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ASSESSMENT OF FRUIT FRESHNESS USING DIP

B. Bharathi[1], Dr. S. Senthil Rani[2], Dr. B. Ashok Kumar[3]

Student[1], Assistant Professor[2,3]

Department of Electrical and Electronics Engineering[1,2,3]

Velammal College of Engineering and Technology[1,2]

Thiagarajar College of Engineering[3]

Place: Madurai.

Email Id: itzbharathib@gmail.com[1], ssr@vcet.ac.in[2], ashokudt@tce.edu[3]

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Abstract:

The good source of food are fruits and it is host for microorganisms also. Decayed fruits create serious health issues. During imports and exports or during their storage in companies and markets economic problem arises. By using fruit size and colour as input parameter, the freshness of fruit can be extracted using DIP. Freshness of fruit can be accurately predicted by using the image pixels. Only by manual inspection method the freshness of fruit was detected. The proposed system uses image processing to store the characteristics of fruit and also gas sensor used to detect the harmful gas sprayed on the fruit. This paper presents the basic concepts and technologies that are associated with computer vision system and automatic vision based technology, tools used in image analysis and automated inspection..

Keywords — **Digital Image Processing, image pixels, RGB, Gas Sensor, Non-destructive quality assessment.**

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I. INTRODUCTION:

Fruit plays a vital role in human survival. When we buy the fruit, we want check the freshness criteria since the fruits freshness availability period is short. India's diverse climate ensures availability of all varieties of fresh fruits. It ranks second in fruits production in the world. Slow agricultural growth is main concern for Indian farmers Majority of people struggles on daily basis for fruit, due to preservation of fruits and use of chemicals to artificially increase the time span of fruit that cause illness to people.

It has been proposed the image processing technique using Raspberry pi 0W is very complex and its storage capacity is very low and the system requires high resolution camera [1].

In [2] a smart sensor plate developed to detect the freshness of household items like meat, cooked items.

Gas sensor to detect only gas leak or other emission automatically has been highlighted in [3].

PH Sensor and Moisture Sensor are developed to identify the food freshness which is a smart food freshness detector [4].

According the principle of measurement of ion concentration charge of fruits and vegetables, a freshness sensor is developed to detect the freshness of food that has been explained in [5].

In [6] they used oxygen and carbon dioxide concentration system based on RFID to estimate the food freshness

.In the proposed system, whenever the fruit is being picked, it should be passed through the conveyor belt. A camera with a video processing followed by an embedded system is used to identify the colour of the fruit. The system is trained initially with a set of images defined as the reference images. While execution, real images are compared with the reference images. The fruit freshness detection is based on its colour with the help of DIP.

Gas sensor is used for the detection of any harmful gases that is sprayed on the fruit and display the complete freshness status of fruit. This frame work is to create automated fruit quality detection system in order to reduce the man power, processing time of the fruit grading industry.

II. PROPOSED SYSTEM

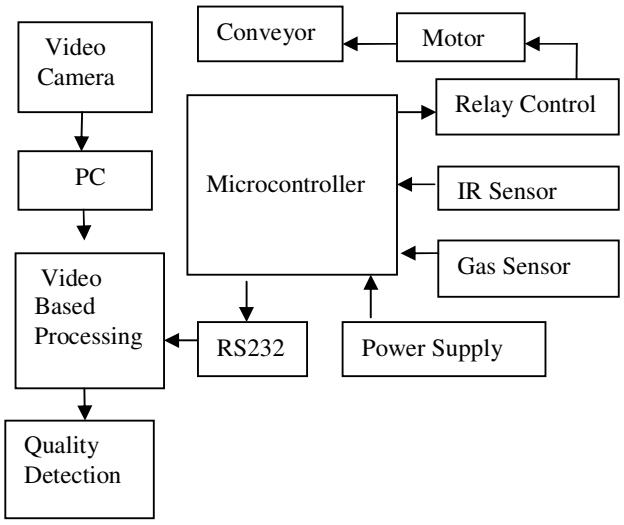


Fig 1: Over all block diagram

A) Microcontroller:

Arduino UNO is used as a microcontroller. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C+

B) Video Camera:

High Quality CMOS Image Sensor with Image Resolution of 2.5 Mega Pixels is used for Image Control i.e., Colour saturation, Brightness, Sharpness and Contrast. The lens used are f=6.0, f=0.2 and Anti –Flicker of 50Hz, 60Hz or out door. Image Quality is about RGB24 or 1420 and Focus Range is 4cm or infinity, consisting a Frame Rate of 30 fps. The exposure may be either Auto or Manual. With the help of Video Camera the rotation of the fruit is recorded when it hits the stopper. The recorded video then converted into multiple images.

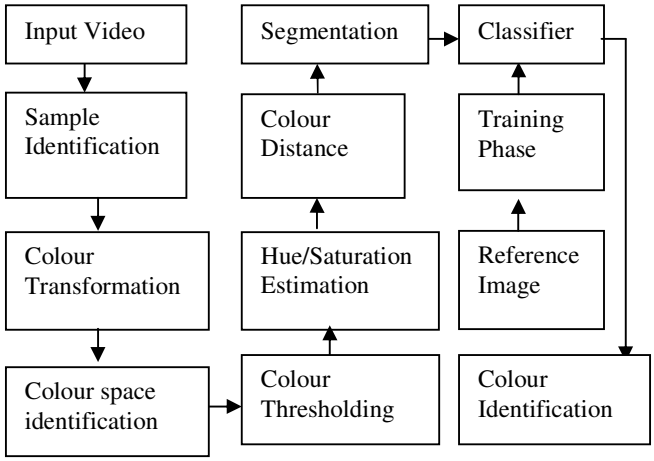


Fig2: Image Based Analysis for Fruit Freshness

C) Gas Sensor:

This device is used to detect any gases that are sprayed in such fruit. It can automatically sense gas leakage or other emission and also detects many gases that are harmful to human life. If any gas is identified then LED is Turned ON otherwise it is in OFF condition.

D) IR Sensor:

IR Sensor is used for different applications. In Proximity Sensor IR technology is used to detect a near object. It consists of IR Transmitter and IR Receiver. IR Transmitter as LED and IR Receiver as Photo Diode. Whenever the radiation from IR Transmitter reaches the object is reflected back and it is detected by the IR Receiver, variation in the output voltage is used to detect the presence of the object.

III. DIGITAL IMAGE PROCESSING:

The concept of Digital Image Processing plays a vital role in this system. Computer Algorithms are used to perform Image Processing.

A) Image Capturing:

Input video is made by the video camera then it is converted into Image Frame from which the Sample Image can be identified. By using LAB Colour transformation RGB Equalization or Colour Equalization is obtained.

B) Image Segmentation:

A region based segmentation scheme is used to differentiate the signals. On the basis of Hue/Saturation Estimation the relative and non relative areas are segregated.

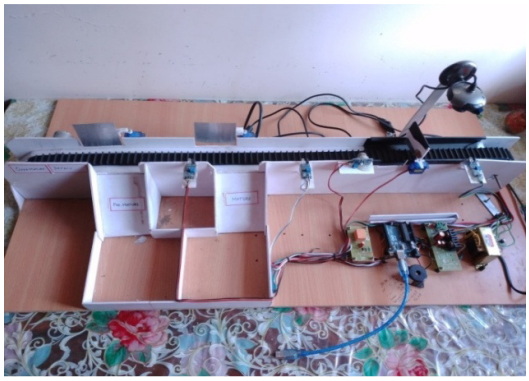
C) Feature Extraction:

In this phase K Means Clustering is used to classify the similarity patterns from the segmented images. To get the object image gray scale conversion, back ground subtraction using colour and size, dilation and erosion were made.

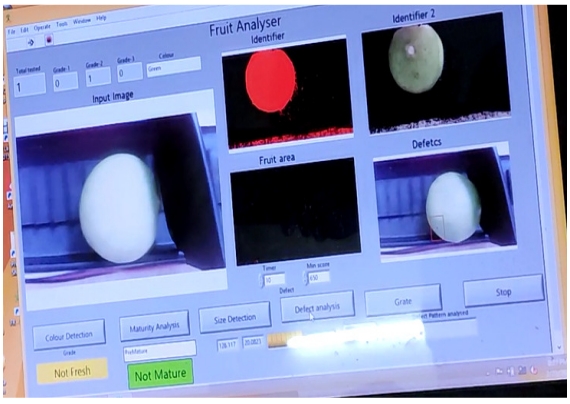
D) Image Classification:

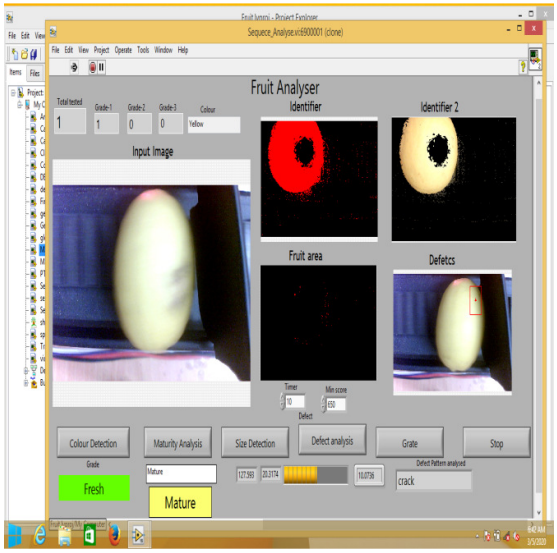
It is made on the basis of Pixel per Index (size). The colour classifier is trained initially with a set of images defined as the reference images. While execution, real images are compared with the reference images. As a result colour can be identified from which the freshness of the fruit is been estimated.

IV. HARDWARE SETUP:



V. SOFTWARE RESULT:





VI. CONCLUSION:

This method can overcome the uncertainty of fruit freshness. In this paper we consider colour as the major factor for determining the freshness of the fruit, which will give solution for serious health problems that are cause by the microorganisms since fruits are the good host for microorganisms. This frame work is to create automated fruit quality detection system in order to reduce the man power and process time of the fruit grading industry. This system is essential for fruit processing industry to improve it's efficiently.

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