International Journal of Advance Research in Science and Engineering
Volume No.07, Special Issue No.03, April 2018
www.ijarse.com
IJARSE
ISSN: 2319-8354

INTELLIGENT SEGREGATION SYSTEM

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ABSTRACT

In manufacturing industries, there arises a need to sort objects. The objects may be of similar or different types. The system should be able to detect the objects and then differentiate the objects from each other based on their properties. Objects may have different shapes or different colors. The objects may be of same shape and same color but different texture. Thus, different objects and different conditions require different type of processing. Our aim is to classify objects using different image processing algorithms on the parameters like color, shape. The report presents development and design of automatic color object sorting system. The proposed system is low cost, low power. The object sorting using flipper based on color and shape detection is designed and implemented. The object is sensed using IR sensor on conveyor belt. Furthermore, the flipper is used to sort object on conveyor belt. Existing sorting method uses a set of different capacitive, inductive, and optical sensors to differentiate object color and the object is sorted by robotic arm. In the proposed system a mechatronics color sorting system is developed with the image processing technique. Image processing technique senses the objects captured in real-time by a webcam and then identifies color and information out of it. This information is processed by image processing technique for sorting mechanism. Based upon the detection, the flipper moves to the specified direction, slides the object and comes back to the original position. So, the proposed system will eliminate the monotonous work done by human and provides greater accuracy and speed in the work.

Keywords: color and shape detection, flipper, IR sensor, webcam.

I. INTRODUCTION

In fast growing industries every industrial unit needs speed in manufacturing. Robotics has found a wide application in industries. Automation provides far better service to customers eliminating the monotonous work by human, achieving accuracy and speed in work. In the previous system the camera is interfaced with raspberry pi to detect the object based on color and robotic arm is interfaced arduino to sort object. In day to day life industrial processing requirement is becomes faster with more accuracy. There should be such automatic decision making system which takes decision itself by which the accuracy of an industrial product will increase and minimum time required making products of bulk amount. In proposed system the using webcam the objects are detected and sorted based on color and additional property shape. Keeping in view the techniques developed for object recognition MATLAB has the most powerful tool box for image improving, enhancing and categorizing different images using different features such as color, dimensions and texture of the object.

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II.BLOCK DIAGRAM

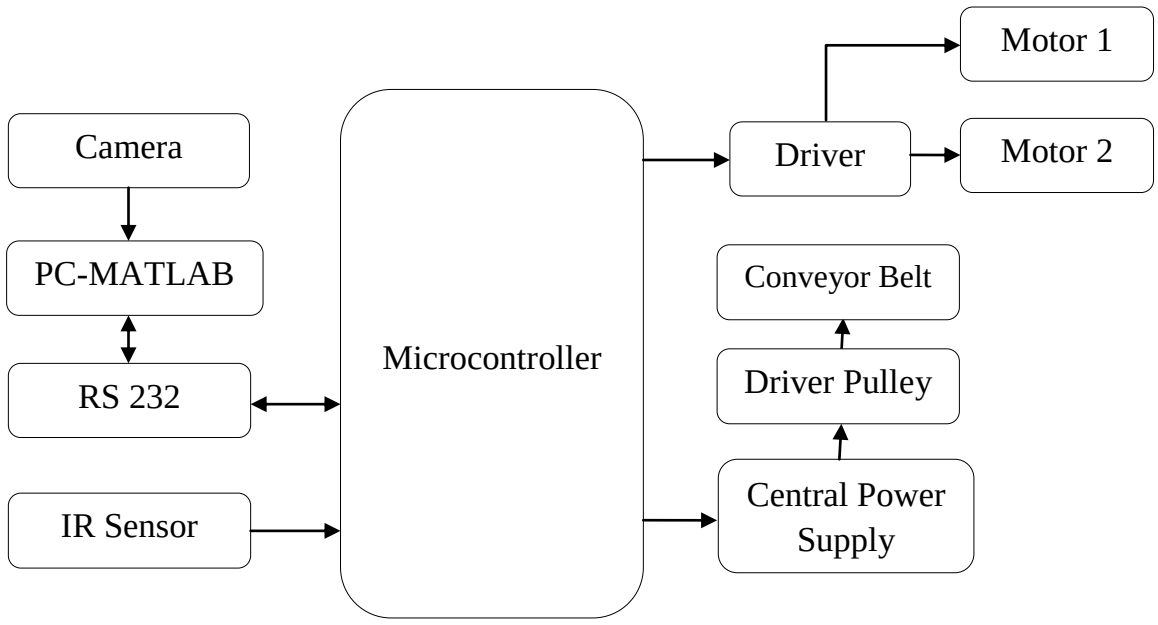

Fig.1 Block Diagram of Intelligent Segregation System

III. PROPOSED SYSTEM

In proposed system there are various key elements. The central power supply drives the motors of conveyor. The system taken input from IR sensor which detects the object drives the microcontroller. Microcontroller send signal to camera through TTL signal by which camera turns ON and captures the object on conveyor belt. The image of an object is fed into PC. PC having MATLAB software which processes the image. Image is processed and identified with the help of two properties that are shape and color. The particular shape of colored object is sorted according to the MATLAB signal given to microcontroller. The microcontroller drives the flipper motor to sort the object.

IV.SYSTEM COMPONENTS

1. PIC Microcontroller

The PIC18F4520 is the major block of this system which is an 8 bit controller has 40 pin. It consists of high performance RISC CPU. Also, the self-reprogrammable software. Only 35 single-word instructions to learn and 20MHz clock input is used, Up to 8K x 14 words of Flash Program Memory can be used. It has an inbuilt 8-channel ADC. Port A and E are multi functionality ports which can be used for I/O. PIC8xxxA series controller is highly available and very cost efficient. Wide Operating Voltage Range (2.0Vto 5.5V) and low power consumption.

2. Camera

Web camera is used to capture images of colored objects. These images are used by MATLAB for detection of object's color and its shape according to that objects gets sorted. Camera simply interfaced with pc or laptop. It is VGA camera which captures image of 480p.

3. MATLAB

The robot system describes a visual sensor system used in the field of robotics for identification and tracking of objects. The program designed to detect and capture an object through PC based camera using MATLAB software. It describes image processing technique, followed by an introduction to actual robotic application to track the object using serial COM port of the computer. The whole system of making a robot to follow object can divide into four blocks: image acquisition, processing image, decision-making, and motion control. Acquisition can be achieved with a computer-based camera or digital video camera. This device will capture the image and send it to the processor for further processing in the computer. Decision making is done with help of software program.

4. DC Motor

DC motors are generally more powerful than servos in terms of speed and torque. Microcontroller could not accurately control DC motors without a motor controller. Therefore, motor Controllers are needed. An encoder used to get feedback from the DC motor. For this system 3 DC motors are used of which 2 are used for conveyor belt and 1 used for flipper. The DC motors is of 12V and 1A. The L293D driver is used to drive the dc motors. The dc motors are bipolar in nature.

5. IR Sensor

IR Sensors work by using a specific light sensor to detect a select light wavelength in the Infra-Red (IR) spectrum. By using an LED which produces light at the same wavelength as what the sensor is looking for, you can look at the intensity of the received light. When an object is close to the sensor, the light from the LED bounces off the object and into the light sensor. This results in a large jump in the intensity, which we already know can be detected using a threshold.

V. FLOW OF SYSTEM

1. Initialize Microcontroller, camera, motors.
2. The camera continuously detecting the object.
3. If an object is detected then the image is captured & image processing is performed in MATLAB.
4. It gives the information about its shape & color.
5. According to this information flipper is rotated.
6. This flipper rotates in clockwise and counter clockwise direction to sort the object.
7. If there is another shape object then goes to step number 3.
8. Otherwise, Stop.

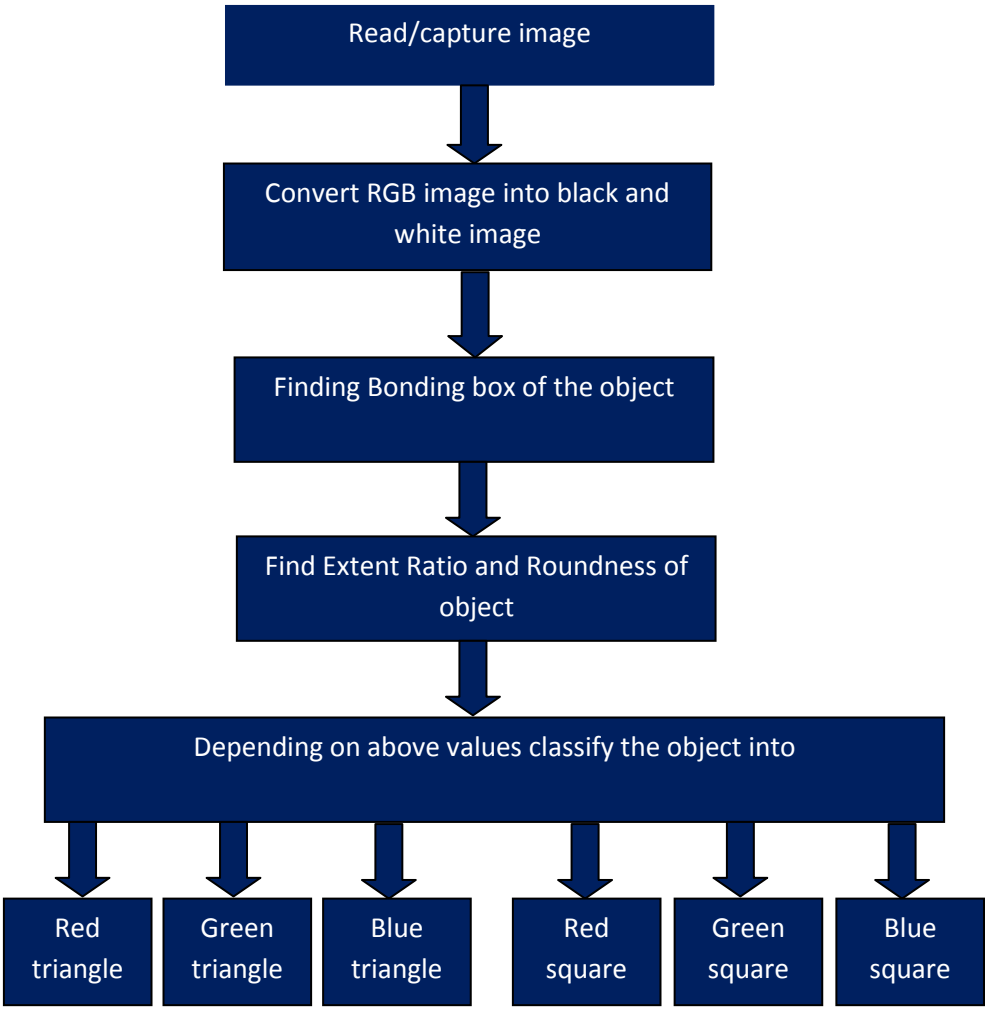

Fig.2 Flow of System

VI.ADVANTAGES

1. High precision.
2. High accuracy.
3. Time-saving than the manual method.
4. It gives a high degree of intelligence if used with PLC control.
5. Good quality level.
6. The low failure rate with long life.

VII.APPLICATIONS

1. In small scale or large scale industries to sort out products based on the shape.
2. In chocolate manufacturing industries.
3. In malls and small shops.

4. In various industries to sort the bottles or boxes or bags of various sizes such as medicine and wine industry.

VIII. CONCLUSION

According to this review paper, we have concluded that by using image processing application we can easily sort out different shape objects from each other like a square, triangle, circle. By using this system time required for sorting objects from the each other decreases than conventional separation system. It is also helpful to minimize labor cost, time and power. It is very useful for large-scale industries. It improves the accuracy.

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