Arduino Based Color Sorting Machine

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Abstract- **There is a wide range of many products in our daily life, and manufacturing of this products are done in many large scale and small scale industries. Arranging makes quality consistency issue. Nowadays the main difficulty that is faced after the production is sorting when there are too many items to sort. Arrange of items in an industry is a dull process, which is usually done physically. But sorting of items by physical method consumes more time. To save the times and have accuracy in sorting we are introducing an automatic color sorting machine.**

The color sorting machine is a device which sorts the object based on their color. We use Arduino, TCS3200 color sensor to sense the color of any objects and after detecting the color servo motor grab the thing and put it into respective box. They can be used in different application areas where color identification color distinction and color sorting is important. Some of the application areas including Agriculture industry (Grain sorting on the basis of color), Food industry, Diamond and Mining Industry, Recycling etc

Index terms- **Arduino UNO, TCS3200 color Sensor, Servo motors, Jumpers, Bread board**

1. INTRODUCTION

As the name suggests color sorting is simply to sort the things according to their color. It can be easily done by seeing it but when there are too many things to be sorted and it is a repetitive task then automatic color sorting machines are very useful. These machines have color sensor to sense the color of any object and after detecting the color servo motor grab the thing and put it into respective box. They can be used in different application areas where color identification, color distinction and color sorting is important.

Merchandise should be taken care of in numerous ranges of manufacturing and manual sorting is time consuming and labor extensive. This paper discusses about the automatic sorting tool which helps the sorting mechanism to kind based at the coloration. For sensing TCS3200 coloration sensor has been used. With the aid of reading the frequency of the output of the sensor, color primarily based absolutely sorting is completed.

Layout of a innovative venture referred to as item sorting system by means of spotting the only of a kind shades of the item has been leader goal of the challenge. Accumulating the objects from the hopper and distributes those objects to their accurate area based on their coloration even they'll be unique in coloration.

To reduce human effort on mechanical maneuvering different types of sorting machine are being developed. These machines are too costly due to complexity in the fabrication process. A common requirement in the field of color sorting is that of color sensing and identification.

Many paintings environments aren't suitable for manual sorting and a few areas are risky for humans to paintings on. Consequently to avoid the unstable work, time consumption and hard paintings catch 22 situations. This prototype is built as simple digital gadgets like microcontroller for processing, Servo motors for actions and coloration sensor for recognizing exclusive colored devices.

2. APPROACH

This venture makes use of a simplified and not steeply priced technique for sorting the substances of a unique colored items, it's far sensing the color of the object and kind out the different colored devices. Servo automobiles are used to manipulate the motion of the skittles are amassed on the hopper. A servo motor is used to pressure the skittles to the sensor and the sensor that is interfaced with ARDUINO

identifies the shade of the object and the bottom servo is operated as consistent with the deliver code.

Interfacing - Arduino UNO with color Sensor and Servomotor

Figure 1: Block Diagram of the System

3. METHODOLOGY

Prototype Design parameters

For making the complete set up including chassis, arm, roller, pad, we have used the white sun board of 2mm thickness. It is easily available in the stationary stores. We have used paper cutter to cut the sun board sheet and FlexKwik for joining the different parts.

At first a sun board was chosen to make the structure of the conveyer. A rectangular shaped sun board, 18 inches length and 12 inches width were selected for the base of the structure. Two pieces of sun board, length 14 inches, width 0.75 inches and height 5 inches was selected for two horizontal support of the belt. The horizontal sun board were placed parallel and 5 inches apart from each other. These two horizontally directed parallel sun board support the roller so that they can rotate freely between them with the help of bearings. To fix the bearing properly with the horizontal wooden block, 4 holes in each wooden block was made which had diameters has same as the bearings. The whole were made by drilling the black with a drilling machine. Then the bearings were tightly fitted with the sun board by hammering. Four rollers were made by turning sun board into the lathe machine. The diameter of the roller was 1 inch. The diameter of the smaller shaft of the roller which coupled with the bearings was 10 centimeters.

Now a structure was made for holding the servo motor. It was made by cutting a plastic sun board. First a 'u' bend was made from the sun board. The full structure shown in the below figure.
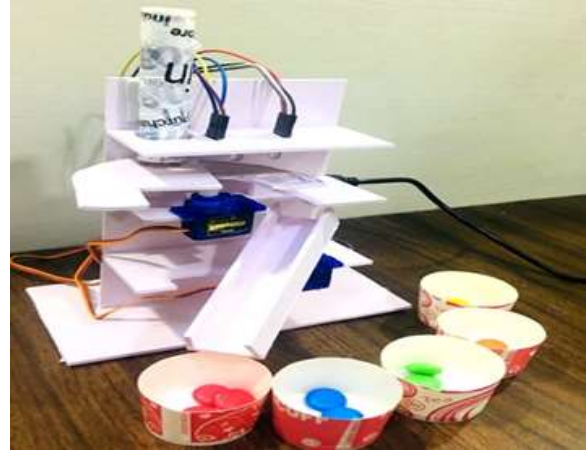

Fig 3a: Fitting of sorting machine

4. TECHNOLOGY FOR OBJECT SORTING

A. Color Sensor

Figure 2:TCS3200 Color Sensor

TCS3200 is a color sensor which can detect any number of colors with right programming.

TCS3200 contains RGB (Red Green Blue) arrays. As shown in figure on microscopic level one can see the square boxes RGB matrix. Each of these boxes contain three sensors, One is for sensing Green light intensity, One is for sensing Red light intensity and the last in for sensing Blue light intensity.
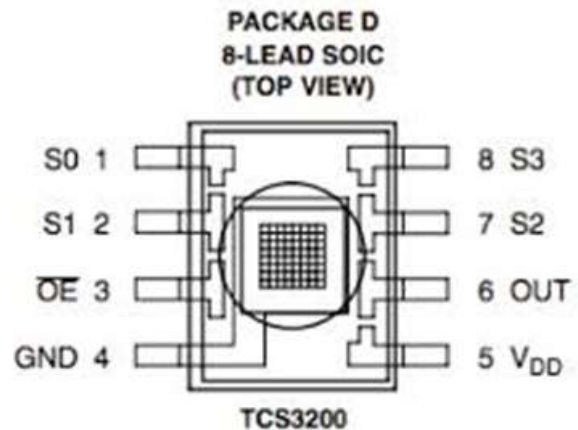
Figure 2b: Arduino based Color Sensor
Each of sensor arrays in these three arrays are selected separately depending on the requirement. Hence it is known as programmable sensor.

B. Arduino UNO

The Arduino UNO power supply can be done with the help of USB cable or an external power supply. The external power supplies mainly include AC to DC adopter otherwise a battery. The adapter can be connected to Arduino uno by plugging into the power jack of the Arduino board. Similarly, the battery leads can be connected to the vin pin and the GND pin of the power connector. The suggested voltage range will be 7 volts to 12 volts. Arduino UNO can detect the surroundings from the input. Here the inputs are variety of sensor and these can affect, etc. The ATmega328 microcontroller on the Arduino board can be programmed with the help of an Arduino programming language and the integrated development environment.
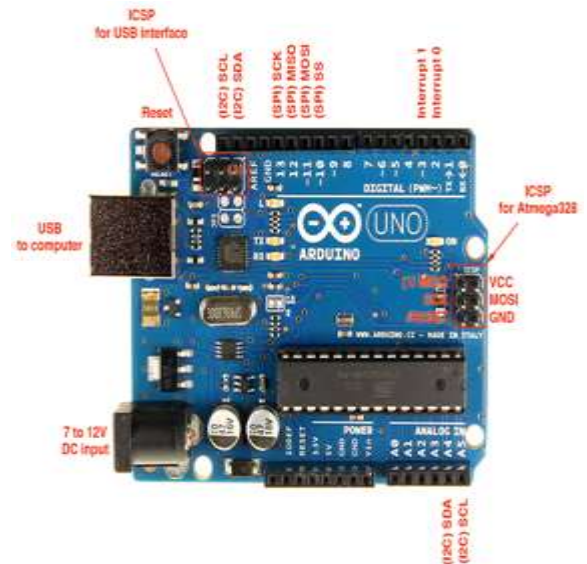

Figure 2c: Arduino UNO

4. SERVO MOTOR

It is a rotary actuator or a linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module design specifically for use with the servomotors

Figure 2d : Servo motor

The Specifications of servo motor are mentioned below

- Operating voltage: 4.8 V (~5V)
- Operating speed: 0.1 s/60 degree
- Stall torque: 1.8 kgf•cm
- Dead band width: 10 µs
- Temperature range: 0 ℃ – 55 ℃

5. RESULTS

The object are sorted with respect to their color and dropped into the respective box.
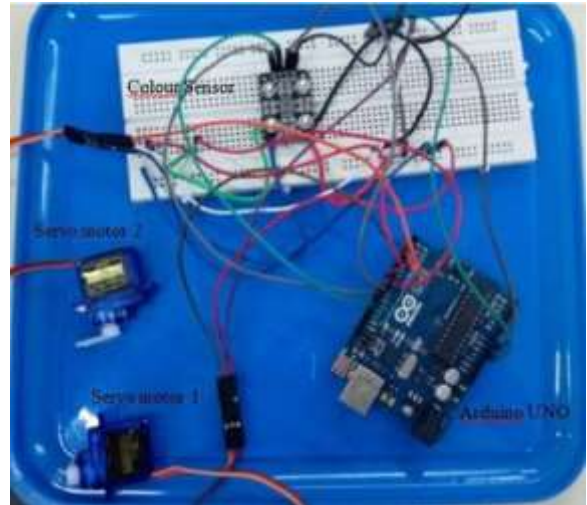

Figure 3:Hardware Implementation of system

When any color from Red, green or blue is kept for detection in front of the color sensor then the desired color led is turned on and the output of the sensing of color is seen first, we keep the green color paper on the top of the color sensor, it detects and turns the led on and in the same way it works for other two color.
We have developed a sorting machine for automatic color sorting, in this sorting we can easily identifies the color indication of sorting machine.

6. CONCLUSION

On the component even as any object of hues, as an instance, crimson, green, Blue is stored near the sensor, the shading LED of the comparing kind is grew to grow to be on giving the yield of the sensor. Inexperienced shading is tried on the begin through different.

The version is intended for arranging any item of any form which having length beneath 2cm. The version is meant to type diverse tablets of RGB colorings and at time it has the capacity to get up to one hundred pills and type with a hundred% precision. The DC servomotor is prepared to pivot for various plots for each shading isolated. This version can be stretched out to ongoing programs in pharmaceutical ventures and bundling corporations. It moreover can likewise be robotized. Rapid engines deliver full-size outcomes for mechanical applications.

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