



International Journal of Multidisciplinary Research Transactions

(A Peer Reviewed Journal)

www.ijmrt.in

Automatic Unwellness Fruit Separation Using LabVIEW

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Abstract

A induction motor is any of a class of rotary electrical machines that converts direct current electrical power into mechanical power. The most common types relay on the forces produced by magnetic fields. Nearly all types of motor have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor. It includes low initial cost, high reliability, and simple control of motor speed. A Relay is a electromagnetic switch operated by a relatively small electric current that can turn on or off a much larger electric current. Stepper motor that divides a full rotation into a number of equal steps. The motor position can be commanded to move and hold at one of the steps. The experimental results show that the system can achieve the control of belt conveyors in real time. This paper will discuss about how the conveyor works in real time and also how to control the speed of the conveyor by using induction motor. By using the relay circuit we can control the conveyor to detect the fruit. Also this paper will discuss about relay control. Based upon the enum input the motor is to get triggered and controlled by interfaced with NI-myRIO and personal computer with Lab VIEW 2017.

Keywords: NI-LabVIEW, NI-myRIO, Relay circuit, Induction motor.

1. Introduction

The belt consists of one or more layers of material. They can be made out of rubber. Many belts in general material handling have two layers. An under coating of material to afford linear strength and shape christened a carcass and an over layer baptized the cover. The carcass is habitually a woven fabric consuming a warp & weft. The most communal carcass materials are polyester, nylon and cotton. The cover is frequently various rubber or plastic compounds

quantified by use of the belt. Covers can be made from more exotic materials for unusual applications such as silicone for heat or gum rubber when traction is indispensable.

Shiv Ram Dubey, A.S.Jalal has proposed the method of fruit disease classification, precise image segmentation is required; otherwise the features of the noninfected region will dominate over the features of the infected region. In this approach K-Means based image segmentation is preferred to detect the region of interest which is the infected part. After segmentation, features are extracted from the segmented image of the fruit. Finally, training and classification are performed on a Multi-class SVM classifier[1]

S.Arivazhagan has proposed a need of change in the colour space of the images, in order to obtain one channel containing the luminance information and two other channels containing chrominance information. The HSV representation is often selected for its invariant properties. Texture features are computed from the luminance channel 'V', and colour features are computed. In the classification phase, for the test fruit image, colour and texture features are derived as that of the training phase and compared with corresponding feature values, stored in the feature library. [2]

Kevin Edward Kane has studied about citrus fruits by spectral character, the spectral information about the citrus fruit is identified by reflection of infrared ray and recording the spectrum of the citrus fruit, the resulting spectral curves compare with the threshold wavelength of a good citrus. [3]

Mrunali Desai has proposed a method of fluorescence spectroscopic and imaging technique that are used to detect the disease of fruit then that multiple image fluorescence spectral image is compared with the standard spectral image that are acquired using feature extraction.[4]

Barna keresztes, florent abdelghafour has proposed a system of real time fruit detection using deep neural networks. This paper discussed that the proximal imaging using tractor-mounted camera to acquire large quantity of data in vineyards. And they monitor vegetation and fruit detection in agro-field with a geometrical pre-processing and deep neural network classifier [5]

Aye min minmyat, tin myint.naing has done the automatic recognition of fruits with computer vision, robotic system using a monocular camera as their input device for real time and accurate image of fruits. In this paper, they segmented object are classified with convolutional neural network which is trained to detect defected or not. The control domestic robot arm pick and place the object. [6]

Daniel J Fonseca, Gopal Uppal has created a prototype for industrial conveyor selection. In this paper they proposed the conveyor selection based on unbiased decision making, greater availability, faster response, and reduced cost. In this paper computation of the score performed through the Weighted Evaluation Method, and the expected value criterion. [7]

2. Simulation

The fruit that need to be detected is acquire, then various variety of good conditioned fruit and un-wellness fruit is trained and that template value is analyzed and identified based on that a program is done on LabVIEW using IMAQ toolkit icons .Image of various fruit is detected and its various template value is detected and recorded. Our project is based on comparison of that fruit template with fruit that need to be detected.

2.1. Preprocessing

Before doing the program, we must analysis and get the good condition template for a particular fruit type, for this we need to get a various fruit template by analysis different fruit of same variety. The fruit template is acquired in white background with perfect resolution and lighting setup for better acquisition .

2.2. Process flow

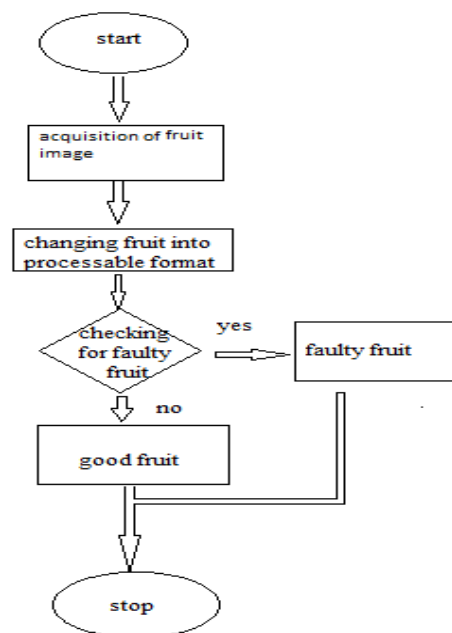


Fig.1. Flow Chart

2.3. Process Involved

2.3.1. Image acquisition

In LabVIEW vision acquisition icon is used to acquire the image of fruit by connecting the camera with measurement and explore, then the image form the camera is acquire

2.3.2. Changing the image into process able format

Vision assistant icon is used to change the image into process able format, there fruit is classified based on color and there is output of this icon portion template of that fruit.

2.3.3. Comparing the portion value

During preprocessing the portion value of the good fruit is identified and that is compared with the current portion value of the fruit, that comparison is done with relational icon in LabVIEW,

We have taken lemon and orange in this project ,for lemon the portion value of good fruit is in the range between 0 to 5,if the portion value of fruit is above it is faulty fruit. For orange, the value will be in-between range of 5 to 15, if it is greater than it is a faulty fruit

2.3.4. Output:

The output is given in terms of string and Boolean, by using relation and selection icon. The status of the fruit and the default detection Boolean is displayed in the front panel

2.4. Hardware

2.4.1. Conveyor setup:

The conveyor base is made up of 4 feet plywood with 3 mm thickness that are cut down into pieces. The conveyor having two rollers that has gear of diameter 10cm and radius of 5 cm, the shaft and PVC is of same length of about 29cm. That are put together to form the conveyor base. A white cloth is used instead of other conveyor belt such as nylon, rubber or leather because white base will give good resolution and better contour for image acquisition .the induction motor that used is 12v and 48rpm, the speed is limited by 5v supply, two induction motor is used at each end that is connected with the shaft of the rollers. Fig 2 and Fig 3 is the resultant conveyor belt.



Fig.2.



Fig.3.

2.4.2. Relay circuit

A 5v relay can be control the conveyor .Since a low speed conveyor belt is needed and the relay is controlled by programming in LabVIEW through myrio. Myrio can give only 5v, so 5v relay is needed. The program is done with delay of 5 sec to stop the conveyor setup and run them after 5 sec. The relay has no,nc and com Fig 3 is the connection of relay to myrio.



Fig.4

2.4.3. Separation part

A stepper motor can be used to separate the wellness fruit and the un-wellness fruit to the given baskets. It rotates on 45rpm speed. The programming is done using LabVIEW via MyRio. The stepper motor rotates in a discrete step increment when electrical command pulses are applied to it in the proper sequence. The motor rotation has several direct relationships to the applied input pulses.

3. Experimental Results

We have gain the results for fruits which is kept in the conveyor setup in the following pictures,

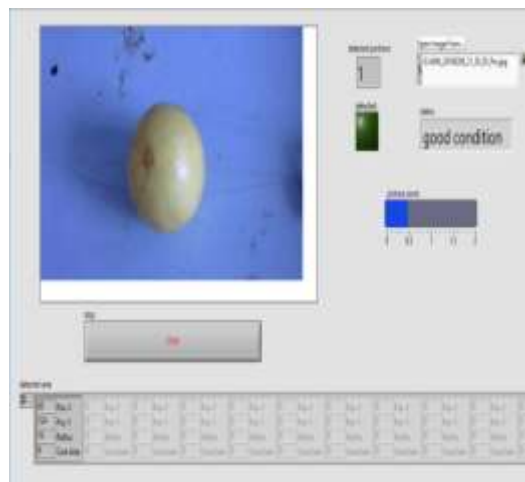


Fig.5.Good fruit result for lemon.

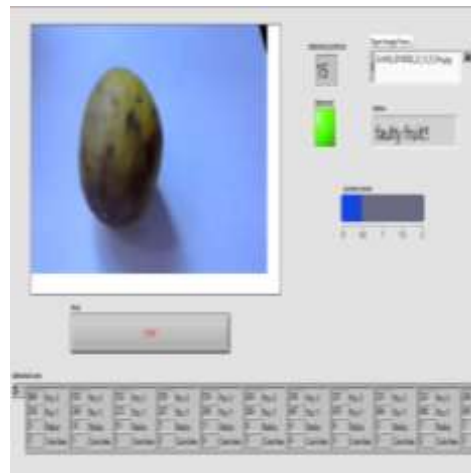


Fig.6.Bad fruit result for lemon.

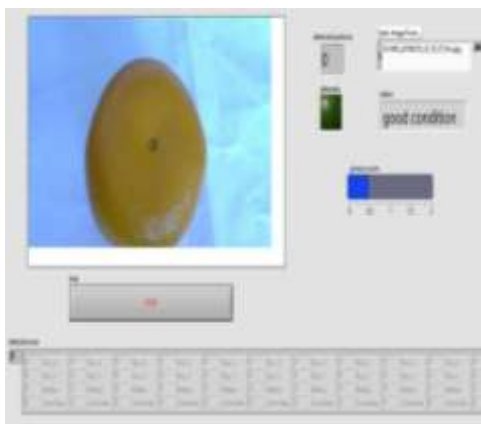


Fig.7. Good fruit result for orange.

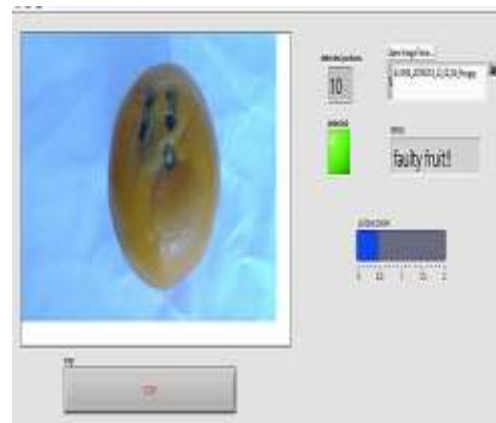


Fig.8.Bad fruit results for orange.

4. Conclusion

Nowadays, in highly competitive world the industries need to be well equipped. The management of the highly integrity of supply of a production, through raw material to deliver finish product, through quality manufacturing is of paramount importance. To accelerate the process and to maintain the quality of the products, automation is required. Automatic production related process needs to be introduced. It is very necessary to bring diversity in products considering shape, size and colors, etc. By applying the idea of this project, an industry can easily sort the required product according to its height, convey them to the required destination and also count them. Though it has some limitations, by some modification this concept can be implemented in wide range of application.

5. Future Scope

The effectiveness of this project can be improved by following this recommendation:

An additional power can be included for the absence of mains. The limited motor power limits the mechanical structure and a heavy structure can be obtained increasing power to have a smarter look & more effective power. Taking more care of the sensitive devices from the

unwanted emissions can augment sensitively. Sorting by every way of dimension can be done by some modification. Improving the sensor quality, sorting can be done more accurately. Decreasing time delay, one can make the process fast

Acknowledgment

Our project came to this level with the help of our project guide Ms.Deepa.B and our project coordinators Dr.Mrs.shanmugavalli and Mr.sathish kumar, we are thanking you with our whole hearted

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