

COMPONENTS

Arduino Nano-1

Colour sensor-1

Servo motor-2

Jumper wires

Breadband

Introduction

The color sorter project aims to demonstrate the automated sorting of objects based on their color using Arduino and sensors. In this project, we utilize RGB color sensing technology to detect the color of objects and then sort them accordingly. The system employs servo motors to physically sort the objects into different bins based on their detected color.

Working:

The project utilizes a TCS3200 color sensor module, which consists of red, green, and blue filtered photodiodes. These photodiodes detect the intensity of light reflected from the object being sorted. By varying the output frequency of each

photodiode, the sensor can distinguish between different colors.

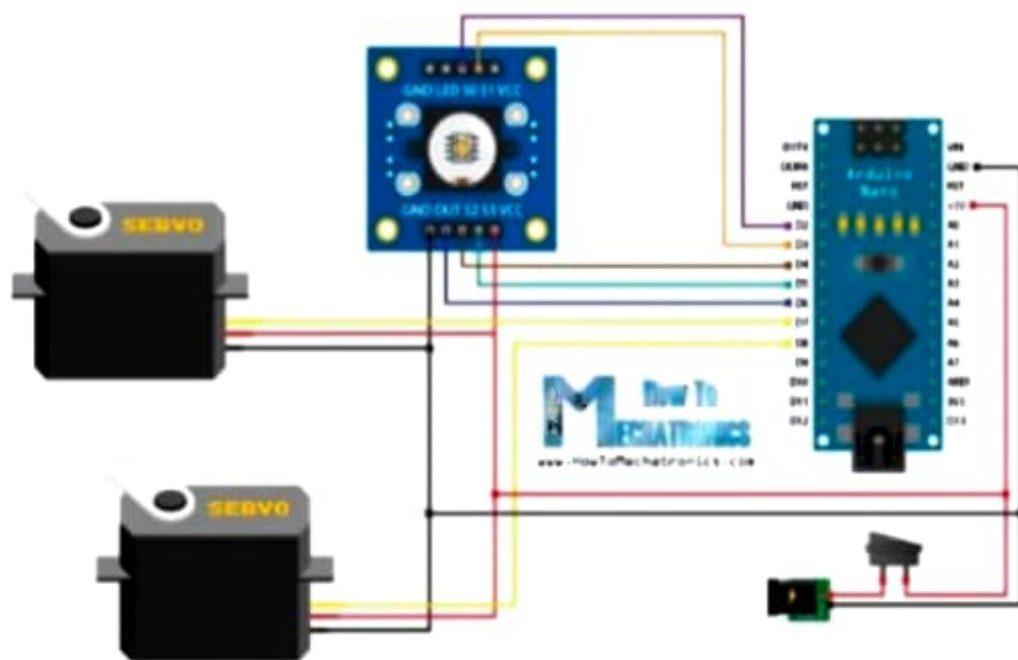
The Arduino board is programmed to control the servo motors that move a sorting mechanism. Such that the gems that enter the range of detection of the colour sensor it senses the color and the second servo motor will change its path to that particular container.

In this particular experiment the colour senses two colours black and white if there are any other colors the second servo motor will change the angle to the default container. The black color has the highest intensity among all other colors and white has the lowest intensity.

Principle:

The principle behind the color sorting system lies in the ability of the TCS3200 color sensor to detect different wavelengths of light reflected from objects. When light falls on an object, its surface absorbs certain wavelengths and reflects others. By analyzing the intensity of reflected light in the red, green, and blue spectra, the sensor can determine the color of the object.

The Arduino microcontroller processes the sensor data and instructs the servo motors to move the sorting mechanism accordingly. This automation allows for efficient and accurate sorting of objects based on their color, demonstrating the practical application of sensor technology and automation in real-world scenarios such as recycling or quality control processes. The code is written in C++ language.



Pictorial representation of connections

Benefits:

- 1. Automation:** The color sorter project automates the process of sorting objects based on color, reducing the need for manual intervention and increasing efficiency.
- 2. Accuracy:** By utilizing precise color sensing technology, the system can accurately detect and sort objects, minimizing errors and inconsistencies.

- 3. Versatility:** This project can be adapted for various applications and industries, such as recycling, agricultural sorting, quality control in manufacturing, and educational purposes.
- 4. Cost-Effectiveness:** Once implemented, the system can operate continuously with minimal maintenance, making it a cost-effective solution for sorting tasks.
- 5. Customization:** The project can be customized to sort objects based on specific color criteria, allowing for flexibility in sorting different types of objects.

APPLICATIONS:

Color sorters are utilized in various industries for separating items based on their color. Here are some applications:

- 1. Food Industry:** Sorting grains, nuts, fruits, and vegetables based on color ensures quality control, removes defects, and enhances product appearance.
- 2. Recycling:** Separating recyclable materials such as plastics, glass, and paper by color aids in efficient recycling processes.
- 3. Pharmaceuticals:** Sorting pills and capsules by color ensures accurate packaging and identification, preventing errors in medication distribution.

4. Plastics Industry: Sorting plastic pellets or flakes by color ensures uniformity in the manufacturing process and facilitates recycling.

5. Mining Industry: Sorting minerals and ores by color helps in separating valuable materials from waste during the extraction process.

6. Textile Industry: Sorting fabrics or yarns by color ensures uniformity in dyeing processes and helps in quality control.

7. Cosmetics Industry: Sorting cosmetic products by color ensures consistent packaging and presentation, maintaining brand aesthetics.

8. Seed Industry: Sorting seeds by color ensures purity, removes impurities, and enhances the quality of agricultural produce.

9. Chemical Industry: Sorting chemicals or compounds by color aids in quality control, ensuring the purity and consistency of products.

10. Waste Management: Sorting waste materials by color helps in recycling efforts and reduces contamination in waste streams.