

1.1 Introduction:-

Objects sorting are widely used in industry, sorting objects according to their weight, material, shape and color. Historically in color sorting techniques the components used for color sensing were considered expensive and require precision support circuitry, limiting their Application mostly to specialized instrumentation. However, new technologies of color sensors with higher levels of integration are becoming available, allowing for more cost-effective solutions.

Industries today are approaching to use color sensor to fulfill their needs for a higher Production and precise quality.

In this project a color sensor and Arduino Uno are combined to make a color sorting robot, to detect RGB colors and sort objects accordingly.

The color sensor has an array of photo detectors, each with either a red, green, or blue filter. The filters of each color are distributed evenly throughout the array to eliminate location bias among the colors.

Arduino Uno is used to control the robot actions according to the detected color. It is a Microcontroller board based on the ATmega328p. The ATmega328p is a single-chip microcontroller created by Atmel in the megaAVR family, it is an 8-bit AVR RISC-based microcontroller.

The applications of this project include recycling, food processing, grain sorting and diamond purity testing. The programming should be successful and information of color sensor and Arduino Uno can be useful to further understand their application. As a result of this, organizations can use this application for students to use in their researches.

1.2 Problem Statement:-

In general, classification process can be done manually or automatically according to mechanism used.

Problems concern with manual classification:

1. The speed of classification process is very slow.
2. The implementation cost is very high.
3. Low efficiency and accuracy.

Automatic sorting can be done by size, weight, volume, color and many other attributes. In the proposed system products have the same size. Thus, sorting objects by size, weight, and volume is not applicable.

1.3 Proposed Solution:-

Automatic classification is used to overcome the problems of manual classification by using a suitable algorithm to classify objects by color attributes.

1.4 Aim and Objectives:-

The aim of this project is to replace the process of manual sorting with automatic sorting.

Objectives:-

1. To design a control circuit for the proposed system.
2. To use a suitable algorithm to sort objects.
3. To simulate the proposed system.
4. To implement hardware.
5. To evaluate performance of the system.

1.5 Methodology:-

To control the system digital controllers like 8051, ATmega16 or Arduino can be used.

In this project Arduino Uno is used because it is a cost-effective controller. It is an open-source prototyping platform based on easy-to-use hardware and software that uses Atmega328p AVR Microcontroller.

Color sensor circuit is used to determine the color of the object, it consists of LDR that its voltage depends on the intensity of the reflected light, and this operation is done according to the distance of a torch from the surface of the LDR. The resultant voltage is an input to the non-inverting terminal of an operational amplifier, which its output is interfaced to one of the ADC channels of Arduino Uno to convert this analog voltage into digital form.

The output of Arduino Uno is interfaced with a motor driver circuit to control the DC motor responsible of the movement of the robot, and also interfaced with two Servo motors responsible for the robot's arm movement. The Arduino Uno is responsible for determining when and which of these motors should operate.

At the beginning the robot picks the object and moves until reaching the container of the specified color and then releases the object and returns to its initial position. This operation is interpreted into a code to control the system.

1.6 Chapters Organization:-

Chapter 1: Provides a general overview about the proposed system.

Chapter 2: Reviews of system components and previous studies.

Chapter3: Represents he proposed system design, interfaces between components and discussion of the results

Chapter 4: Provides a simulation to the proposed system.

Chapter 5: Shows whether the main aim is reached or not, and provides recommendations.