Review on Sensor based Colour Sorting Robot for Candy Manufacturing

S.Krishnakumar¹, K.Sneha², A.Reethika³

¹, ² Assistant Professor, Bannari Amman Institute of Technology, Department of Electronics and Instrumentation Engineering, Sathy, Tamilnadu, India.
³ Assistant Professor, K.P.R Institute of Engineering and Technology, Department of Electronics and Communication Engineering, Coimbatore, Tamilnadu, India

krishnakumars@bitsathy.ac.in sneha@bitsathy.ac.in reethikaanandan@gmail.com

Abstract. In this work, a new approach for high speed sorting of candy into desired locations is introduced. In this work color sorting of candy is done by detecting colour and the edges of given image which are of similar colours. The colour sensor TCS230 detects three colour red, green, blue and black (no colour). When there is no candy in front of the sensor it produces an output of 330Hz range frequency and when there is a candy it produces an output frequency of 7-14 kHz. The microcontroller can find the frequency of the output from TCS230. The output is obtained by sorting the color of candy depending on the frequency analysis of the output of the TCS230 sensor in the Conveyor system. This work focuses on literature review of sensor based colour sorting robot for candy manufacturing.

Keywords: Edge detection; TCS230, Microcontroller; Conveyor system

1. INTRODUCTION

Automation is very important task for control systems for handling different process station, for improving the product quality. With help of automation humans working in the hazardous areas can be reduced and it brings safety for humans. The error caused due to human negligence can be prevented with the help of automated system for classifying the various color. In this work the main components involved are conveyor belt, color sensor, and dc motor. Input and output from this modules are easily accessed by using various controllers like Arduino, Raspberry Pi, IOT and PIC controllers. In this work various operating methods are compared for colour recognizing, sorting, and motor with microcontroller. Colour sorting are used in various application for sorting of rotten fruits and defected products.

2. COLOR SORTING ROBOT

Color sorting is very fundamental steps in which one or more objects of different types are arranged in correct order. Sorting of color robots are generally done by microcontroller unit with help of sensors. In the following method high speed color sorting robot TCS230 is generally used to detect the various color that is incident on it.
In general this sensor consist of array of photodiode, in general it consist of 8x8 matrix that is it contains 64 sensors, sensor is covered with four filter, sixteen sensor have red filter it measures only red when incident on the sensor similary sixteen green filter and sixteen have blue filter. TCS230 will convert the incident light into frequency. The output waveform generally contain 50% duty cycle square wave, with help of timer in microcontroller unit to measure period of pulse and thus get the frequency.

Figure 1 Block diagram of Colour sorting robot

Figure 1 shows the block diagram of color sorting robot. PIC16F877A is one of the advanced Microcontroller from the Microchip. In general it has separate code for storing the data, it follows the harvard architecture. It has flash memory that is it can be reprogrammable, ram for memory storage of variable is generally done, eeprom is generally used for long duration stable memory, and it is electrically erasable programmable read only memory generally used for reading the data. It contains Input & Output ports for High current input and output ports it is generally used for the pin direction change. In power supply unit, it generally consist of step down transformer for converting high voltage into low voltage, next stage is rectification stage it is used to convert ac into dc voltage, smoothing stage is used for avoiding unwanted ripples from the signal, regulation stage is generally used for regulation stage.

3. LITERATURE SURVEY

LIM JIE SHEN[1] In this method, first step starts with background study on material, after the background study is finished, next very important classification-colour sensing connection, colour recognising connection, fabricating of Robot body, after following operations are done building of assembly parts are very important and troubleshooting analysis is done at the last part. In programming section, background study on programming language is done by comparing various other methods, in this work it generally focus on TCS3200D Colour sensor for sorting of various colours, Arduino UNO board is used for controlling operations and GS90 Tower Pro servo motor used in conveyor for sorting of various colour. In this work robotic system will have huge potential for proper implementation.
Snehal Shirgave[2] In the Zigbee based Colour Sorting mechanism, the input unit consists of a Power supply unit, a Rectifier unit for converting AC into DC, a regulator used for regulation of supply, a Display unit consisting of an LCD, it is generally used for displaying various colours, a sorter mechanism consisting of different colour balls used to sort and sensing of different colours is done by a Wifi based module. With help of Raspberry Pi based method, the entire color sorting system is automated. Rudresh H.G[3] In this work colour sensor based object sorting robot generally uses the robotic arm for sorting of various colours, this robotic arm is generally placed near the conveyor belt. This robotic arm will generally pick and place the object in the desired location, with the help of robotic arm the manwork is reduced in rapid rate, accuracy and speed of classification of is done at the rapid rate. Colour sensor will detect the colour, and send the signals to the microcontroller unit, this microcontroller unit drives the motor in the conveyor belt. Shweta[4] In this work a smart approach for implementing the robotic arm is introduced for sorting based on the basics of color. In this method they have used a TCS34725 color sensor which it is interfaced with the controller unit, sensor unit sends the signal to the microcontroller unit, it senses the signal and it generally sends the data to the motor driver unit L293D. It generally drives the motor unit. The main application of this project is pick and place using the product like grains, apples, grapes, and other fruits. It is generally used for industry sorting.

D A Jakkan[5] In this work the first stage of the operation is power supply unit, this unit is generally used for supplying the power to the system, the next stage of operation is rectification stage, during this stage it is generally used for converting AC into DC, in the regulator stage it is generally used for regulation of the things. A display unit is used for displaying the various parametric values. With help of IOT, sorting is done generally with help of sorting mechanisms. Himanshu Patel[6] In this work various color objects are generally segregated with the help of the color sensor, color sensor will detect the incoming object, and sends the signal to the controller. The controller analysis the signal send the output for servomotor used for easy classification of the data. It is generally used in food industry for identifying the various rotten fruits and vegetables and it generally used for identify the defects in the raw materials and it is used in used small scale and large scale industries.

Ch. Shravani[7] Color based product sorting machine using IOT is very low cost method with which it is very much suited for small scale industry can able to get updated with the automated system for easy way of sorting. With the help of sequence of objects that can sorted based on colour which can reduce the man power and time consumption in industries, the output is displayed in the LCD Display. Uzma Amin[8] In this work they used PIC microcontroller(18F452) it 8-bit controller and it has 40 pins, the main operating voltage of this system is 2-5.5V, it generally contains number of 34 input and output, it also contains timer modules, comparator modules it generally contains communication peripherals like SPI, I2C and UART, and it generally has 1536 byte of RAM and 256 bytes of data EEPROM memory.

4. COLOR SORTING ROBOT

In the following figure 2 represent sorting of colour robot using PIC microcontroller, the colour sensor which detects the various based on the wavelength, the colour sensor generally used in the colour matching, sorting of the various colors, test strip readings. The power consumption of this sensor is 2.7-5.5v
The color sensor generally used in industrial and manufacturing applications for improving the quality, the colour sensor generally consist of arrays of 16 photodiode, one array for each of the primary colors is generally unfiltered array, it generally consist of a total 64 sensing points. This sensor generally called as light to frequency convertor. It generally communicates directly with the microcontroller.

5. CONCLUSION

In today's modern era, the gadgets are automated and the man power is reduced. In this various color sorting of various application for recognize color balls, pick and place robot using the robotic arm. In this work comparison of developing of a color sorting robot has been achieved. The main operation done in the sensing section is detection of objects, identification of color is compared.

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