

Colour Sorting Machine using Arduino Nano

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Abstract— This paper describes a working prototype designed for sorting colored marbles based on the color. TCS230 sensor was used to detect the color of the marbles and Arduino Nano serves as the primary controller to control the overall process. The color sensor is attached facing down as it checks the marble's color and this checking correspond to a color frequency with a custom-made function that helps to identify the color of the object. Two servo motors MG90s and SG90 are used. One is used to place the marble below the sensor to detect the color and the other motor is used to drop the marbles into various containers which are separated according to the color. Arduino color sorting machine demonstrates the operation of sorting machines that are commonly used by industries. This Arduino color sorter project is applicable in organizing small objects considering the capabilities of the hardware which is used in the project.

Key words: Colour Sorting, Servo Motors, TCS230 Colour Sensor, Arduino Nano

I. INTRODUCTION

Sorting of products is a very difficult industrial process. Continuous manual sorting creates issues. Automating many of the tasks in the industries may help to improve the efficiency. This machine consists of three parts: Servo motors, colour sensor and the output and input of these parts is interfaced using Arduino Nano. The main part of this model is detecting and identifying the colour and sorting them accordingly.

A. Color Detection & Identification

The TCS230 colour Sensor is a complete colour sensor. The colour of an object we can see in fact is the chromatic light the object reflects in white light. The white colour is a mixture of various visible colours, which means it includes each coloured light like red (R), yellow (Y), green (G), blue (B), and purple (P). Based on the theory of three primary colours, any colour is made by mixing the three primary colours (red, green, and blue) in a certain proportion. Colour sensor consists of a TAOS TCS3200 RGB sensor chip and 4 white LEDs TCS3200 sensor has 4 types of filter: red filter, green filter, blue filter, and clear with no filter. When the part of RGB colours in the light reflected by the object passes through the filter selected to the TAOS TCS3200 RGB chip, the built-in oscillator outputs square waves. Place the colour sensor on the surface of an object and the colour value can be displayed in the Serial Monitor. Sensor outputs a voltage, proportional to all the light that it sees weighted by the curve.

II. METHODOLOGY

A. Design Parameters

This model can sort Red, Blue, Green and Yellow coloured marbles. Model consist of two Servo Motors. Servo motors

are used for angular motion and we can accurately know the angle in which motor is rotated.

B. Height-Width-Time

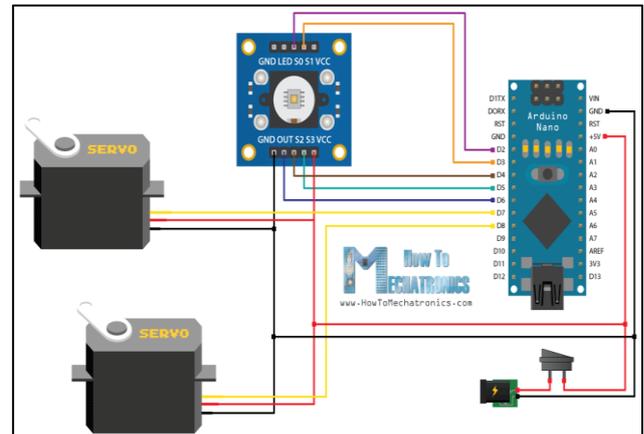


Fig. 1: Circuit Diagram

C. Working of Model

When power supply of 12V is connected, the first servo motor starts to rotate. The motor rotates and brings the marbles below the color sensor which detects its color. The Arduino NANO serves as the primary controller to which the color sensor and servo motors are connected. Its analysis the data received from color sensor and then transmit a command to the servo motors. The color sensor is attached facing down as it checked the object color and this checking correspond to a color frequency with a custom-made function that helps to identify the color of the object. The color sensor will send the data to Arduino, Arduino will process those data according to code uploaded in it and command the servo motor to move and sort the marbles. The top servo ensures a piece of object is delivered after the object color is identified, which it moves the object from the source to the color sensor, then to the dropping hole with a slider platform handle by a bottom servo. Slider platform is then set in order to deliver the object to the group container where the colored object store. Then the top servo motor again rotates till the skittles drop into the guide rail.

III. LITERATURE SURVEY

A. Advantages

1) Fully Automated

As there is no human intervention in the entire procedure of sorting machine, this machine counts in automated machines.

2) Useful in Industrial Application

This machine result to be useful for the industries whose work depends on components of various colours.

3) It is Time Efficient as the Procedure is automated

This machine can sort components in very less time thus resulting to be time efficient.

B. Disadvantages

- 1) If any one component fails, it may lead to entire failure of machine: If any one of the components fails, the entire machine may give faulty results.
- 2) Any environmental disturbance created will identifying the colour, may produce false result: The colour sensing part of this machine is quite sensitive, thus any disturbance in colour sorting may produce false result.
- 3) This approach is costly for small scale industries.

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IV. FLOWCHART

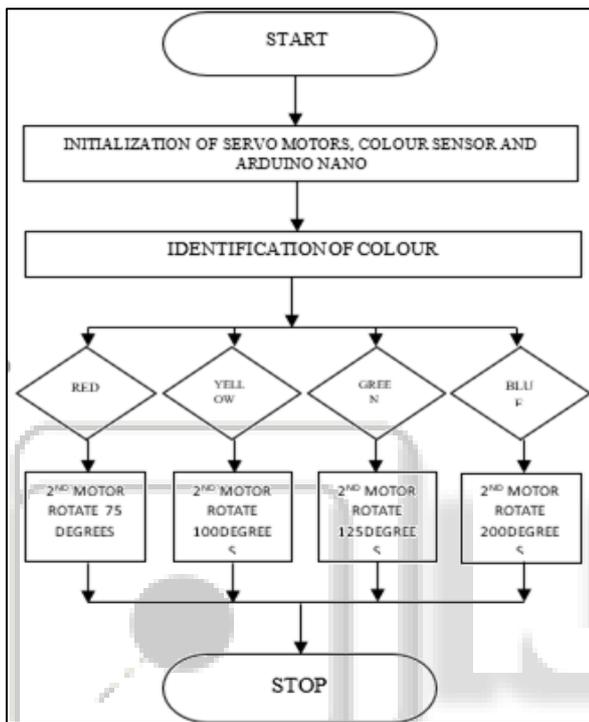


Fig. 2: Flowchart

V. APPLICATION

- 1) Used for sorting grains.
- 2) Also used in diamond industry.
- 3) Used in industries to sort small coloured components.

VI. CONCLUSION

We have developed a sorting machine using PIC for automatic color sorting, taking in to consideration three colors namely Green, Red and Black. We consumed one month to produce the prototype and an overall expenditure of Rs. 3000.

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