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Orange Sorting Processor

(A Mechanism for Sorting Oranges at Low Cost)

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Abstract: *The sorting of oranges in small scale industries includes in whole sale market or farm at home. This research work aims to make an ideal project for small scale orange suppliers to grade the oranges and thus to sort the rotten oranges from fresh one. This research paper proposes the orange sorting on the basis of colour detection of the oranges and then rotten patch detection on the oranges. Further the full grading and sorting is done by applying two steps which includes sorting of oranges on the basis of sizes and rotten spots detection. Vidarbha region of Maharashtra in India is the big production area of oranges mainly the Mandarin oranges [6]. Now days sellers are using manual sorting process for small scale production. Manual sorting is a time consuming process. As well as labour cost for manual sorting is very high and if the seller do this process by its own it will take lot of time as well as energy. So their is a highly demand for the mechanism of orange sorter. Thus in this research work of orange sorting mechanism we highly focus to reduce the mechanism cost to perform this process in low cost so than small scale seller of oranges can also afford the mechanism.*

Keywords: *Orange sorting, colour image processing, Raspberry Pi module, MATLAB***.**

I. Introduction

Nowadays according to the analysis, the marketing cost is the major cost component. Marketing cost consist of labour cost for sorting, packing cost, transportation cost and different market charges [6]. Also a small scale orange sellers have to give these marketing cost. Labour cost affects a lot in the marketing cost. So this mechanism we proposed in this paper also reduce the labour cost. We effectively focused on the sellers of oranges who cannot afford mechanism which is very costly.

So our aim is to solve the problems of those orange sellers who don't want to waste their time in sorting oranges by their own, who don't want to appoint labour on daily basis to sort oranges spending money on that and don't want to buy a mechanism which is very costly.

Nowadays the all it matters is the freshness of the fruit. One rotten fruit affect all the fruits in the box. Everyone is always concern about their health, so buyers always need fresh and best fruits to consume. So we have to give priority to the freshness of the fruit. The Orange marketing involves sorting of oranges need to be done with a great care if good returns are to be expected from the sales.

World's famous Mandarin Orange known as 'Nagpur Santra' in Vidarbha region of Maharashtra state in India [6]. Here the orange production is very high so such type of mechanisms in low cost is in demand. In Maharashtra at present about 1 lakh hectare of land is under oranges with 75,000 hectares for mandarin oranges and 20,000 hectares for sweet oranges [6]. So for all the small scale sellers of oranges they need to have low cost orange sorting mechanism, so the problem of labour cost can be nullify.

Here sorting process is based on the basis of colour and size. Prediction of maturity of the fruit can be determined by the colour detection because it is a product and we cannot check the acidity of the fruit from inside [2]. So better way is to check the freshness using its outside texture. So we have to decide the current status of the fruit of being fresh or rotten by using the colour detection process.

This research work is carried out with an aim to design orange detection and sorting mechanism with size grader using MATLAB Software. System designed can automatically classify an Orange fruit and then reject it or passed further on the basis of its maturity status of being fresh or rotten. The coding further be dumped into Raspberry pi module.

II. Methodology

The process will go in synchronizing with each and every components we used. Each and every slot of the mechanism as shown in Fig. 1. work one after another. This process first involves the dumping oranges into containers. Oranges come into conveyor belt serially. One by one oranges come into sorting zone. Two roller were used to rotate the orange. The image could be captured using single RPI camera. The system consists of several steps like object detection, colour detection and sorting. Two angular lights are used for detection of oranges. Mechanical sorter using motor is used to carry orange further or remove down. Then oranges one by one sorted by different sizes. We used MATLAB software.

The project is intended to sorting of oranges using levels based on the following techniques:-

1. Object detection
2. Fresh oranges detection
3. Sorting by sizes

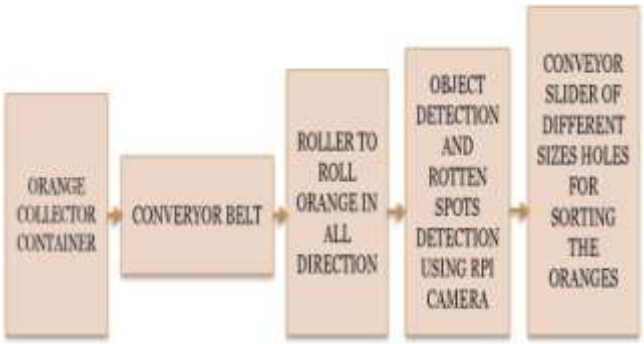

Fig. 1 Process of the mechanism for orange sorting.

Thus sorting of oranges done on the basis of two parameters as they are follows:

1. Sorting Of Oranges On The Basis Of Rotten Spots:

A. After colour detection, image processing should be done effectively on the area where object is detected.
B. The image processing and output of the image are shown below :

a) Reading the image.
b) Detecting the fruit is orange or not.
c) Converting the colour image into gray scaled picture.
d) Finding the area of the rotten spot on object detected region.
e) Determining whether orange is rotten or not.

2. Sorting Of Oranges On The Basis Of Sizes:-

A. A slider is used to collect different sizes of oranges as per their sizes.
B. We are sorting in three section Size 1, Size 2, Size 3.
C. In Size 1 we are sorting very small size of oranges in one section.
D. In Size 2 we are sorting the normal or medium size of oranges which are generally in maximum amount. In Size 3 we are sorting the maximum size of oranges we expect.

III. Technologies Used

The most important part of any mechanism is which kind of technologies we are using. Technologies play a very crucial role to navigate the process in the direction of output. Here we are using technologies related to hardware as well as software. They have to be used with their perfect module number for better processed of the mechanism.

The technologies are described as follows:

1. Hardware:

The hardware part should work in a synchronizing manner. So that the transferring of oranges from one part to another of this mechanism should go in the flow and every oranges will be processed.

The hardware part is divided into four segments, they are as follows:

A. *Raspberry pi:-* We are using RPI 3 b+ module which will be used for image processing and controlling interfaced hardware. MATLAB software is used to program the module. It is a low cost, portable, multipurpose and tiny computer.

B. *Camera:-* The 5 megapixel Raspberry Pi B camera module Rev 1.3 is used for attaching with RPI 3 b+. The Raspberry Pi camera captures images as well as video.

C. *Conveyor belt:-* Two types of conveyor belts are used in the mechanism of sorting. The first will be a simple conveyor belt which is from orange container to the sorting section and next will be the rolling small length conveyor used at the sorting section. On basis of output of Raspberry Pi the oranges will be separated on the conveyor by using motor.

D. *Motor:-* Motors will be used for rotating belts and for separating the rotten and fresh oranges at the end. 150 RPM motor will be used for the conveyor and a low RPM motor for separation.

2. Software:

Matlab R2018b software is used for programming Raspberry pi and all the process of object detection and sorting is done here as shown in Fig. 2. Raspberry pi support packages are installed for MATLAB and Simulink to make the software compatible with the module.

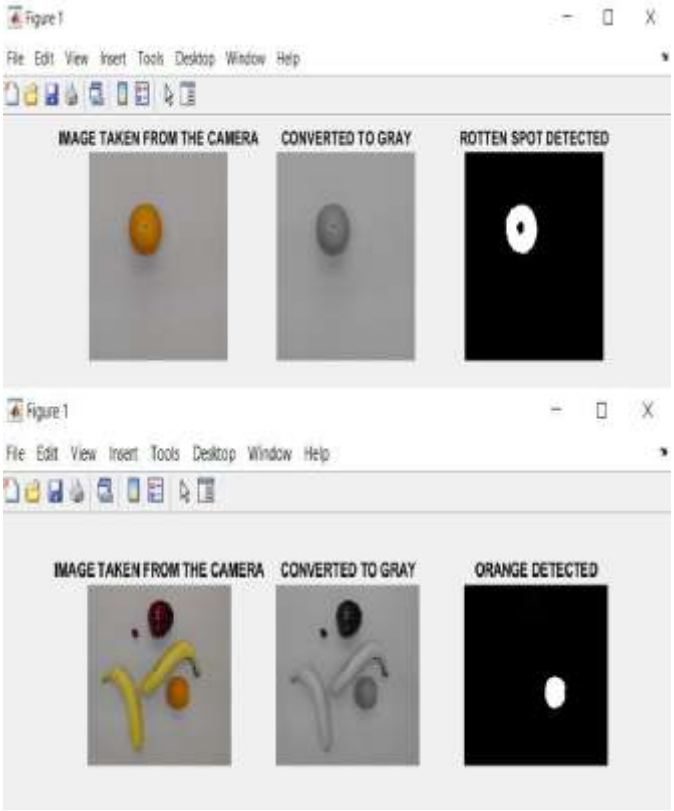

Fig. 2 Rotten spot detection and orange detection using MATLAB

IV. Conclusion

In this paper, we propose and evaluate a scheme for orange fruit detection and grading. Basically this paper gives a direction to reduce manual sorting process of oranges and give a simple and low cost mechanism for the oranges sellers. External defects of oranges is the main approach we consider for orange sorting and thus classify it according to their sizes. Large, medium and small sizes of oranges should be divided for selling them in perfect price. At last all this research work is taken into consideration in order to minimize the involvement of human error.

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