

Material Segregation Using Plc And Arduino

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Abstract- This paper presents a similar but simplified system which will sort the objects according to different parameters such as color using simple PLC, Arduino UNO and TCS 3200 color sensor .for that we have developed a LCA (Low Cost Automation) system to sort boxes of different color and weight. We have used motors for this LCA system. This low cost automation system is controlled by Programmable Logic Controller (PLC). TCS 3200 Sensor are used to sense the color of boxes and actuate the respective motors for sorting. This box sorting system is very much useful in packing industries.

Keywords- PLC, Arduino, TCS 3200 color sensor, DC motors, Proximity Sensors.

I. INTRODUCTION

Determining real time and highly accurate characteristics of small objects in a fast flowing stream would open new directions for industrial sorting processes. The proposed selection process is based on a multisensory characterization is useful in the industries for the sorting application. Which reduces man power and saves time and it is highly efficient.

II. PROPOSAL WORK

This proposed system gives the efficient way of automatically sorted material using color and weight directing the products in the convenient conveyor using plc for high reliability and fast operation without delay. It consists of hardware and software modules, giving more efficiency in less cost.

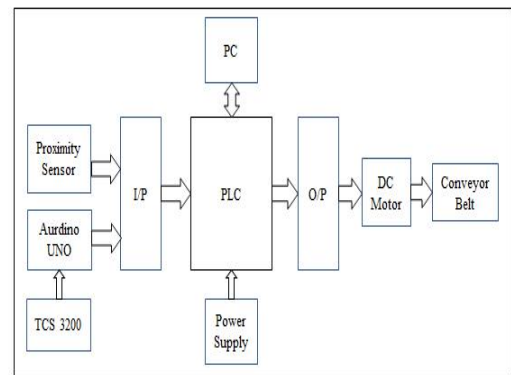
III. SYSTEM ARCHITECTURE

3.1 BLOCK DIAGRAM:

Process consists of a conveyer belt driven by a small DC geared motor. The belt conveyers are mounted in such a way that the object mounted on the first conveyer will fall on the second conveyer. To sense the object proximity sensors are mounted at various points.

In this system the color of the material or object is detected by the color sensor TCS 3200 and it gives output to the Arduino UNO which is integrated with PLC. Also 3 proximity sensors which are connected to PLC are used in front of different color containers like Red, Green and Blue. After detection of proper color the hardware section containing motor or pneumatic piston(according to application) pushes the material on the container of appropriate color section and which feeds the material to the other part where the conveyor to different units are connected.[3]

BLOCK DIAGRAM



The main components of the system consist of many subparts, which are as follow;

3.2 Color Sensor TCS 3200:

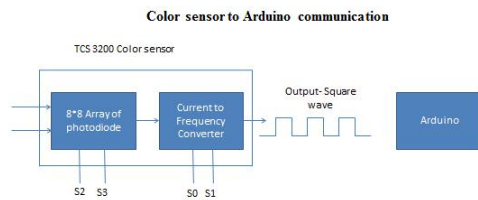
The TCS3200 programmable color light-to-frequency converters that combine configurable silicon photodiodes and a current-to-frequency converter on a single monolithic CMOS integrated circuit. The frequency directly proportional to light intensity (irradiance).

The color sensor consists grid of 8*8 array of photodiodes, sixteen photodiodes have blue filters, 16 photodiodes have green filters, 16 photodiodes have red filters, and 16 photodiodes are clear with no filters.

The full-scale output frequency can be scaled by one of three preset values via two control input pins. Digital inputs and digital output allow direct interface to a microcontroller or

other logic circuitry. Output enable (OE) places the output in the high-impedance state for multiple-unit sharing of a microcontroller input line.

[5]



S3	S2	Photodiode Type
L	L	RED
L	H	BLUE
H	L	CLEAR(No Color)
H	H	GREEN

S0	S1	OUTPUT FREQUENCY SCALING
L	L	POWER DOWN
L	H	2%
H	L	20%
H	H	100%

3.3 PLC:

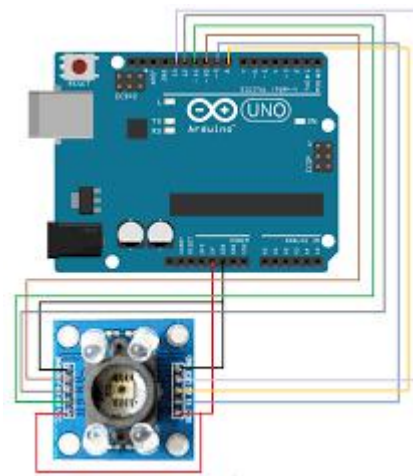
The term ‘programmable logic controller’ is defined as a digitally operating controller uses the specific functions like logic, sequencing, timing, counting and arithmetic through digital and analog inputs and outputs. PLC is advance version of conventional based relay logic system and also have extended logic capabilities.

Operation of PLC consists of 3 important steps as,

- a) Analyzing the input status
- b) Execution of the program
- c) Updating the output status.

3.4 ARDUINO UNO:

The Arduino Uno is a microcontroller board based on the ATmega328 used for the programming and interfacing with the color sensor for colors sensed by the TCS3200 according to the intensity of light. PLC cannot be operated on the frequencies given by color sensor so Arduino is interfaced with the PLC in order to recognise the color with the help of suitable programming.[4]



IV. OBJECTIVES

1. The segregation of product into different workstations is the aim of this project.
2. The main objective of this system is to segregate different materials according to color, weight.
3. In various industries sorting of the material is done manually and it requires lot of time and human efforts. This system helps to reduce man-power and time.

V. CONCLUSION

This project is integration of two technologies widely used in industries lead to many new features like acquiring data at faster rate and controlling the industrial parameters accurately and many other features. It is very hard to segregate material using man-power as it consumes lot more time and requires lot of efforts. By using Arduino and PLC combination its easy to detect the material and control the parameter according to our application in industries. Hence in order to achieve desired system, Arduino is integrated with PLC and efficient control of Industrial parameters are achieved.

VI. FUTURE ENHANCEMENT

This system can be improved by using pneumatic system as single acting pistons replaces geared motor sorting for more efficiency.

VII. ACKNOWLEDGEMENTS

We have great pleasure in presenting our paper title, “Material Segregation using PLC and Arduino” We would like to express our sincere and whole hearted thanks to our guide Prof. S.C Rajgade our project coordinators. We are extremely obliged for his guidance received time to time during this project.

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Data sheet