Color Sorting Machine using Microcontroller

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Abstract-**Controls the sliding platform so that the discs can Machines can perform highly repetitive tasks better than humans. Worker fatigue on assembly lines can result in reduced performance, and cause challenges in maintaining product quality. An employee who has been performing an inspection task over and over again may eventually fail to recognize the colour of product. Automating many of the tasks in the industries may help to improve the efficiency of manufacturing system. The purpose of this prototype is to design and implement a system which automatically separates products based on their colour. This machine consists of four parts: rotating platform, colour sensor servo motor and stepper motor. The output and input of this part was interfaced using ESP 32 microcontroller Sorting of products is a very difficult industrial process.**

I. INTRODUCTION

The project intends to design and implement an "Color Sorting Machine using Micro Controller" using position control mechanism and color sensing technology with the help of Micro-Controller (Arduino nano). A prototype has been developed to illustrate the project. In this project the stepper motor brings the color discs from the holder to exact top position of the color sensor TSC230. The color sensor TSC230 identify the color of the disc and send the RGB value of the color to the microcontroller. The microcontroller then identifies the color from the pre define value and instructs the servo motor to rotate the sliding platform to the respective color pot. In the sext rotation of the stepper motor the disc fall down to the particular color pot. The developed prototype consists of the following main section. • Disc holder – it holds the color disc in the vertical position just above the rotating disc positioner. • disc positioner – it brings the color discs from the holder and place it exactly above the color sensor TSC230 • Stepper motor – it moves the disc positioner • Servo motor – it Accumulate to the correct color pot • Control board – it consists of ESP 32 microcontroller,

stepper motor driver, voltage regulator etc. The heart of the project. Controls the stepper motor, servo motor and the color sensor TSC230. • Color sensor – this sensor senses the color of any object and break it the RGB value 1.2 Color sorting process In the cutting-edge-day scenario of competitive manufacturing in commercial zone performance of manufacturing holds the important component for achievement. Its miles essential to beautify manufacturing pace, lower the labour charge and reduce the breakdown time of production gadget. Merchandise should be taken care of in numerous ranges of manufacturing and manual sorting is time consuming and labour extensive. This project discusses about the automatic sorting tool which helps the sorting mechanism to kind based at the coloration. For sensing TCS230 coloration sensor has been used. With the aid of reading the frequency of the output of the sensor, colour primarily based absolutely sorting is completed. Layout of an innovative prototype referred to as item sorting system by means of spotting the only of a kind shade 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. Many paintings environments aren't suitable for manual sorting and a few areas are risky for humans to paintings on. This prototype is built as simple digital gadgets like microcontroller for processing, Servo motors for actions and coloration sensor for recognizing exclusive- Coloured devices. As the name suggests, colour sorting is simply to sort the things according to their colour. 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 colour sorting machines are very useful. These machines have Colour sensor to sense the colour of any objects and after Detecting the colour servo motor grab the thing and put 4 it into respective pot. They can be used in different application areas

where colour identification, colour distinction and colour sorting are important. Some of the application areas include Agriculture Industry (Grain Sorting on the basis of colour), Food Industry, Diamond and Mining Industry, Recycling etc. The applications are not limited to this and can be further applied to different industries.

II. OBJECTIVE

Cost Minimization: The primary objective is often to minimize the overall cost of the hybrid renewable energy system. This involves considering the capital costs of different components (solar panels, wind turbines, energy storage systems), operational and maintenance costs, and the costs associated with integrating and managing differentrenewable sources. Energy Reliability and Availability: Ensure a reliable and continuous power supply by optimizing the system to meet the energy demand at all times. This involves determining the right mix of renewable sources and storage capacity to ensure energy availability during periods of low renewable generation.

III. METHODOLOGY

A. Working:

A color sorting machine, also known as a color sorteror optical sorter, is a sophisticated device used in various industries to separate items based on color. The machine operates through a series of key components and steps. First, items are fed into the machine via a hopper and evenly distributed on a vibrating conveyor or chute to ensure a single-layer spread. High- resolution cameras and sensors, typically CCD or CMOS sensors, capture images of the items as they pass through a controlled illumination system, usually using LEDs to eliminate shadows and highlight true colors. The images are processed in real-time by an image processing unit, which analyzes the color data against predefined criteria Color sorting machines are widely used in industries such as food processing, recycling, pharmaceuticals, and mining. They sort grains, rice, nuts, fruits, vegetables, plastics, glass, pills, tablets, minerals, and ores to ensure uniformity and quality. These machines offer several advantages, including high-speed sorting, precise color detection, reduced

labor costs, and improved product quality by removing defective or substandard items. Overall, color sorting machines are crucial for maintaining high standards and efficiency in modern manufacturing and processing industries.

A. Circuit Diagram:
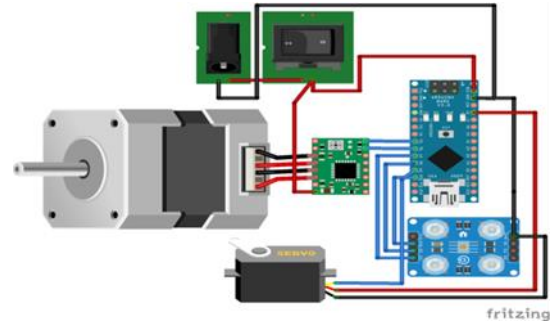
A color sorting machine is designed to automatically sort objects based on their color, utilizing a series of interconnected components to achieve this task. It begins with a hopper or feeder, which ensures a steady and controlled flow of items onto a conveyor belt. The conveyor belt then transports these items past a lighting system, typically consisting of LED lights, which provide consistent illumination for accurate color detection. Color sensors, often CCD or CMOS cameras, capture the color data of each object as it moves along the conveyor. This data is sent to a data processing unit, which analyzes the color information against pre- set criteria to determine the appropriate sorting category for each item. Based on this analysis, the processing unit activates an ejector mechanism, such as air jets or mechanical arms, to direct the objects into designated bins or containers, each corresponding to a different color category. The sorted items are then collected in these bins for further use or processing. Color sorting machines are widely used in various industries, including food processing, recycling, and pharmaceuticals, to efficiently and accurately sort products by color.

B.RESULT

The results of a color sorting machine include highly efficient and precise sorting of objects based on their color properties. These machines provide high sorting accuracy by using advanced color sensors and data processing algorithms to correctly identify and segregate items based on subtle color differences. The consistent illumination and controlled environment ensure uniformity, minimizing errors and leading to reliable sorting

results. Additionally, the automated nature of these machines allows for increased efficiency, as they can sort large volumes of items much faster than manual methods. High-speed conveyors and rapid ejector mechanisms contribute to significant throughput, processing thousands of items per hour. This automation improves product quality by ensuring that the sorted products are more uniform, enhancing their aesthetic and quality appeal, which is particularly beneficial in industries such as food processing, recycling, and pharmaceuticals.

C. CONCLUSION

Here we developed a prototype which automatically sorts out color discs in the respective color pots with the help of a micro-controller. It will help in reducing human effort and error. Our circuit consists of ESP32, TSC230, and Stepper motor with driver and servo motor. First after switching on, the stepper motor places the color disc above the TSC230 color sensor. After sensing the color of the disc, the servo motor place, the color discs to the respective color pots with the help of a sliding platform. All the motors are controlled by the microcontroller.

REFERANCES

1. Ch.Shravani, G. Indira, V. Appalaraju, "Arduino Based Color Sorting Machine using TCS3200 Color Sensor", International Journal of Innovative Technology and Exploring Engineering (IJITEE), ISSN: 2278-3075, Volume-8, Issue- 6S4, April 2019.

2. K.Sasidhar, Shahwar Farooqi, Mohammed Abdul Moin, M Sachin, "Design and Development of a Colour Sorting Machine using PLC and SCADA", International Journal of Research and Scientific Innovation (IJRSI), Volume V, Issue VII, July 2018, ISSN 2321–2705.

3. Aung Thike, Zin Zin Moe San, Dr. Zaw Min Oo, "Design and Development of an Automatic Color Sorting Machine on Belt Conveyor", International Journal of Science and Engineering Applications Volume 8–Issue 07,176-179, 2019, ISSN:-2319–7560.

4. Aye Myat Myat Myo, Zar Chi Soe, "Automatic Color Sorting Machine Using Arduino Mega Microcontroller", International Journal of Latest Technology in Engineering, Management & Applied Science (IJLTEMAS), Volume VIII, Issue VIII, August 2019, ISSN 2278-2540.

5. Dharmannagari Vinay Kumar Reddy, "Sorting of objects based on colour by pick and place robotic arm and with conveyor belt arrangement", International Journal of mechanical engineering and robotic research (IJMERR), Vol. 3, No. 1, January 2014, ISSN 2278 – 0149.

6. Mr.V.A.Aher, Mayur Dukre, Ganesh Abhang, Trupti Thorat, "Colour based object sorting machine", International Research Journal of Engineering and Technology (IRJET), Volume 08, Issue 02, Feb 2021, ISSN(print): 2395-0072, ISSN(online):2395-0056