



Arduino Based Automatic Colour Sorting Machine in Food and Health Care Industries

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ABSTRACT:

Object sorting is an essential mechanical process that sometimes calls for laborious labour. Consistency problems arise from persistent manual organisation. In the majority of dull tasks, machines will outperform humans. Working man fatigue on well-organized production structures may result in poorer performance and cause issues with maintaining the target fine. A worker who consistently demonstrates analysis enterprise may also be able to recognise the colour of tem in the end, but a machine cannot. This project describes a sorting machine that can assist in product sorting. Our daily lives involve the use of several products, the production of which is handled by numerous small and large-scale businesses. Quality consistency is a problem with arrangement. Nowadays, the most common problem that arises during the assembly of sorting and arranging items in a trade may be a tedious, fashionable operation that is primarily carried out manually. the installation of a colour sorting device with a new capability that allows it to detect and count marbles.

I. INTRODUCTION

In the cutting-edge-day scenario of competitive manufacturing in commercial zone performance of manufacturing holds the important component for achievement. It's 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 colouration. For sensing TCS3200 colouration 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 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 colouration even they'll be unique in colouration. Many paintings environments aren't suitable for manual sorting and a few areas are risky for humans to paintings on.

II. RELATED WORK

Arduino-based automatic color sorting machines, there have been several projects and research efforts. Here are some related works and projects:

1. Open Source Color Sorter using Arduino: Many DIY enthusiasts and hobbyists have developed open-source color sorting machines using Arduino boards. These projects typically involve using color sensors to detect the color of objects and servos or stepper motors to sort them into different bins based on their color.
2. Research Papers: There are research papers discussing the design and implementation of color sorting machines using Arduino or similar microcontroller platforms. These papers often delve into the technical details of the hardware and software components used, as well as the algorithms employed for color detection and sorting.
3. Educational Projects: Arduino-based color sorting machines are popular educational projects in schools, colleges, and universities. These projects not only teach students about electronics and programming but also allow them to explore concepts such as image processing and automation.
4. Commercial Products: Some companies have developed commercial color sorting machines based on Arduino or similar platforms. These machines are typically used in industrial settings for sorting items such as candies, fruits, and electronic components based on their color.

5. Online Communities and Forums: Platforms like GitHub, Arduino forums, and Instructables host a wealth of information and project documentation related to Arduino-based color sorting machines. These resources often include step-by-step instructions, code samples, and design files that anyone can use to build their own machine.
6. Hackathons and Maker Fairs: Arduino-based color sorting machines are popular projects at hackathons and maker fairs, where participants showcase their creativity and innovation. These events often feature a wide range of sorting machine designs, from simple prototypes to more advanced systems incorporating machine learning and computer vision techniques.

III. PROPOSED SYSTEM

The proposed system for an Arduino-based automatic color sorting machine typically involves several key components and functionalities:

1. Color Sensing Module: This module consists of one or more color sensors (such as TCS3200 or TCS34725) that can detect the color of objects passing through the sorting mechanism. The sensors capture data about the RGB (Red, Green, Blue) values of the objects, which are then processed by the microcontroller.
2. Conveyor Belt or Mechanism: Objects to be sorted are placed on a conveyor belt or similar mechanism that moves them past the color sensing module. The conveyor belt ensures a smooth and consistent flow of objects for sorting.
3. Microcontroller (Arduino): An Arduino board serves as the brain of the system, responsible for controlling the operation of the color sorting machine. The microcontroller receives input from the color sensors, processes the data, and activates the sorting mechanism accordingly.
4. Sorting Mechanism: The sorting mechanism separates objects into different bins or containers based on their color. This could involve actuators such as servo motors or solenoids that divert objects into the appropriate bin based on instructions from the microcontroller.
5. User Interface: The system may include a user interface for configuring settings, monitoring the sorting process, and displaying relevant information. This could be a simple LCD display and a few buttons or a more sophisticated graphical interface depending on the complexity of the system.
6. Power Supply: A stable power supply is essential to ensure the proper functioning of the color sorting machine. This may involve using a regulated DC power supply or batteries, depending on the application and environment.
7. Calibration and Maintenance: The system should include mechanisms for calibration to ensure accurate color detection and sorting. Additionally, provisions for maintenance and troubleshooting should be considered to keep the machine running smoothly over time.
8. Safety Features: Safety features such as emergency stop buttons, protective enclosures, and sensors to detect obstructions or malfunctions should be incorporated to prevent accidents and ensure operator safety.

The overall design and implementation of the proposed system may vary depending on factors such as the specific application, budget constraints, and desired level of automation. However, the key components outlined above form the basis of an Arduino-based automatic color sorting machine.

IV. THEORETICAL BACKGROUND

4.1 Service Delivery Models:

When it comes to service delivery models for an Arduino-based automatic color sorting machine, several options can be considered based on the needs of the customers and the capabilities of the service provider. Here are some potential service delivery models:

1. Product Sale with Installation Support: In this model, the service provider sells the color sorting machine as a product to the customer. Installation support is provided by the service provider to ensure that the machine is set up correctly and functioning optimally. The customer assumes responsibility for maintenance, repairs, and ongoing operation of the machine after installation.
2. Leasing or Rental Model: Instead of purchasing the machine outright, customers have the option to lease or rent it from the service provider for a specified period. The service provider retains ownership of the machine and is responsible for maintenance and repairs during the lease period. This model allows customers to access the technology without a large upfront investment and provides flexibility in terms of scalability and upgrades.
3. Subscription-Based Service: Under a subscription-based model, customers pay a recurring fee to access the color sorting machine and associated services. The service provider is responsible for installation, maintenance, repairs, and ongoing support. This model offers customers predictable costs and the convenience of outsourcing maintenance and support to the service provider.
4. Managed Services Model: In a managed services model, the service provider takes full responsibility for the operation and maintenance of the color sorting machine. This includes installation, proactive monitoring, maintenance, repairs, and upgrades as needed. Customers benefit from having a single point of contact for all their needs related to the machine, and the service provider ensures optimal performance and reliability.

4.2 Direct-to-Customer Approach:

A direct-to-customer approach for an Arduino-based automatic color sorting machine involves the manufacturer or developer selling the product directly to end-users without intermediaries such as distributors or retailers. Here's how such an approach might be structured:

- Product Development and Manufacturing** The manufacturer designs and develops the Arduino-based automatic color sorting machine, sourcing components, writing firmware, and assembling the hardware. Quality control processes are implemented to ensure that each unit meets the required standards.
- Online Sales Platform** The manufacturer establishes an online sales platform, such as a website or e-commerce store, where customers can browse product information, view specifications, and make purchases directly. The platform may include detailed descriptions, images, videos, and customer reviews to showcase the product's features and benefits.
- Marketing and Promotion** The manufacturer utilizes digital marketing channels such as social media, search engine optimization (SEO), email marketing, and online advertising to promote the color sorting machine to potential customers. Targeted advertising campaigns may be employed to reach specific demographics or industries where the product is most relevant.

4.3 Technology Integration:

Technology integration in an Arduino-based automatic color sorting machine involves incorporating various hardware and software components to create a functional and efficient system. Here's how technology integration might be approached in such a project:

- Arduino Microcontroller** The Arduino serves as the central processing unit of the color sorting machine. It interfaces with other hardware components, such as color sensors and actuators, and executes the sorting algorithm.
- Color sensors**, such as the TCS3200 or TCS34725, are integrated into the system to detect the colors of objects passing through the sorting mechanism. These sensors measure the intensity of red, green, and blue light, enabling the Arduino to determine the color of each object.
- Actuators**, such as servo motors or solenoids, are used to divert objects into different bins based on their color. The Arduino controls the activation of these actuators based on the color detection results.
- A conveyor belt or similar mechanism is employed to transport objects past the color sensors for sorting. The integration of this mechanical component ensures a smooth and consistent flow of objects through the system.
- A user interface is integrated into the system to provide users with control over the sorting process and access to relevant information. This may include a display screen, buttons, or a graphical user interface (GUI) implemented using technologies such as LCD displays or touchscreen panels.

4.4 Customer Relationship Management:

Customer Relationship Management (CRM) is crucial for ensuring customer satisfaction, loyalty, and retention in the context of an Arduino-based automatic color sorting machine. Here's how CRM principles can be applied:

- Pre-Sale Support:** Offer comprehensive pre-sale support to assist potential customers in understanding the capabilities, features, and benefits of the color sorting machine. Provide detailed product information, demonstrations, and consultations to help customers make informed purchasing decisions.
- Customization and Personalization** Understand the unique requirements of each customer and offer customization options to tailor the color sorting machine to their specific needs. This may involve modifying hardware configurations, implementing additional features, or integrating the machine into existing systems.
- Responsive Communication** Maintain open and responsive communication channels to address customer inquiries, concerns, and feedback promptly. Offer multiple contact options such as email, phone, live chat, and social media to accommodate customer preferences and ensure timely assistance.

4.5 Service Quality and Customer Satisfaction:

Ensuring service quality and customer satisfaction is essential for the success of an Arduino-based automatic color sorting machine. Here are some strategies to achieve this:

- Reliability and Performance:** Design the color sorting machine to be reliable and perform consistently under various operating conditions. Use high-quality components, conduct thorough testing, and implement robust software algorithms to minimize downtime and sorting errors.
- Accuracy of Sorting** Accuracy is paramount in a color sorting machine. Ensure that the machine can accurately detect and sort objects based on their color, with minimal false positives or false negatives. Regular calibration and maintenance are crucial to maintain sorting accuracy over time.
- Ease of Use:** Design the user interface of the color sorting machine to be intuitive and user-friendly.

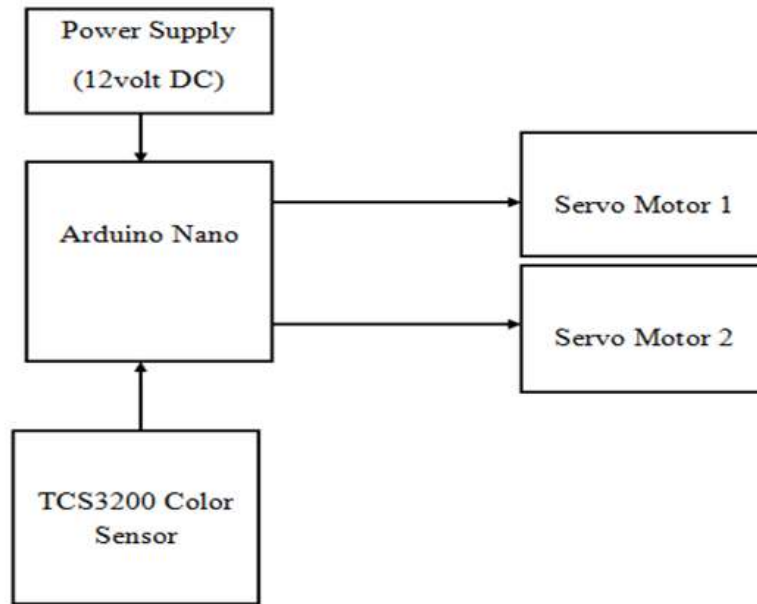


Fig.1.Block diagram

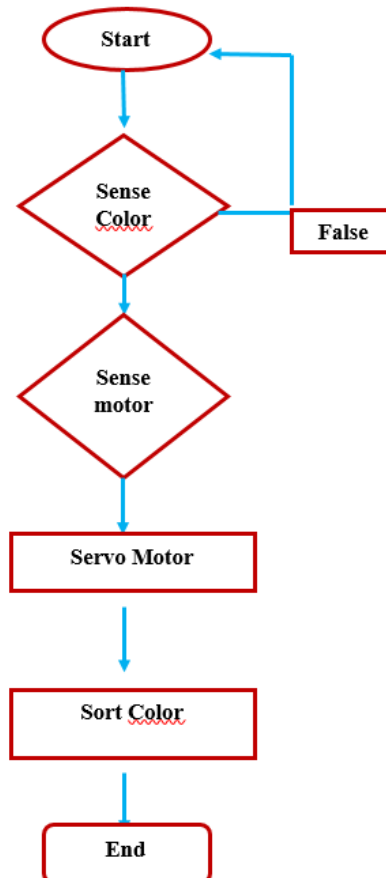


Fig.2.Flow chart

V.FUTURE ENHANCEMENTS:

Looking ahead, several future enhancements can be envisioned for Arduino-based automatic color sorting machines to improve their functionality, efficiency, and versatility. Here are some potential enhancements

Integration of Machine Learning Implement machine learning algorithms to enhance the color detection and sorting capabilities of the machine. By training models on large datasets of color samples, the machine can learn to recognize and classify a wider range of colors with greater accuracy, even in complex and variable lighting conditions.

High-Speed Sorting Enhance the sorting speed

of the machine to accommodate high-throughput applications. This could involve optimizing hardware components such as conveyor belts and actuators for faster operation, as well as refining software algorithms for rapid color detection and decision-making.

Multi-Sensor Fusion Integrate multiple color sensors with complementary characteristics to improve color detection accuracy and reliability. By combining data from different sensors, the machine can mitigate the effects of ambient light variations, surface textures, and object shapes on color measurement.

VI.CONCLUSION:

In this Project we have studied about the different types of research Project based on the colour sorting machine or mechanism. The comparing technologic used in the project. The TCS3200 colour sensor is the best sensor for colour sensing and we are built the colour sorting machine using Arduino Nano. It have tested the assembled device under varying circumstances and found that it worked up to our expectations. We sum up the results of our repeated testing of the device as follows The colour sorting system worked as was expected and it has been experimentally proven to work satisfactorily by adding more colour definitions to it. All colours are correctly identified by the sensor and put in the correct packages. The colour sensor was properly tested before using it within our device, with several different objects having the same colour sensed, and finding the results to be almost identical. The isolation of the sensing equipment from any external light source proved to be a key factor in stabilizing the component frequencies to a great degree. Additionally, the smart home automation system enhances security and safety measures.

VII.REFERENCES:

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