programming and color sensor value match and reject, we'll able to segregate pieces as per decided color

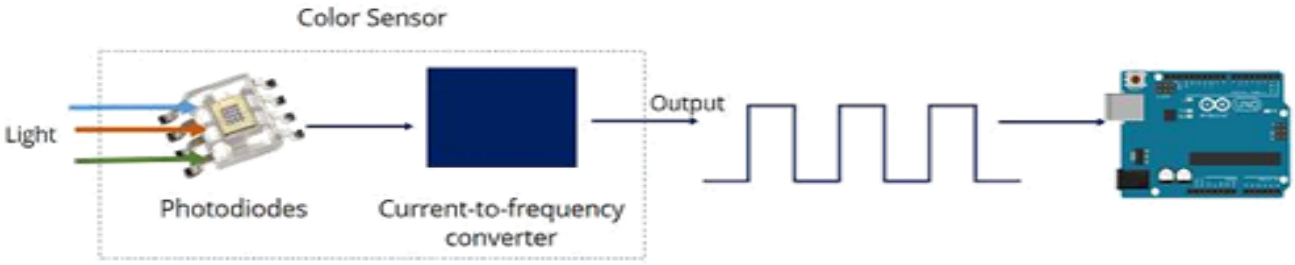
We can storage of last 1000 value with the support raspberry pi



Process of color sensor

The TCS3200 has an array of photodiodes with 4 dissimilar filters. A photodiode is just a semiconductor unit that converts light into current. The sensor has:

16 photodiodes with red filter – the sensitive to red wavelength
16 photodiodes with green filter – the sensitive to green wavelength
16 photodiodes with blue filter – the sensitive to blue wavelength
16 photodiodes without filter



- High-Resolution Conversion of Light Intensity to Frequency
- Programmable Color and Full-Scale Output Frequency
- Communicates Directly With a Microcontroller
- Single-Supply Operation (2.7 V to 5.5 V)
- Power Down Feature
- Nonlinearity Error Typically 0.2% at 50 kHz
- Stable 200 ppm/°C Temperature Coefficient
- Low-Profile Lead (Pb) Free and RoHS Compliant Surface-Mount Package

5 Display

LCD2004 20X4 BLUE SCREEN 5V LCD DISPLAY Description

The 2004-character LCD module is meant to display letters, numbers, symbols, dot matrix. It can display 4 lines of 20 characters. Support 4-bit and 8-bit data transfer mode.

It's easily controlled by MCU such as per 8051, PIC, AVR, ARDUINO, ARM and Raspberry Pi. It can be used in any embedded systems, industrial device, security, medical and hand-held equipment.

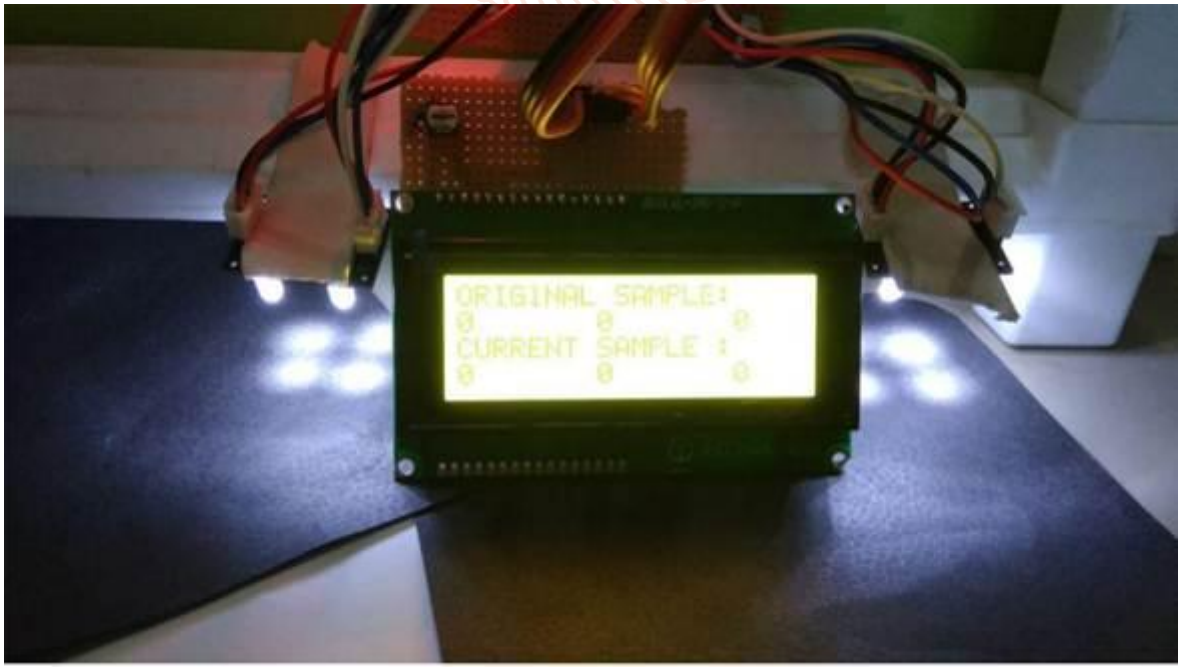
Features

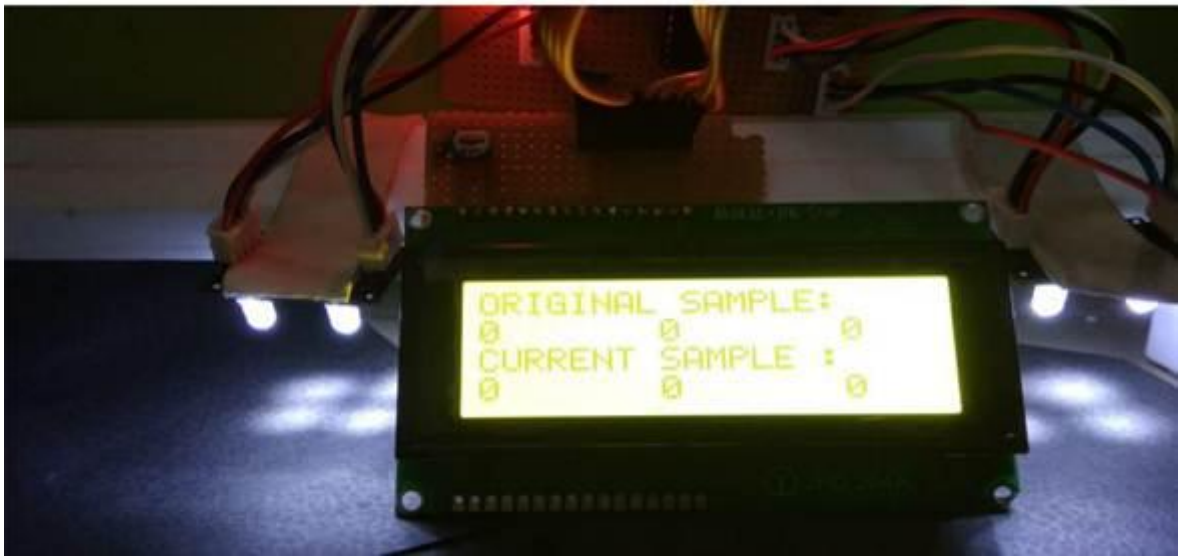
20X4 Character LCD Display Module Blue Backlight.
Display Format: 20 Characters x 4 lines
Built-in controller: ST 7066 (or equivalent)
Duty cycle: 1/16
5 x 8 dots includes cursor
Blue backlight
Fully accumulated and tested Serial LCD 20x4 Module
The module can be easily interfaced with a MCU
The module is a low-power consumption character LCD Module with a built-in controller

TESTING PHASES

Data compare between two simple
Simple freq: taking a 20 reading show mean RGB value on display
Current freq: taking a 20 reading show mean RGB value on display

Sample 1




ORIGINAL SAMPLE:
0 0 0
CURRENT SAMPLE :
0 0 0

Sample 2


ORIGINAL SAMPLE:
246 255 241
CURRENT SAMPLE :
249 255 251


ORIGINAL SAMPLE:
54 255 162
CURRENT SAMPLE :
0 0 0

Sample 3

4 RGB color space

RGB colour space or **RGB colour system**, constructs all the colours from the assortment of the **R**ed, **G**reen and **B**lue colours.

The red, green and blue use 8 bits each, which have number values from 0 to 255. This makes 256*256*256=16777216 possible colours.

RGB ≡ Red, Green, Blue

Each pixel in the LED monitor displays colours this way, by combination of red, green and blue LEDs (light emitting diodes).

When the red pixel is set to 0, the LED is turned off. When the red pixel is set to 255, the LED is turned fully on.

Any value amongst them sets the LED to partial light emission.

Calculation examples

5 RGB color table

Basic colours:

Color	HTML / CSS Name	Hex Code #RRGGBB	Decimal Code (R,G,B)
	Black	#000000	(0,0,0)
	White	#FFFFFF	(255,255,255)
	Red	#FF0000	(255,0,0)
	Lime	#00FF00	(0,255,0)
	Blue	#0000FF	(0,0,255)
	Yellow	#FFFF00	(255,255,0)

Cyan / Aqua	#00FFFF	(0,255,255)
Magenta / Fuchsia	#FF00FF	(255,0,255)
Silver	#C0C0C0	(192,192,192)
Gray	#808080	(128,128,128)
Maroon	#800000	(128,0,0)
Olive	#808000	(128,128,0)
Green	#008000	(0,128,0)
Purple	#800080	(128,0,128)
Teal	#008080	(0,128,128)
Navy	#000080	(0,0,128)
maroon	#800000	(128,0,0)
dark red	#8B0000	(139,0,0)
brown	#A52A2A	(165,42,42)
firebrick	#B22222	(178,34,34)

crimson	#DC143C	(220,20,60)
red	#FF0000	(255,0,0)
tomato	#FF6347	(255,99,71)
coral	#FF7F50	(255,127,80)
indian red	#CD5C5C	(205,92,92)
light coral	#F08080	(240,128,128)
dark salmon	#E9967A	(233,150,122)
salmon	#FA8072	(250,128,114)
light salmon	#FFA07A	(255,160,122)
orange red	#FF4500	(255,69,0)
dark orange	#FF8C00	(255,140,0)
orange	#FFA500	(255,165,0)
gold	#FFD700	(255,215,0)
dark golden rod	#B8860B	(184,134,11)

golden rod	#DAA520	(218,165,32)
pale golden rod	#EEE8AA	(238,232,170)
dark khaki	#BDB76B	(189,183,107)
khaki	#F0E68C	(240,230,140)
olive	#808000	(128,128,0)
yellow	#FFFF00	(255,255,0)
yellow green	#9ACD32	(154,205,50)
dark olive green	#556B2F	(85,107,47)
olive drab	#6B8E23	(107,142,35)
lawn green	#7CFC00	(124,252,0)
chart reuse	#7FFF00	(127,255,0)
green yellow	#ADFF2F	(173,255,47)
dark green	#006400	(0,100,0)

green	#008000	(0,128,0)
forest green	#228B22	(34,139,34)
lime	#00FF00	(0,255,0)
lime green	#32CD32	(50,205,50)
light green	#90EE90	(144,238,144)
pale green	#98FB98	(152,251,152)
dark sea green	#8FBC8F	(143,188,143)
medium spring green	#00FA9A	(0,250,154)
spring green	#00FF7F	(0,255,127)
sea green	#2E8B57	(46,139,87)
medium aqua marine	#66CDAA	(102,205,170)
medium sea green	#3CB371	(60,179,113)
light sea green	#20B2AA	(32,178,170)
dark slate gray	#2F4F4F	(47,79,79)

teal	#008080	(0,128,128)
dark cyan	#008B8B	(0,139,139)
aqua	#00FFFF	(0,255,255)
cyan	#00FFFF	(0,255,255)
light cyan	#E0FFFF	(224,255,255)
dark turquoise	#00CED1	(0,206,209)
turquoise	#40E0D0	(64,224,208)
medium turquoise	#48D1CC	(72,209,204)
pale turquoise	#AFEEEE	(175,238,238)
aqua marine	#7FFFD4	(127,255,212)
powder blue	#B0E0E6	(176,224,230)
cadet blue	#5F9EA0	(95,158,160)
steel blue	#4682B4	(70,130,180)
corn flower blue	#6495ED	(100,149,237)

deep sky blue	#00BFFF	(0,191,255)
dodger blue	#1E90FF	(30,144,255)
light blue	#ADD8E6	(173,216,230)
sky blue	#87CEEB	(135,206,235)
light sky blue	#87CEFA	(135,206,250)
midnight blue	#191970	(25,25,112)
navy	#000080	(0,0,128)
dark blue	#00008B	(0,0,139)
medium blue	#0000CD	(0,0,205)
blue	#0000FF	(0,0,255)
royal blue	#4169E1	(65,105,225)
blue violet	#8A2BE2	(138,43,226)
indigo	#4B0082	(75,0,130)
dark slate blue	#483D8B	(72,61,139)

slate blue	#6A5ACD	(106,90,205)
medium slate blue	#7B68EE	(123,104,238)
medium purple	#9370DB	(147,112,219)
dark magenta	#8B008B	(139,0,139)
dark violet	#9400D3	(148,0,211)
dark orchid	#9932CC	(153,50,204)
medium orchid	#BA55D3	(186,85,211)
purple	#800080	(128,0,128)
thistle	#D8BFD8	(216,191,216)
plum	#DDA0DD	(221,160,221)
violet	#EE82EE	(238,130,238)
magenta / fuchsia	#FF00FF	(255,0,255)
orchid	#DA70D6	(218,112,214)
medium violet red	#C71585	(199,21,133)

pale violet red	#DB7093	(219,112,147)
deep pink	#FF1493	(255,20,147)
hot pink	#FF69B4	(255,105,180)
light pink	#FFB6C1	(255,182,193)
pink	#FFC0CB	(255,192,203)
antique white	#FAEBD7	(250,235,215)
beige	#F5F5DC	(245,245,220)
bisque	#FFE4C4	(255,228,196)
blanched almond	#FFEBCD	(255,235,205)
wheat	#F5DEB3	(245,222,179)
corn silk	#FFF8DC	(255,248,220)
lemon chiffon	#FFFACD	(255,250,205)
light golden rod yellow	#FAFAD2	(250,250,210)
light yellow	#FFFFE0	(255,255,224)

saddle brown	#8B4513	(139,69,19)
sienna	#A0522D	(160,82,45)
chocolate	#D2691E	(210,105,30)
peru	#CD853F	(205,133,63)
sandy brown	#F4A460	(244,164,96)
burly wood	#DEB887	(222,184,135)
tan	#D2B48C	(210,180,140)
rosy brown	#BC8F8F	(188,143,143)
moccasin	#FFE4B5	(255,228,181)
navajo white	#FFDEAD	(255,222,173)
peach puff	#FFDAB9	(255,218,185)
misty rose	#FFE4E1	(255,228,225)
lavender blush	#FFF0F5	(255,240,245)
linen	#FAF0E6	(250,240,230)

old lace	#FDF5E6	(253,245,230)
papaya whip	#FFEFD5	(255,239,213)
sea shell	#FFF5EE	(255,245,238)
mint cream	#F5FFFA	(245,255,250)
slate gray	#708090	(112,128,144)
light slate gray	#778899	(119,136,153)
light steel blue	#B0C4DE	(176,196,222)
lavender	#E6E6FA	(230,230,250)
floral white	#FFFAF0	(255,250,240)
alice blue	#F0F8FF	(240,248,255)
ghost white	#F8F8FF	(248,248,255)
honeydew	#F0FFF0	(240,255,240)
ivory	#FFFFF0	(255,255,240)
azure	#F0FFFF	(240,255,255)

snow	#FFFAFA	(255,250,250)
black	#000000	(0,0,0)
dim gray / dim grey	#696969	(105,105,105)
gray / grey	#808080	(128,128,128)
dark gray / dark grey	#A9A9A9	(169,169,169)
silver	#C0C0C0	(192,192,192)
light gray / light grey	#D3D3D3	(211,211,211)
gainsboro	#DCDCDC	(220,220,220)
white smoke	#F5F5F5	(245,245,245)
white	#FFFFFF	(255,255,255)

(Source; https://www.rapidtables.com/web/color/RGBColor.html)

RESULT/EXPECTED OUTCOME

A. A new technology way of analysis fabric color variation in very less time.

- Color sensor detect is done on the basis of RGB color space with automatic show on display
- RGB value 0 to 255 frequency and next collaboration with each other
- It can be absorbed during the RGB value of original frequency and current frequency the mean value show on the display after both frequency matching the result will reject and accept

B. Technical enhancement in R&D from total rejection garments & profit margins of company.

- Successful examination, demo & Implementation of new Industrial engineering technology for easy of fabric color different & reducing rejection of garment planning & control.
- Successful examination, demo & Implementation of RGB sensor with Arduino by reducing manual matching, manpower & other needful resources

CONCLUSION

In sensing/detecting the color shade in fabric, RGB sensor Pre-processing is a consistent and efficient way to detect a color variation. It involves a

collection of techniques that are used to improve the quality and visual RGB value. Fabric color and compare feature extraction are very important for shade analysis. This project has considered and investigated two different types of RGB value one is original frequency and current frequency and RGB color space. According to the tests result, RGB color sensor has given better results than Grayscale color matching cabinet machines. RGB sensor has given error free frequency, which is better suited for human or machine interpretation.

But due to an important color variation in fabric, trims & CM which fluctuates during the production stage, the proposed/deliberate color vary from the actual.

Conclusively, color matching is a very critical process which has to handled & controlled as the order proceeds

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