SMART FARMING USING IMAGE PROCESSING AND IOT

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ABSTRACT

Due to the cumulative demand in the agricultural industry, the need to efficiently grow a plant and increase its yield is very significant. In order to do so, it is significant to monitor the plant during its growth period, as well as, at the time of harvest. In this image processing is used as a tool to monitor the diseases on leaves during farming, right from plantation to harvesting. The attack of animals in the agricultural land and the theft of crops by humans cause heavy loss in cultivation and fruit ripeness detection along with deficiency of nutrients in the plant. In this work, we suggest a hardware prototype using image processing.

Keywords: image processing, fruit ripeness detection, disease identification, animal attack.

I. INTRODUCTION

Agriculture plays a dominant role in the overall economic scenario in India. Nowadays agriculture becomes very important due to the increasing population in the world.Farmers are facing lot of problems in their cultivation areas, which include climatic change, water problem, pests and diseases. Expected crop loss is up to 37% every year. This project focuses mainly with the diseases. Due to the diseases caused to the plants leads to reduce the crop production. In recent years animals are unusually cause severe damage to the farmers all over the world, Animals like buffalos, sheep, cows and monkeys etc., cause serious damage to crops by running over the field and flattening over the crops. It causes financial problem to the farmers. Mango processing industry is one of the big fruit processing industries in the world. Ripening stage of various types of mangos can be predictable by visual examination. The manual examination is likely to differ from person to person and therefore lack the regularity and accuracy. It would also increase the time to market and manpower in the overall processing. The main idea of proposed system is addressing the above issues and increase the quality and quantity of the agriculture crop production.This project identifies the disease and intimate the farmers about the disease caused to the plants. To overcome from problem like animals enter into the field, the proposed project uses the raspberry pi and camera to capture the images of animals that are entering into the farm by pre-processing that images, if it is detected as animal then buzzer get activated until the animal repellent from the field. To identify the ripeness of mango fruit, this project avoid the manual process and introducing the automation would increase accuracy, effective use of mango fruits. Visual features play an important role in case of classification of mangos according to their ripening stage. Image processing can be applied to extract these features and analyse them to get the result.

II. LITERATURE SURVEY

1. LEAF DISEASE DETECTION USING IMAGE PROCESSING

Thete Vaishali V, Thakare Pradnya R, Kadlag Gaurav B, P.A. Chaudhari... [1]

In this they found the software that can detect the diseases on the leaf which is not identified by the human eyes. In this they have undergone many steps like image acquisition, image pre-processing, segmentation, feature extraction which finds patterns and checks for matching and they used neural network for classification.

2. COLOR IMAGE SEGMENTATION FOR FRUIT RIPENESS DETECTION

Meenu Dadwal, V. K. Banga...[2]

In this paper they used different techniques for finding the ripeness of fruits and vegetables at every stage. In this they used Various method with some threshold levels and gives coloured images of fruits and vegetables as an input and based in that threshold values using some clustering methods it will find the ripeness of fruits.

3. ANIMAL DETECTION SYSTEM IN FARM AREAS

Vikhram B, Revathi B, Shanmugapriya R, Sowmiya S, Pragadeeswaran G… [3]

In this they discussed how to protect the crops from damage caused by animal. They used the ultrasonic sensor to detect the animal movements that are entered into the field and making the animals to get scared with some sound without harming the animals and also they mentioned that the display shows the data so that farmer can know about the state of the electric fence. In this they installed GSM module so that by using this farmer gets message alerts.

4. DIAGNOSIS AND CLASSIFICATION OF GRAPE LEAF DISEASES USING NEURAL NETWORK

Sanjeev S Sannakki, Vijay S Rajpurohit, V B Nargund, Pallavi Kulkarni…[4]

The aim of this project is analysing the leaf diseases of grape plants by using artificial intelligence and image processing .This methods are used with some threshold values for accuracy. They used k-means clustering for segmentation of leaves of a grape. They got accurate results after using the feedback propagation.

5. A SMART FARMLAND USING RASPBERRY PI CROP PREVENTATION AND ANIMAL INTRUSION DETECTION SYSTEM

S Santhiya, Y Dhamodharan, N E Kavi Priya, C S Santhosh, M Surekha…[5]

In this project they used Radio Frequency Identification Device and GSM Module foe detecting the animals which causes damage to the crops ln the field. By this GSM module farmer and forest officers get message alerts. This detection is done by using the RFID injector that is injected under animal skin that entered into the field. They mentioned this system uses Raspberry pi for this detection.

III.EXISTING SYSTEM

There were different problems and challenges are identified in the existing system:

1.In Existing method electric fences are used to protect the crops from the wild animals. Due to electric fence animals are hurt extensively and it is not only affect to wild animals it also dangerous to the pet animals and even human beings.

2.In Existing method ripen fruits can be picked manually. The manual inspection is likely to vary

from person to person and thus lack the uniformity and accuracy. It would also increase the time to market and manpower in the overall processing.

3. In Existing method the manual classification and identification methods which are being used to distinguish between different types of leaf diseases are subjected to some kind of errors. Since these techniques are focused by human involvement so to avoid these problems the proposed system that could identifying diseases without any errors.

IV.PROPOSED SYSTEM

The proposed system uses raspberry pi and camera to capture the images of the leaves and after pre-processing the captured image it provides information about the type of disease caused to the plant and also provides information about the deficiency of plants thereby saving time, money & power of the farmer. It also captures the images of fruits and then after pre-processing the captured images it will provide information if the fruit is ripened or not if it is ripened, it will send the location of that ripened fruit to the farmer. It also captures the images of a field, if any animal enters into the field then it will send a SMS to the farmers. The proposed system is used to reduce the man power and helps farmers to increase the productivity of crops.

ADVANTAGES:

1. Increase the productivity of crop.
2. Detection of disease at initial stage.
3. Reduce the human errors and man power.
4. Reduce the damage to crops by animals running over the field and trampling over the crops.

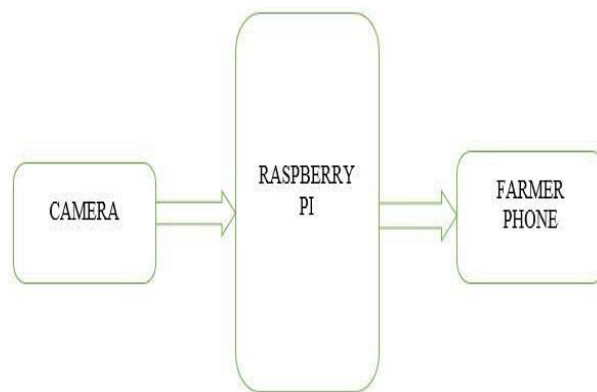## V. ARCHITECTURE DIAGRAM

1. FRUIT RIPENESS DETECTION

Figure 1: Block diagram of Fruit Ripeness Detection

In this fruit ripeness detection, the system will capture the image of the fruit and the image will be pre-processed and it is compared with he data set images that are loaded into the raspberry pi for finding the ripeness of the fruit. If it is detected as ripened then the system will send the mail to the farmer using imu+gps app which is connected raspberry network.
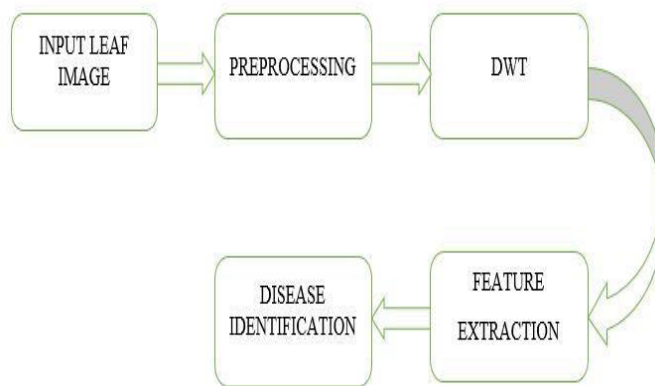
2. LEAF DISEASE IDENTIFICATION

Figure 2: Block diagram of Leaf Disease Identification

In this leaf disease detection,it captures the image of the leaf as it is taken as the input leaf image then it undergoes pre-processing where color of the leaf are taken into account and green pixels are tested

and in feature extraction color and texture of the leaf are taken for identification and after doing all this processes and comparing with the dataset it identifies the disease of the leaf.
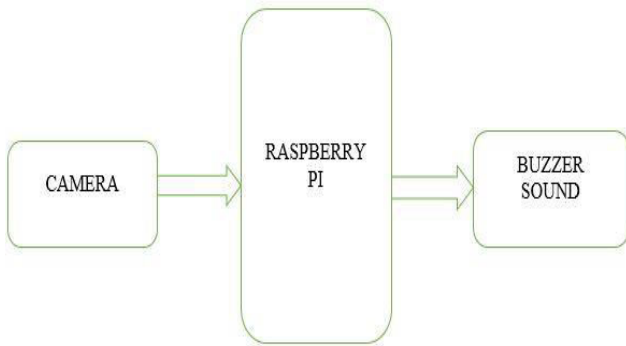
3. ANIMAL ATTACK OBSERVATION

Figure 3: Block Diagram of Animal Attack Observation

In this the system captures the images of the field using camera and pre-processes the captured images and if it is identified as an animal it will intimate the farmer by sending the SMS to the farmers phone and when it is identified as an animal the buzzer

will get activated that gives terrific sound to make animals move out of the field.

VI. IMPLEMENTAION

1. FRUIT RIPENESS DETECTION

In this module, the system will detect the ripeness of mango fruit by using the camera. If the mango fruit has ripened it will send the location along with the ripen mango fruit image to the farmer through mail.
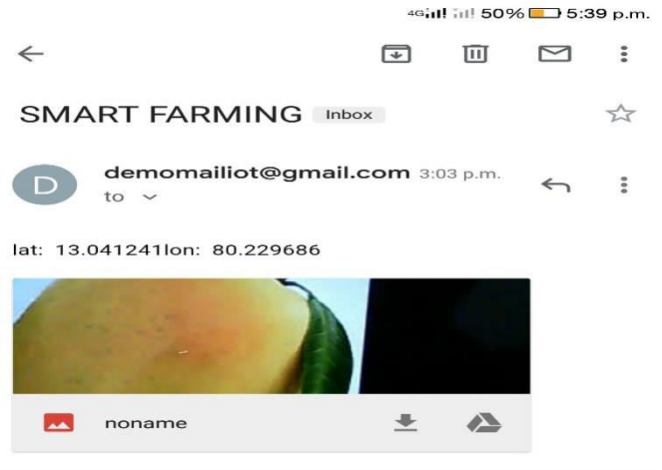

Figure 4: Fruit Ripeness Detection

2. LEAF DISEASE IDENTIFICATION

In this module, the system capture the image of leaf through and it has gone for pre-processing and identify the disease caused to the plant.
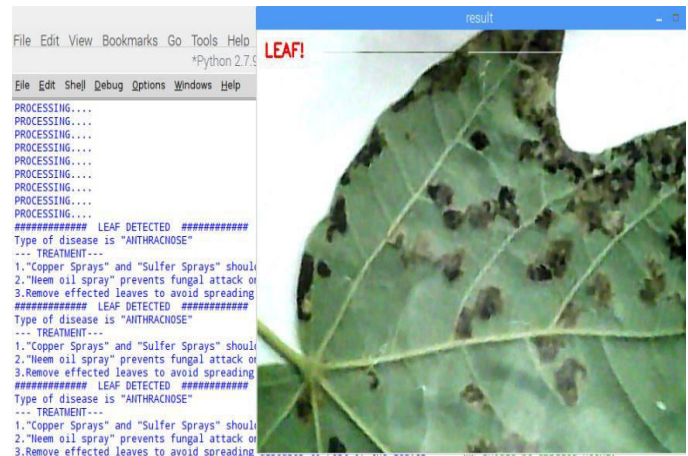

Figure 5: Leaf Disease Identification

3. ANIMAL ATTACK OBSERVATION

In this module, the system will observe the animals entered into the farm field by using camera. If any animal enters into the field the camera detects the animal and activates the buzzer.
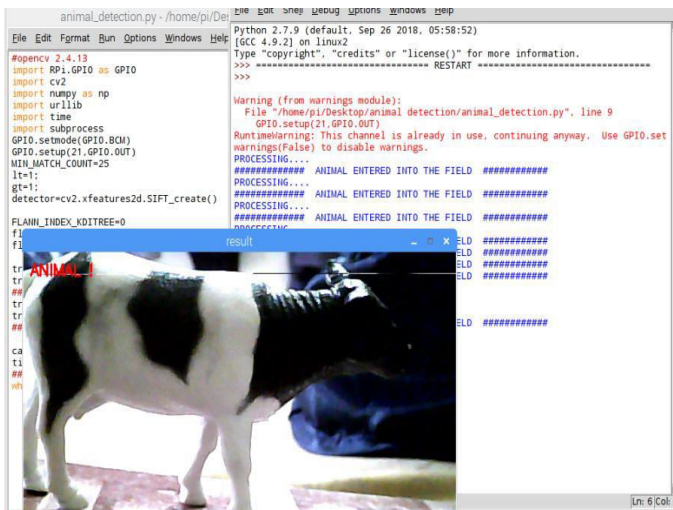
Figure 6: Animal Attack Observation

VI. CONCLUSION AND FUTURE ENHANCEMENT

In this paper the proposed project SMART FARMING serves as a reliable and efficient system and remedial action can be taken. The developed system is more efficient and saves a lot of time and helpful for farmers. This system is reducing manpower therefore less energy of the farmer is required. An extension of this work will focus on including mobile alerts and make the system completely automatic and in this the fruit ripeness is done through colour identification but in future we can implement it through calculating the duration for the ripeness of a particular fruit at every stage.

VII. REFERENCES

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