Technologies for Primary storage of Onions

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Abstract **- India is the second largest producer of onions in the world. Indian dry and humid atmospheric conditions throughout the year are unfavorable for the shelf life of onions. The traditional heap storage of onions or bamboo sheds for ventilated storage of onions is not enough to increase the storage life of onions for a longer time period. The onions rot in these types of storages over a period of time throughout the year until the next harvest comes in. Nearly 40% of the total onion stored after harvest is lost due to rotting throughout the year. This reduces the onion reserves throughout the year to meet the required supply of onions for the public. The shortage of onions increases the price of onions. Onions are a very basic food that is needed by the majority of people. The shortage and increased rate of onions create a huge problem for the people of the country.**

India is also the second largest exporter of onions in the whole world. A shortage of onions can put a big dent in the country's economy. This stated the importance of a reliable storage system for onions to increase their shelf life. The reduction of weight and physiological losses during the storage of onions will stabilize their availability throughout the year. Healthy storage of onions will provide the country's public with its basic necessity of food as well as the country's economy by increasing the export of onions.

This system for storing onions will help increase the shelf life of onions. This system will provide the onions with their preferred temperature (25ºC-30ºC), humidity (65%-70%), and proper ventilation to increase their shelf life of onions. It will also detect rotten onions from the storage to intimate the user/client to remove them and stop the bacteria from affecting other onions.

Keywords: **Onions storage, Rotting of onions, Losses during Storage**

I. INTRODUCTION

Onion is one of the richest sources of the nutrient 'Quercetin'. It prohibits the activity or creation of cancer elements. India is considered the second largest producer of onions all around the world. It accounts for 16 percent of the area and 13 percent of production. In India, onion is grown on 0.83 million hectares with a production of 13.56 million tons. To fulfill domestic and export demand during the lean season, a considerable quantity of onions needs to be stored. It is stored in ambient storage conditions, with high storage losses. These losses consist of physiological loss in weight (PLW) i.e. moisture losses and shrinkage of about 30 to 40 %, rotting of about 10-12%, and sprouting around 8-10% for 4 to 5 months of storage. Most of the onion produced in India comes from the states of Maharashtra, Madhya Pradesh, Karnataka, Andhra Pradesh, Bihar, Gujarat, and Haryana. The fluctuation in prices often happens when there is a mismatch in demand and supply of onions. The supply shortage can occur due to weather and rising exports. So there is a need to go for a solution, which would eventually, reduce these losses.

II. RESEARCH BACKGROUND

The Department of Food & Public Distribution ensures that every and each person within the country gets procurement and distribution of food grains in a timely. They supply quality Agri-produce associated merchandise to the shoppers at a reasonable value. Onion being one of the essential commodities, faces worth fluctuation considerably thanks to many reasons. But, thanks to improper storage systems, the country faces an annual loss of approximately Rs 11000 atomic number 24. While developing technological solutions to the matter of rot of onion, it's necessary to form a good investment, which is able to additionally offer engaging returns. Although the normal technique of creating onion husks saves cash, the loss of storage is large and these huts aren't economically viable. The lack of adequate and applicable storage facilities is one of the foremost constraints that enforce distress sales on farmers. This storage capacity unit is either inadequate or

pseudoscientific. As a result of the glut state of affairs, the value variability has been too high in the recent past.

III. PROPOSED SYSTEM

Our model is designed in a way that will help reduce the physiological and rotting wastage of the onions in their storage period when the external environment is undesirable. Thus, the availability of the onions will be pretty much constant which in turn will keep their retail price constant as well, assuming that the transportation and other costs that may be responsible for the fluctuation of the cost remain constant.

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B. Figures and Tables

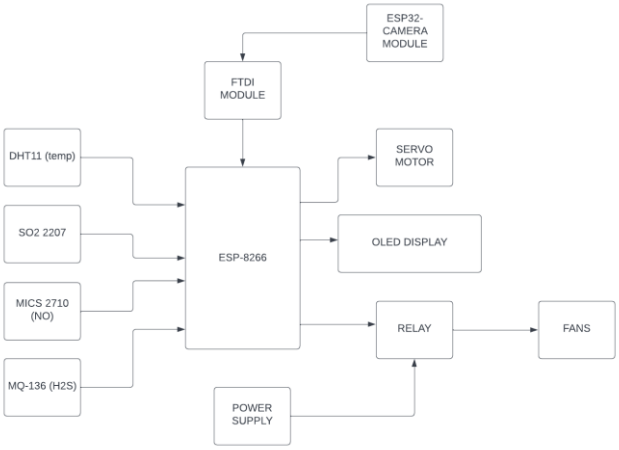

Fig. 1. Block Diagram of the proposed system

The ESP-8266 module is the controller which is being used for this project. It is interfaced with various components like gas sensors, servo motors, displays, relays, and FTDI modules. The FTDI module is the connecting device between ESP-8266 and ESP-32 camera modules. Similarly, an external power supply is attached to the relay, which in turn controls the fans and blowers present in the system.

The ESP-32 camera module will keep a track of the onions present inside. A database consisting of all the different types of images of rotted onions will be fed in the system. If any of the stored onion matches the images, a signal will be sent back, and it will be displayed on the OLED. On the other hand, to detect the beginning of the rotting process, the gas sensors present inside will play a major role. Temperature and humidity sensors, sulfur dioxide sensors, nitrous oxide sensors, and hydrogen sulfide sensors would detect the respective gasses emitting from the onions.

In order to avoid such rotting, fans and blowers are attached. They will be responsible to maintain the humidity and temperature inside the storage casing. Other than that, the trays on which the onions will be placed, will have a moving mechanism. Using the servo motor, the trays with onions will shake, which will keep onions in motion, thus slowing down their process of getting dry. So this system will eventually increase the life span of the stored onions and also help the farmers and retailers to detect the rotting of onions at an early stage.

Fig. 2. Sample Database Images for Rotted Onions

Image sensors are unit metal-oxide-semiconductor (MOS) technology that springs from MOSFET. The imaging device receives incident lightweight (photons) that are targeted through a lens or different optics. betting on whether or not the device is CCD or CMOS. CMOS sensors convert photons into electrons, then to a voltage, then into a digital price mistreatment associated degree on-chip Analog to Digital device (ADC).

Generally, visual sensors are units used for the aim however here we are going to be mistreating ESP32 camera modules programmed with the FTDI model. The script for object detection and image process can write mistreatment python artificial language. totally different libraries that may be needed are area units Numpy and cvlib.

Image Sensors process the onions and match the photographs it's been provided.

Image sensors will capture the images of the onions present in the storage. These images will be compared with the images of the rotten onions that are pre-fed. If any of the images gets matched, the result will be displayed on the screen.

Using OpenCV images will be processed. OpenCV itself is a huge library for computer vision, machine learning, and image processing. Images will be detected based on their color, rotted onion's colors will be noted and its color code will be provided to the database.

Images will be converted to HSV images and further, it will verify the rotted onions.

IV. CONCLUSION

With the help of this technique, onions will last longer in storage. The number of onions that are kept and preserved will grow and remain stable for a longer period of time till the onions are harvested again. This would aid in minimizing the variation in onion costs that occurs over the course of a year due to a lack of storage, wastage brought on by onion rot, and physiological losses. Our concept will assist both farmers and customers in making and saving money throughout the entire year.The technique can be enhanced in the future to store onions for the entire year. Eventually, system improvements would limit onion prices by maintaining a consistent cost. These technologies for storing onions would reduce price volatility and the demand for them in emergency scenarios.

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