

Development of Onion Grading Machine for Indian Food Agro Industries

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Abstract— In the economic development of India, agriculture sector plays a key role. For the proper price of any agriculture product, grading according to size is necessary. And it is also value adding technique to the product. To makes the product more attractive and improve its processing qualities uniformity in size is important. Grading according to the sizes is an important value adding technique for most agricultural products. At present, size grading of most agricultural products including lemon, garlic, onion, tomato, Orange, mandarin, apple are carried out manually by farmers, agents, whole sellers, retail sellers and customers also. Most of farmers market their products without any grading. Persons engaging in postharvest crop handling such as collectors, whole sellers, retail sellers, and farmers cannot use high technical and costly grading technique. And also by the local market survey it is found that retail market price of the fruits is significantly varied according to its size. Fruit grading by human is inefficient, labor intensive and error prone. The automated grading system not only time saving but also minimizes error. Improvement of quality and value addition of agricultural produces has gained higher concern in recent times. There is a great demand for fruits in both local and foreign markets. The study is carried out for the design of a machine which can be used to grade multiple fruits by making adjustments. Machine should be simple to use so it can be operated by any illiterate person also so that farmers can also use it.

Key words: Onion Grading Machine, Food Agro Industries

I. INTRODUCTION

The research on this field is also very much necessary in the future to develop new mechanism that will aid the farmers to be capable manage their crops themselves. The other area is the creation of awareness among farmers about this type of innovation to proper implementation of advanced technology in the farmland to increase the productivity of farms. Onion is one of the important crops cultivated in India is the second largest producer of onion in the world. Improvement of quality and value addition of agriculture produces has gained higher concern in recent times in India due to creation of new opportunities for sale of agriculture, commodities in open market at competitive prizes .Until now almost everywhere in India, the onion grading is the manually. This manually grading is increase the cost of onion tremendously to customers and producers. The manual grading is also needs more labour .There is also lot of human errors will be in the grading so we cannot clearly guarantee the highest fool proof grading with the present way of grading. Now the need of automation arrives in the agriculture sector also due to the higher competition across the world. So we have to increase the quality and efficiency of the grading machine. This type of new ideas will surely help a lot of people, to focus back to agriculture and this will lead to new innovations in agriculture sectors.

II. LITERATURE REVIEW

Smitha and Phatale (2013) depicts about the automatic grading machine based on the machine vision. In this project, Authors insist on the quality requirement of onion when it is exporting to foreign country. The concept of onion grading machine used in the project based on the colour and texture. If any onion is satisfying the requirement will be rejected as damaged one. The viewer is introduced to light as an electromagnetic quantity, and to the mechanisms by which light interacts with objects. The processes of producing colours by addition and subtraction of light are introduced. Then the concept of human colour perception and colour description is discussed. The basis of this identification onion will be selected by the machine.

El-Rahman and Magda (2011) presents the onion grading machine which was developed from a small cylinder type grading machine to suit grading of onion sets crop. The project also considered two parameters for optimum performance. Those parameters are revolving speed and feeding rate. On these parameters four levels of increase in revolving speed and feeding rates The studied parameters included, revolving speed 35, 45, 55 and 65 rpm (0.366, 0.471, 0.576, and 0.680 m/s), and feeding rates (75, 100, 125 and 150 kg/h). The grading efficiency (%), grading productivity (kg/h) and the mechanical damage percentage, were also considered on the effect of machine parameters. This project was successful based on the obtained results in which the maximum grading efficiency was higher on the third set of parameters (55 rpm and 125kg/h).

Wang and Li (2014) present the grading concept of onion based on the RGB-Depth sensor. The post-harvest handling of the onion has a great role in the profit of onion. This paper clearly mention the onion grading using advanced technology such as measuring of the RGB- depth sensor. The authors used the RGB- depth sensor to measure the volume and diameter of the onion based on the colour of the onion and the density of the onion in regard with the measured parameters. Images were acquired when onions were placed at six different orientations. The colour and depth images helps to get the maximum diameter of the onion. The volume of the onion was estimated using the depth images. The onion diameter estimated by depth images achieved a higher average accuracy and robustness (RMSE = 2 mm) than those calculated by colour images (RMSE = 3.4 mm). Two types of onion varieties were measured in this project are Mexican sweet onion and Vidalia sweet onion. The results obtained from this project was shown the effectiveness of this model where the depth is finding non-destructively. The proposed methods can be applied to improve the efficacy and efficiency of size estimation in onion phenotyping and postharvest sorting/grading.

III. FIGURES AND TABLES

Category	Size
Extra Large	Over 90 mm
Large	70-90 mm
Medium	40-70 mm
Small	35-50 mm
Pickle	m

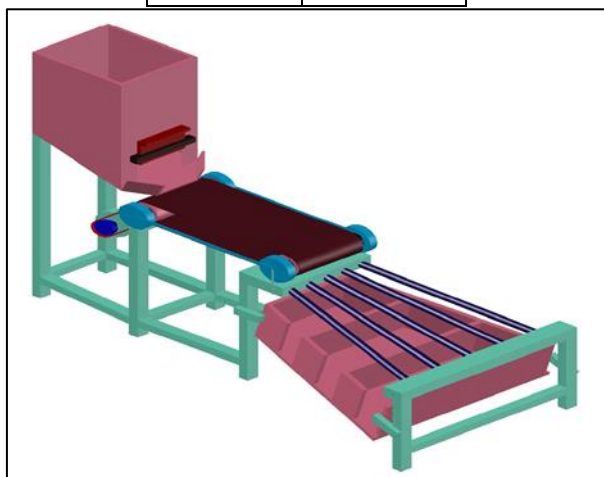


Fig. 1: CAD Model of Onion Grading Machine

Grades In Onion Bulb Grade	Bulb Diameter (mm)	% Proportion In Good Crop
A	>60	40-50
B	50-60	30-40
C	5-50	10-20

IV. CONCLUSION

Fast, automatic and precise system for grading of different types of onion. The system can replace the conventional methods with better efficiency. We have successfully developed a model of onion grading machine with better efficiency. From the existing prototype we have studied all the mechanical process which comes under the project.

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