Cashew Nuts Sorting

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ABSTRACT

The food quality is very essential to the farmers as well as the end users. The classification is presently performed manually which is less efficient, low speed, expensive and tedious work. For this purpose, we need to automate the classification which will lead to less production cost and improves the quality of food. The classification is based on shape and size of the cashew.In the process of sorting cashews servo motor being also DC motor being use for the conveyor belt. The web camera being use for the capturing the images. To process the image according to its shape, size by using python language. Proximity sensor will be used to sense the cashew. Then separation will be done according cashew's shape and size. The servo motors will be rotated to direct the cashews as per their quality to the respective containers.The products will be sorted as per the quality and this will help to decide the market cost. This fully automated system will reduce the manual work and make the quality cashews available to the customers in a short time. The average sorting rate is 480 cashews per minute.

Keywords—.Fruit Sorting, Cashew Nuts Sorting, Arduino, Conveyor Belt, Camera, Image Processing.

ARTICLE INFO

I. INTRODUCTION

Cashew is one of the most popular and important crops in India. India is one of the leading producers, processor and exporter of cashew in the world. Commercial cultivation of cashews began in the early 1960s.In India, cashew was first introduced in Goa, from where it spread to other parts of the country. Major portion of the cashew industry still depends on expert employees for grading and sorting. Manual grading is inefficient, expensive, labor intensive and time consuming and in most of the cashew industries grading and sorting performed manually. So, using computer vision techniques we don't need to waste our time to do the work which is performed by the labor. With the help of computer vision techniques, it can be minimizing the production cost and increase the product quality. Automatically grade and sort different types of cashew kernels from their images. So that the things have been arrange in such a way that it can automatically grade and sort different types of cashew kernels from their images

II. LITERATURE REVIEW

The author [1] implemented the mechanism to sort the fruits like mangoes. And not only sorting of the mangoes but also it can be sorted by considering the grade, quality and weight of the mangoes. The author [1] collected the different categories of mangoes in three batches with an interval of one week in between batches. After taking different types of the mangoes, after the fixed time of interval they took the images of the mangoes. And they rate mangoes with their categories like M1, M2, M3, M4 as the author [1] selected optimum set of features. This paper proposes a machine vision-based system, suitable for grouping for mango according to the expiry day available after harvesting. The average performance of the proposed machine vision-based system found to be better than the human experts. The application lies with the fact that it can be used with conveyer belt for faster sorting of the mango. The main applicability of the proposed technique is that vendors can easily select the groups, i.e., M1, M2, M3, and M4 according to their choice of days, on the basis of transportation delays and accordingly they can train the classification model by only feeding the images

of the mangoes and respective expiry date. The proposed technique can also be extended with other varieties of the mango and also for other fruits. The author [2] Segregation of Cashew Kernel and Areca Nut by Using Advanced Color Sorting Mechanism has been developed. Various external features of the cashew kernel such as color, texture, shape and size are extracted from the captured image. For the classification to be done first the different types of cashews and areca nut are stored in the database by taking pictures of the cashew and areca nut on the conveyer belt using the same webcam and the features are extracted. The conveyer belt is the carrying medium of the conveyer belt system. A belt conveyor system consists of two or more pulleys with endless loop of carrying medium that rotates about them. The author [3] five different classifiers were used and their performance in terms of accuracy was observed. Among the classifiers, Back Propagation Neural Network was proved to be efficient and it had an accuracy of 96.8%. The proposed system consists of four phases namely image acquisition, pre-processing, feature extraction and classification. After segmentation, morphological processing was applied to improve the background subtraction in which the unwanted small holes on the background region were identified and removed. A real-time prototypical date grading and sorting system was designed by Ohali [4], in which different external features such as color, size, shape and defects were extracted from the images to feed to the classifier for the grading purpose. Razmjooya et al [5] developed a real-time system for sorting potatoes according to their size and to identify defective potatoes based on their color. In order to determine the size, maximum diameter, minimum diameter rand Length/width diameter ratio was calculated. To recognize the defects of potatoes, color features were used. The author [6] proposed a system which would increase the production rate and accuracy of material handling systems. The system would segregate objects based on their type i.e. metal or non-metal, weight and color as required by the user. Use of PLC with the frame of logic gates will make program modification easy and thus, we can modify the system according to the requirement.

III. BLOCK DIAGRAM OF PROPOSED SYSTEM

The proposed system can be used to sort the cashews of two or three different types, according to their shape and size. As we can see in the block diagram in fig.1 the proposed system contains the web camera, servo motor, DC motor, proximity sensor etc. so that it captures the images of the cashews into the computer through USB port 0. The camera is focused on the conveyer belt on which the cashews are passed. and with the help of image processing it calculate frame rate. To segregate the cashews according to its shape and size the camera will captures the image and after capturing the image to decide the size of cashew it is calculate by number of pixels which means the conveyer belt is black and cashew is

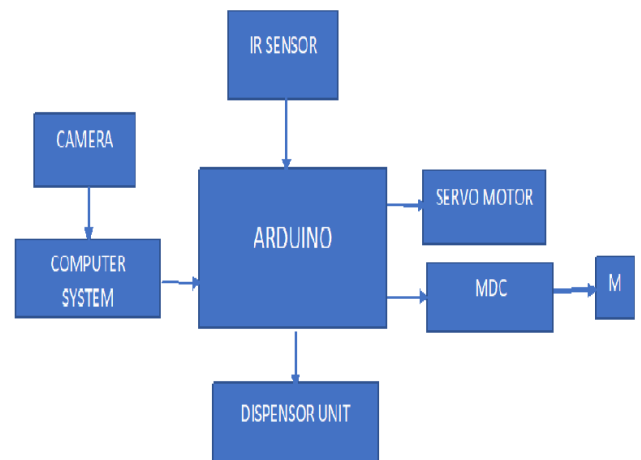white so it will calculate the white pixels and accordingly it will segregate in different containers.

Figure.1. Block Diagram

In the above block diagram, it contains camera which is of 16 MP will capture the image. The processing of the image will be in computer system with the help of python language. Then computer system will send the signal to the Arduino, then Arduino will process the signal and resend back to computer system. In the block diagram IR sensor will sense the cashew and conveyer belt will stop and with the help of servo motor it will decide the angle from which the cashews will get sorted.

IV. DESCRIPTION OF COMPONENTS

Data Base Creation
For the classification first the different types of cashew nuts are stored in the data base taking the picture from the web camera. The size and shape of the cashews are calculating the number of pixels of cashews.

Arduino Uno Board
The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. It is a basic board microcontroller design to make the applications. The word "uno" means "one" in Italian and was chosen to mark the initial release of Arduino Software. The Uno board is the first in a series of USB-based Arduino boards. It used to control the DC motor and servo motor

Camera
The camera being use to take the pictures of the cashews. A web camera is a video camera and images are processed in computer system. Once the image will capture it will be saved in the computer system or forward it to the other networks. The camera which is of 16 MP whose dimension 18.8 x 14 x 7 5cm.

Conveyer Belt

The conveyer belt system consists of two pulleys and which is rotate it about them. With the help of these two pulleys the conveyer belt will move and forward the material on it. There are two types of conveyer belt, one is material handling and bulk material handling. In this project we use material handling conveyer belt.

Servo Motor

It consists of DC motor, potentiometer and control circuit. As the motor rotates the potentiometer resistance changes so that with the help of control circuit it can be regulate in which direction we want. Which means with the help of servo motor the different types of cashews are segregate in different containers. The servo motor which is of SG 90 whose operating voltage is 5volt and torque is 2.5k/cm.

DC Motor

It is a rotary electrical machine which converts the direct current electrical energy into the mechanical energy. The DC motor is used to control the movement of the conveyer belt. The supply voltage for DC motor is 4 to 12 volts and RPM is 10 to 12 volts.
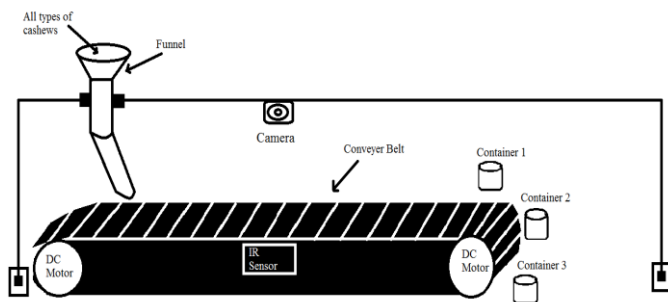

Figure 2. Proposed Hardware Design

The proposed hardware design is as shown in fig. 2. All types of cashews will be poured in funnel and then, one by one the cashews will drop on conveyer belt. DC motors are fixed at the both end of the conveyer belt. IR sensor will sense the cashew and camera will capture the image. The cashews will get sorted as per their shape and size and moved todifferent containers by deciding the angle of rotation of servo motor.
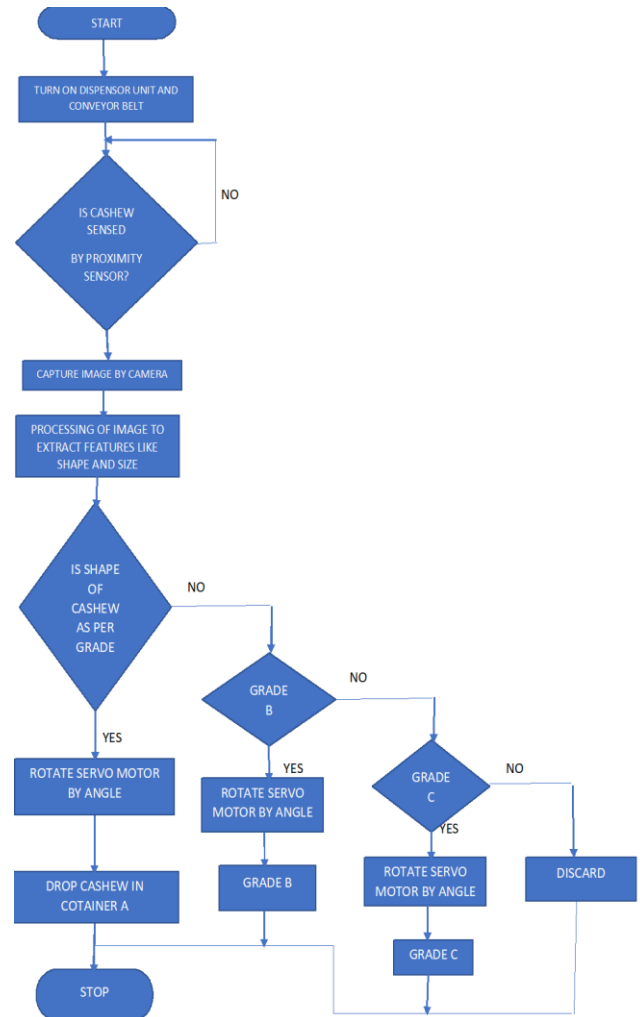
V.   SOFTWARE DESIGN

Figure 3. Flow chart
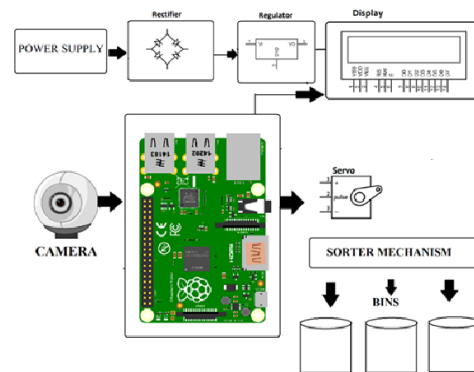
VI. SYSTEM ARCHITECTURE

Fig.4. System Architecture

VII.CONCLUSION

In this paper we conclude that cashews will be sort according to its shape and size with the help of image processing. In image processing we have used python to have better performance. Servo motor is being used for the

sorting of cashews in different containers. As compared to the other systems the efficiency is 95%.

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