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## DESIGN AND IMPLEMENTATION OF PLANT DISEASES DETECTION USING AGRICULTURAL DRONE

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**ABSTRACT:** Agriculture is one of the keys to the significant growth of human civilization. In this progressive world, Automation has begun its supremacy in every field of work. But Automation in the field of agriculture is not as advanced comparatively. Thus, the requirement of developing an Automation system in the field of agriculture is imminent. One of the biggest challenges faced by farmers is the detection of diseases in crops during the early stages of growth. Where it is obliged to take care of the crops and also prevent them from acquiring any serious diseases, our project tends to create an autonomous drone for the detection of diseases at the early stages of crop growth. This project succeeds in detecting the diseases, which in turn helps the farmers to detect the crop diseases at their early stages. We use the image processing method to detect and identify these diseases and highlight the infected crop area using coordinates.

**Keywords:** Drone, Crop diseases, Image processing

### INTRODUCTION

In developing countries like India, the economy mainly depends on agriculture. In India, agriculture is the principal source of food as well as the primary source of income for farmers. Hence, a loss of cultivated crops due to a disease would indeed imply a significant loss of income for the farmers and if this happens on a massive scale, then it will lead to the scarcity of food. Agriculture also serves as a solution to many environmental problems and provides habitats, preserves the ecosystem and as well plays a role in the water cycle.

Plant diseases drastically reduce the quality and quantity of crops which destroys the potential benefits of agriculture. Reducing yield loss to diseases will typically allow farmers to produce food more efficiently, benefiting the

agricultural industry and the environment. Plant diseases are extremely important to be detected and properly cured at an initial stage else, the uncured disease might affect the entire farm and ruin it.

Currently, farmers have to carefully analyse each and every crop periodically to detect diseases, which is an extremely challenging and timeconsuming task (notably when the number of crops is enormous).

If we can automate the process, then this will yield massive benefits for the farmer. Hence, our main objective is to reduce the human effort and increase the accuracy to detect the disease and eliminate the traditional method of visiting the farm for identifying diseases by developing an automated system for the same.

### EXISTING APPROACH

In the existing plant diseases detection there are having So many drawbacks. There is no information what kind of pesticides to be used for the purpose of preventing the diseases. And also here we are implementing what are the images are captured by the drone is sends information to cloud network So that user can know the diseases name and how to prevent them.

### PROPOSED METHODOLOGY

We designed a drone that can be used to monitor crops and identify the plant diseases. Raspberry pi is the core of the system and is attached with camera module. As we can control the drone by using wireless technology like transmitter. Camera captures the pictures of various plants and it will analyze what type of disease by using ML algorithms -tensorflow This

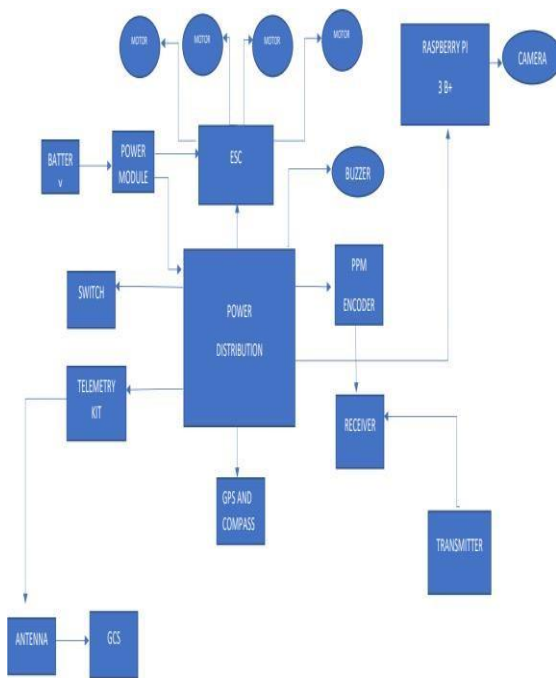
information is informed to farmer/respective persons to take action on it.

We have developed drone which can be controlled through transmitter, it simply takes the image of the plant and uploads it to the cloud server. Then this image is sent through a Convolutional Neural network which encodes this image into a numerical array and classifies it with the other numerical arrays in the model. The model is a TensorFlow model which is made into a TensorFlow lite model because of the large size of the normal TensorFlow model. This model helps classify the uploaded image numerical value to the dataset values. When a numerical array matches it calculates the confidence and displays the value which has the highest confidence. In this way, we can ensure that we always have the highest confidence value showing in the results. The proposed methodology is as follows:

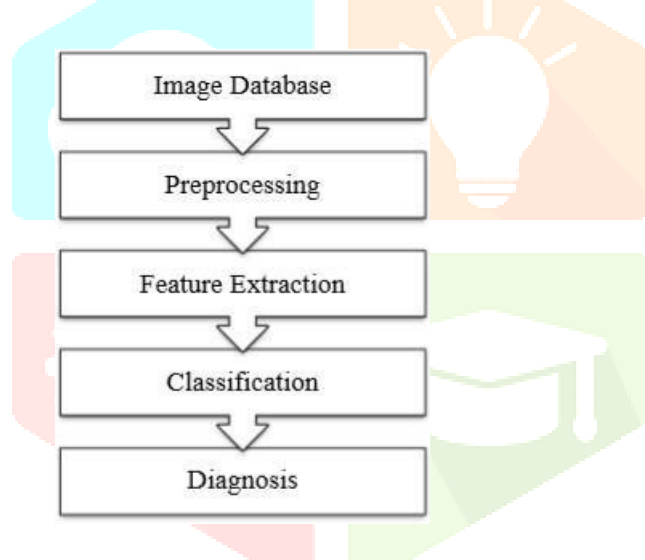
#### Dataset:

Plant Village dataset consists of 54,306 images of different plant leaves which are divided into 18 classes. The dataset consists of 13 types of plant species and 26 types of plant diseases. The dataset contains both healthy and diseased crop images .The images cover 14 species of crops, including: apple, blueberry, cherry, grape, orange, peach, pepper, potato, raspberry, soy, squash, strawberry and tomato.

Each class consists of two fields i.e. name of the plant and name of the diseases .Each of the images are resized and segmented for preprocessing and further classification.



**Figure:Block diagram of proposed Method**



**Figure 2.Flow chart of proposed system**

### ADVANTAGES

1. Scout your fields in less time.
2. Capture precise data that drives decisions and actions.
3. Efficiently track crops over time, for research.
4. Accurate farm analysis
5. Time & cost saving
6. Improved crop yeilds
7. Easy to identify the diseases
8. Helping fight climate change

### FUTURE SCOPE

In future, it can be implemented with mor features using IoT, like

1. It can send the parking diseases information to the users through cloud based network
2. It can also include the how to cure the diseases effected by the plants, and also what kind of fertilizers should used to prevent them

### CONSLUSION

Thus an application built for the identification of disease affected plants and healthy plants is done and this proposed work is focuses on the accuracy values during the real field conditions, and this work is implemented by having several plant disease images.

Overall this work is implemented from scratch and produces a decent accuracy. The future work is to increase the number of images present in the predefined database and to modify the architecture in accordance with the dataset for achieving better accuracy

### RESULTS

Firstly in this project we are using drone with Raspberry pi 4 to interface between hardware and software .Here camera gives the input to the Raspberry pi and it will capture the images . Based on this in the database the data will be updated. Database is connected to Raspberry pi through WIFI.



**Fig 3 :Output of Drone**



**Figure:Mango plant image captured**

## Output:

### Mango plant health analysis:

Name: Fungi

Common Names: None

Description: Fungi take energy from the plants on which they live, causing damage to the plant. Fungal infections are responsible for approximately two-thirds of infectious plant diseases and cause wilting, molding, rusts, scabs, rotted tissue, and other problems.

biological : ['If possible remove and destroy the infected parts of the plant (burn it, toss it into the garbage, or bury it deeply). Do not compost.', 'Apply ecological products for plant protection (e.g. neem oil, baking soda, soap).']

chemical : ['If necessary, apply a fungicide.']

prevention : ['Use resistant species and cultivars as well as healthy, certified seeds and seedlings.', 'Avoid overwatering. Ensure having good soil drainage.', 'Improve the air circulation around the plant.', 'Avoid prolonged wetting of the leaves -

avoid overhead irrigation.', 'Rotate crops. Avoid planting sensitive crops in infested soil.', 'Disinfect the tools and hands to avoid disease transmission.']

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