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Colour Detection of an Object in an Assembly Line

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***Abstract*— Nowadays, vision systems are used in many things to run the industries error free with great accuracy, and for that, image processing is one of the keys that is used in this paper. This paper focuses on product differentiation using the colour detection method in real time with the help of MATLAB software. First task is to take snapshot from the web cam and convert that RGB image into HSV image, in this HSV image plays a vital role in colour description as it makes easier, they need luminous of the image. Threshold value of HSV used for differentiating colour, after applying the threshold values some of the corrections are done for avoiding any kind of error like erosion, dilution and holes.**

***Keywords*—** Image Processing, Colour Detection, MATLAB

I. INTRODUCTION

Nowadays, vision systems are used in many things to run the industries error free with accurately and precisely. Object detection used where the sorting process is done like in food industries, packaging industries etc. on the basis of shape, size and colour. Their objective is to detect the objects on the bases of colour and used this method in pick and place industrial robot. Web cam provide the input to the MATLAB. In the process of colour detection MATLAB 2021a is used for implementation and show simulation to detect different types of objects by colour. The image is first read. A thresholding procedure is employed, which entails comparing each pixel value to a pre- determined threshold value [4]. When the threshold value is lower than the pixel value, a value of "1" is assigned to represent white, and a value of "0" is allocated to represent black.

S. Kazemiet al. [1] work is on pick and place robots with the MATLAB software, in which different shapes and colours are recognized with the use of PLC7035 and HMI. They detect the object within 0.5 s and work on it. Their main focus is to improve the accuracy and process time of the pick and place robot whereas L. Chen et al. [2] present the idea of an intelligent robot with applications of gesture remote, abnormal entry control, and moving target to make the robot arm more flexible and safer with efficiency. Despite that K. Thiyagarajanet al [3] presents the algorithm of cross correlation in which using WEB cam some logo will be detected and give the signal according to the arduino and the received signal is given to the PLC for bottle filling on the conveyor belt. T. Jrgensen et al. [4], work on deformable objects using a light scanner to capture the point cloud of the object for performing the action of picking and placing the object. A. Ragunandan et al. [5] present the concept of skin, face, and target detection with an accuracy of 95% for video surveillance applications. A.P. Dubey et al. [6] concentrated on controlling the 4 DOF robot with the HMI by designing their own HMI system with the TIA portal V12. They found the system reliable, efficient, and user-friendly. Angeles et al. [7] study the challenges for developing fast pick and place robots. Finding all the

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forward kinematics solutions is one of the main challenges, and this is hard to overcome by mounting two actuators on the limb. F. Dai et al. [8] present a PLCopen-based approach in which basic robot knowledge is required to operate it. The PLC open commands are saved in two queues: one on the PLC and one on the robot controller. P.D. Lalwani et al. [9] this paper works on the idea of safety techniques with integration of ultrasonic sensors with Kollmorgan PLC for stopping motion axis of robot without connecting sensor to controller.

II. Methodology

The objective was to create an automated industrial system that could be controlled from any location and at any time. An object is detect using WEB CAM camera and that detection is work with MATLAB which help in differentiate colour. RGB image is converted into HSV image for better results. The HSV threshold value is used for detecting the different colours by comparing the range between the two threshold values, that is, the least threshold value and the highest threshold value. After setting the range, the particular colour is extracted from the image.

Some of the steps involved in extracting specific colours from a real-time image.

Algorithm:

1. Web cam is interfaced with MATLAB
2. Snapshot of objects are captured by camera.
3. Captured image is converted to HSV (Hue Saturation Value) image from RGB.
4. Threshold value of HSV image is used for differentiating the colour.
5. Correct image for avoiding error in detecting the object.

III. Result And Discussion

Figure 1 depicts the actual image in the experiments, whereas Figure 2, depicts a snapshot of a live camera that overlays the red and green using MATLAB code with accuracy of 98% and detect the object in less than 0.5s. This colour detection information can be send to any system for operating automatically.

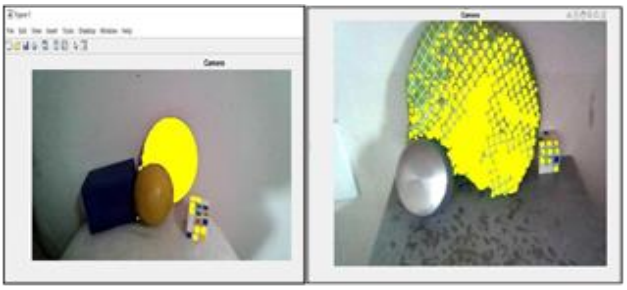

Figure 1: Objects for Detection

Figure 2: Snapshot from live cam for detecting red and green colour

V. Conclusion

This makes use of simulation to comprehend the operation of MATLAB-based vision equipment. The visual system of the robot is created using MATLAB programming and a web camera. After detecting the object's presence and determining its properties, MATLAB offers the simulation result that can be used in many automation industries in less than 0.5 seconds.

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