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## Machine Vision System

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### ABSTRACT

Nowadays various automation techniques are being adopted & researched on for increase in productivity, for better accuracy, eliminating the human errors and for safety. Machine Vision is one such advancement in automatic systems. Machine vision performs the tasks that are equivalent to human vision. It helps to automate the systems where there are limitations of human vision like detecting various shades of colors or determining high precise dimensions and thus permitting human employees to serve in more appropriate positions. Now, what happens when the questions turn to "Is this part of correct color?" or "Which parts are blue and which red?" So in our system, color based identification of the parts will be done and then it will be sorted according to different colors. After recognizing the color of the object, robotic arm will automatically pick & place it accordingly. If the color of the work piece is not found in accordance to the required one then it will be rejected. The complete sorting system operates on image processing using the MATLAB application & microprocessor which will control different motors in the system. Machine vision based on color concept has found its wide application in the pharmaceuticals industry, agriculture industry and assembly of parts especially in automobile industry. Advances in both machine vision technology and related software tools have enabled manufacturers to apply color machine vision on the factory floor in real time. This technology can solve problems formerly restricted to manual inspections & sorting.

### I. INTRODUCTION

#### A. History

Till now the product inspection monitoring system is only analog, if the product is faulty it may miss by the human eye. Production process is fully automated in the automobiles industries is also made digital it will help to make the exact quantity of product. The above fact is considered in our project and we found out a Solution for finding the quality of

product digitally. Here, we are checking the faulty product from the production line. Until now the exact measuring of the quality was not a big deal, because of low level production. Instead of accuracy and quality of the most important things have been to avoided.

#### a. 1st phase

Primary phase:

Firstly, for the comparison of images we have to save the reference image in the processor memory. For that adequate image of product with 5 MP resolution saved in the processor.

### b. 2<sup>nd</sup> phase

#### Image Capturing

Camera which is connected to processor capture image on the production line. For simplicity we use conveyor belt only. Camera capture the image and send to the processor.

### c. 3<sup>rd</sup> phase

#### Processing of Image:

For the processing of image we used the DSP processor. Which basically compare the save image with the captured image and gives result. Image comparison is

### d. 4<sup>th</sup> phase

#### Pneumatic cylinder

If the product is good the then it will pass with the help of conveyor. But if the product is faulty then with the help of pneumatic cylinder it will be thought out of conveyor.

## II. Literature Survey

Paper[1] shows that it implemented the machine orientation of the automated system in the industry. It has published in 2004 by Dawson & Melikian.

Paper [2] shows the process of the fruits and vegetable in automated industry It was published in 2001 by F Pla, JM Sanchiz, JS Sanchez

Paper [3] proposed that the sorting of agricultural good by the machine vision system. It was published by Raji,Almantu in 2005.

Paper [4] proposed Automation, Processing in manufacturing industry .It is related to the integrated automation of the industry.

Table 1- Literature Survey

Sr.no.	Paper name	Author name	year	Work done
1	Applying Machine Vision to Verification	Dawson & Melikian	2004	Machine Orientation
2	An integral automation of industrial fruit and vegetable sorting by machine vision	F Pla, JM Sanchiz, JS Sanchez	2001	Industrial fruit and vegetable sorting
3	Prospects of computer vision automated sorting systems in agricultural process operations	Raji, Alamutu	2005	Sorting of Agricultural goods
4	Automation, Production System, And Computer-Integrated Manufacturing	Mikell P. Groover	2007	Automated computer integrated system

## IV. Block Diagram

Today in this digitized world, if the product inspection is made digitally it will increase the capacity of production with the precise accuracy. The above furnished fact is considered in our project and we found out a proper solution for increasing the accuracy of the products in the production line of an Industry digitally. Here, we are increasing the accuracy which is not detected by human eye. Various other features like the conveyor speed control and pneumatic cylinder for thronging out the product used in the project.

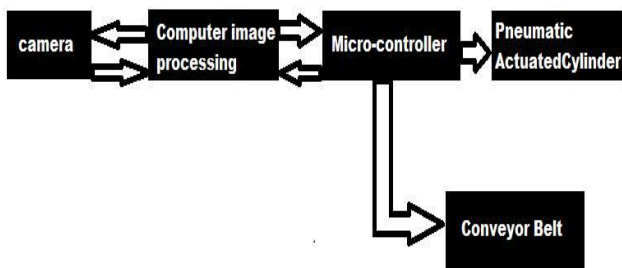


Fig.1: Block Diagram

**A. Camera-**

It will capture the image of object when signal is given to it by computer. We are using simple USB web camera. So Interfacing will become easy with computers.

**Specifications**

- Image resolution: 320x240 640x480
- Frame rate: upto 30 frames per second
- Camera Controls: Color saturation, brightness, sharpness is adjustable
- Exposure: Auto or manual

**B. Conveyor belt**

Conveyor belt is nothing but the mechanical apparatus consisting of a continuous moving belt that transports materials or packages from one place to another. Conveyor belts are often driven by variable speed electric motors or by other moving parts in a complex system. They are commonly found in factories, grocery stores, warehouses and public transportation centers.

**C. LCD display-** The liquid crystal display is of 16\*2 size with indication of fuel level in liter form along with average and critical level indication. The display is LCD type as it gives better contraction with respect to circuitry and brightness. The LCD is connected to arduino kit.

**D. Processor (DSP)-**

A microprocessor (also DSP) is a small computer on a single integrated circuit consisting of a relatively simple CPU combined with support functions such as a crystal oscillator, timers, watchdog timer, serial and analog I/O etc. Program memory is also often included on chip, as well as a typically small amount of RAM. DSP are designed for small or dedicated image processing applications. Thus, in contrast to the microprocessors used in personal computers and other high-performance or general purpose applications, simplicity is emphasized.

**E. Pneumatic cylinder -**

The pneumatic cylinder is basically activated by the processor after the result of image comparison. Pneumatic cylinder work on the principle of the shocking and activating. It will through the product out of conveyor.

**V. Algorithm-**

1. Start
2. Initialize the system
3. Activate the Camera
4. Start conveyor belt
5. Capture image
6. Compare image with reference image (4 images)
7. If image is faulty the activate the Pneumatic cylinder
8. Otherwise product forwarded through the conveyor
9. Continue the process
10. Stop

## VI. Flow chart:-

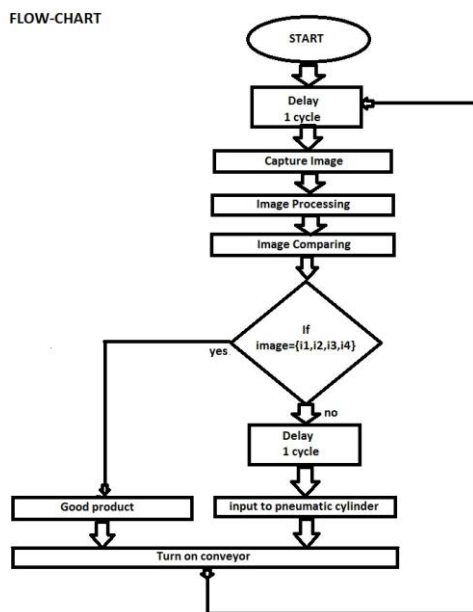
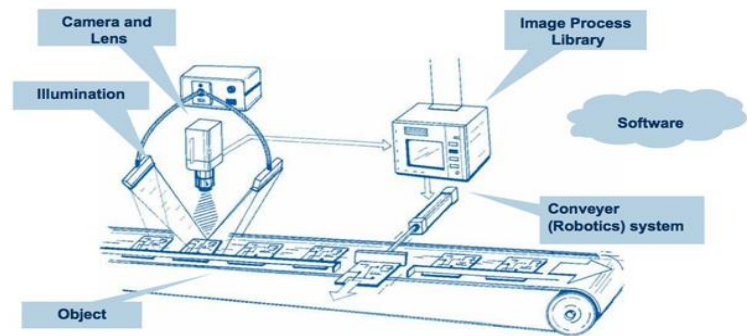


Fig.2: Flow Chart

## VII. Result:-

Initially when product is on the conveyor belt, Sensor will detect the presence of the particular product & give signal to the microcontroller. Image processing software (Matlab) of the system will send the signal to the camera for capturing the image. Once image is captured, the software compare the captured image with the four stored images & if the captured image is similar to any one of the four stored images, then the particular product is selected. And if the captured image is not similar to any one of the four stored images, then the particular product is thrown out from the conveyor belt with the help of pneumatic cylinder, thus the particular product is rejected. This cycle will be repeated number of times as per requirement.



## VIII. Conclusions:-

An innovative system using DSP processor board is used for digitalization of production line and advancement in the industrial automation. The system functionality is cheap, reliable and user friendly hence forth we conclude that the machine vision system in production industry with great future scope and with more advancement it can simplify the human life.

## IX. References:-

- [1]An integral automation of industrial fruit and vegetable sorting by machine vision  
By F Pla, JM Sanchiz, JS Sanchez - Proc. 8th IEEE International Conference on Emerging 2001
- [2]Prospects of computer vision automated sorting systems in agricultural process operations By AO Raji, AO Alamutu - ...  
Engineering International: the CIGR Journal of journals.sfu.ca
- [3][www.avrfreaks.net](http://www.avrfreaks.net)
- [4][www.edaboard.com](http://www.edaboard.com)
- [5][www.atmel.com](http://www.atmel.com)
- [6][www.seattlerobotics.org](http://www.seattlerobotics.org)
- [7][www.societyofrobots.com](http://www.societyofrobots.com)
- [8][www.lvr.com](http://www.lvr.com)
- [9][www.mathworks.com](http://www.mathworks.com)
- [10]Automation, Production System, And Computer-Integrated manufacturing. By Mikell P. Groover

