

Automation of Object Sorting Based on Colour

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Abstract: Automation or automatic control, is the use of various control systems for operating equipment such as machinery, processes in factories, boilers and heat treating ovens, etc. The paper presents sorting of object using microcontroller based on color.

Keywords: Automation, sorting, colour sensors, microcontrollers

1. INTRODUCTION

Automation has been achieved by various means including mechanical, hydraulic, pneumatic, electrical, electronic devices and computers, usually in combination. The benefits of automation [1] include labor savings, savings in electricity costs, savings in material costs, and improvements to quality, accuracy and precision

In the existing system the objects are sorted manually mostly by human beings. This creates a tendency for human errors to come into account and thus result in the work going wrong. If objects or parts in industries are not sorted correctly, then there is a high chance of huge chaos and the final product being defective.

2. REVIEW OF LITERATURE

For many packaging industries, color object counting and sorting is the main job that needs to be completed. Traditionally, the item sorting process was performed by the manually. However, this method has some disadvantages such as increase in the cost of the product, slow, and inaccuracy due to the human mistake.

Nowadays, the competition is so intense that the efficiency of the product is regarded as the key to success. The efficiency of the product includes the speed of the production, lowering material and labour cost, improving quality and decreasing the rejection. Taking into account all the issues this project is being built which is very useful for the industries. This project is aimed at obtaining fully automatic material handling system. This is achieved using microcontroller machine. This device synchronizes the robotic arm 's movement to select the moveable objects on the conveyor belt.

3. PROPOSED SYSTEM

An automated sorting system has primary task of sorting components by number. It also consists of conveyor belt which reduces material handling efforts. These procedures also take place concurrently, viz. handling and testing of materials [2]. The figure below shows the block diagram for the proposed program.

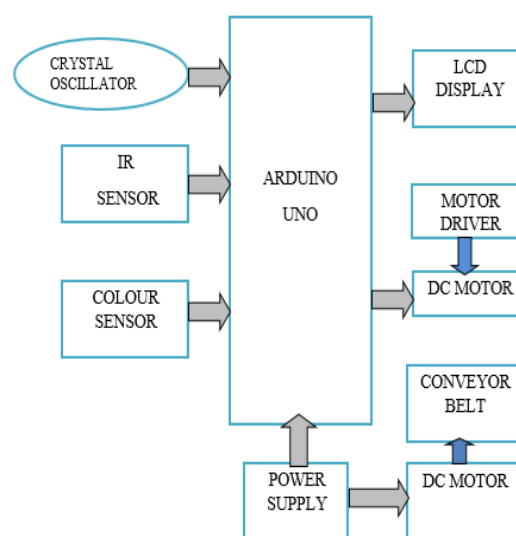


Figure 1: Block diagram for object sorting

As the DC motor (12V, 3.5rpm) receives a 3.4V supply it starts spinning. It will monitor the conveyor belt movement on which the product is placed. When an object exists, the sensor generates an output frequency that is proportional to the object's color. Therefore, when red filter is chosen, the sensor gives maximum frequency for red objects, and similarly other colored objects[3] are also sensed by corresponding filters.

As the light falls on the object the color sensor is reflected back. As stated earlier, the TCS2300 color sensor has 4 color filters for green, red, blue and black (no colour), which is chosen by its selected pins. The software stored inside the microcontroller selects filters. Frequency output from the color sensor depends on the object's color, as well as the microcontroller's select pin configuration information. Select pin can choose one of the four photo diode[4] filters that can provide output according to the object's color.

If an object exists, the sensor generates an output frequency proportional to the color of the object and the

configuration of the selected photo diode in such a way that the respective photo diode is given maximum frequency for the respective color. Therefore, when red filter is chosen, the sensor gives maximum frequency for red objects, and similarly other colored objects are also sensed by corresponding filters. Frequency obtained during each filter selection is counted[5] and stored in separate registers and these values are analyzed to use the larger one to describe the object's color.

The second and third DC motors are used to control the gateway of the particular color object. If placed object is red, the color sensor sense the color of the object and it sends the signal to the microcontroller and display the name RED ITEM with the help of the LCD Display. In our project, red object go straight ,blue drop the left side and green object drop the right side with the help of the gateways. The products will finally fall to the corresponding sections in the container.

Then the IR sensor sense how many objects moved on the conveyer belt and it sends the signal to the microcontroller. At the last displays the total number of object moved on the conveyer belt with the help of the LCD display unit. Once the power up dc motor starts, moving the conveyer belt so that the objects on the conveyer belts also starts moving. Color sensor starts sensing the objects which are moving on conveyer belt. Then the sensed signal sends to the display unit via Arduino for displaying the color of the object.

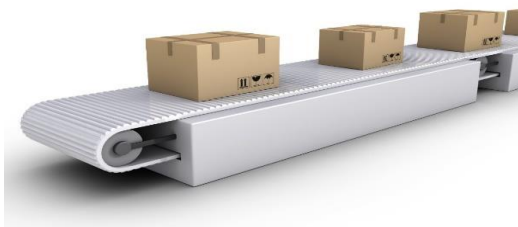


Figure 2: Conveyer belt

For this project the Arduino UN0 microcontroller is used to monitor motion and detect objects. The microcontroller operates on collection of preprogrammed and stored instructions in the memory. This then takes the instructions and one by one from its programme.

4. RESULT & DISCUSION

The paper presents design, development of the sorting object. Using microcontroller Arduino UN0 the objects are sorted as per the color. The color detection is identified by the color sensor. The sensed signal is sent to a microcontroller unit and sent to 16x2 LCD display for displaying the color of the sensed object. Here IR sensor is used for counting the number of objects which are moved on the conveyer belt that count value is also displayed on the LCD.

In this, objects of 3 colors red, blue and green are chosen for demonstration purpose. The system output is displayed on the LCD display i.e name of the project - automatic color sorting, color of the object- red or blue or green and final count of the objects – item number which are sorted.



Figure 3: LCD Display

Above figure shows final result displayed on the LCD display of count value of the objects which are passed on the conveyor belt.

5. CONCLUSION

It is very useful with the help of color sensor and conveyor belt in large varieties of industries, particularly in the packaging sector. Automatic sorting machine[6] increases operator performance, practicality and health. This guarantees exceptional processing power and peerless efficiency including color detection. We will of course add high speed DC motors and sensors.

object sorting system using embedded system are an embedded system approach for object color detection and object sorting can be successfully implemented. Due to use of embedded system for color determination, manual efforts are reduced which produces result in improving accuracy as well as saves money and time.

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