Plant Health Monitoring and Chemical Spraying Robot

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Abstract:- Plant Health monitoring is one amongst the foremost important tasks in any agriculture-based environment. India is one among the nations where agriculture and allied sectors are major employment sources. Thus, there have to be an efficient system for monitoring plant health condition and also for spraying of chemicals to plants. This paper aims at the monitoring of plant health condition supported color prediction calculation which helps in recognizing the difference between the healthy and non-healthy plants. This will be done by calculating HSN color values of plant leaves. The pictures of the plant are taken from the pi camera which is interfaced with the Raspberry pi. The raspberry pi is coded with the python to capture images and calculating color ratios.

We have a robot which can move in multi-direction and controlled over wireless using Wi-Fi, the same robot has raspberry pi with the camera installed which is employed to detect the crop.

Keywords:- Raspberry pi, pi Camera, Image Processing, Relay Module, Water Pump, DC Motors, Mobile, Web Page, 12v Battery.

I. INTRODUCTION

In India, agriculture is the main occupation and it contributes about 17 percent to the total Gross Domestic Product (GDP) of Indian Economy and agriculture engages around 60 percent of the labor force (population). It is estimated that about 45 percent gross loss occurs due to the infestation of pests and diseases per annum i.e., on a mean 20-30 percent of food is eaten away by pests and diseases. There are alternate methods for the prevention of pests and diseases and the commonest is spraying of chemicals. There are different ways for spraying of chemicals which include machinery and manpower. Implementing those methods will cause damage to laborers, other crops, soil, and atmosphere. These factors mean that farmers need to implement different technique which reduces respective damages and improves efficiency in cultivation. So as to attenuate those issues in spraying of chemicals we are introducing a robot which monitors plant condition by using leaves of the plant as subject and it automatically sprays chemicals to the plant having any pest attack. Pest attacks are often detected by the robot supported leaf damage like black spots, holes, yellow circles, etc.

II. TYPES OF LEAF DAMAGE

Needle mines: These are caused by insects feeding inside leaf or needle on mesophyll, between lower and upper epidermis. It is often seen as

Fig 1:- Leaf with Mines

Stippling damage: it is caused by piercing and sucking. It can be observed by small, circular dead black spots on the leaf and can be seen as

Fig 2:- Leaf with Stips

Needle damage: In this, a small part of leaf will be eaten and holes will be created in the leaf.it can be seen as

Fig 3:- leaf with Needle damage
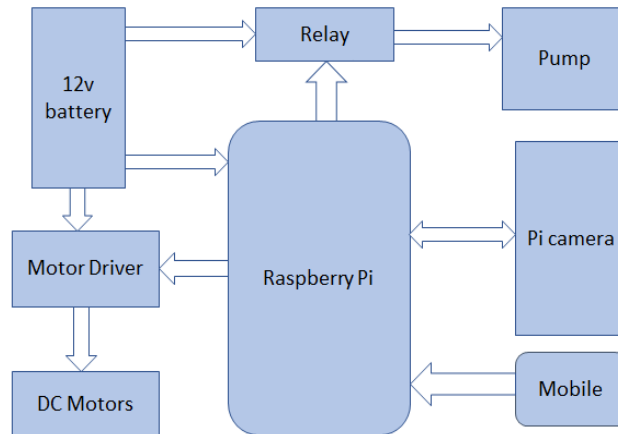
III. ARCHITECTURE AND FLOW CHART

Fig 4:- Block Diagram

IV. WORKING

Robot installed with all required equipment placed in field when power is on using battery source and here the direction of the robot is operated by using wireless through WIFI using webpage from user mobile. This robot will be operated from outside the field. When the robot movement starts a command is sent to the robot to start out camera for capturing images of plant leaves. The captured images are processed using raspberry pi and if there's any defect found with the leaves then the controller provokes relay to activate chemical spraying to that particular plant which will be arranged automatically based on plant height, also the movement of the robot is going to be stopped for a time programmed within the controller then continues. When reached end of the column the robot got to be set to other column and therefore the process of monitoring and spraying continues. Thus the robot performs health monitoring and chemical spraying to plants.
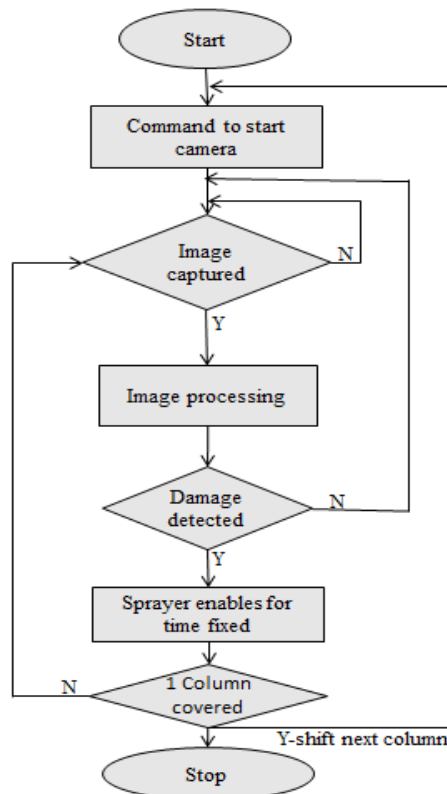
V. FLOW CHART

Fig 5:- Flow Chart of the System

➤ *Techniques for detecting and processing:*
- *OpenCV*

    It is an acronym for Open Source Computer Vision which sis a software library used in machine learning for real-time applications using image processing. All the operations related to images are mainly done using OpenCV.

- *Python*

    It is used for programming raspberry pi which supports all modules and packages having simple and clean syntax. It helps in connecting us to the real world.

➤ *Advantages*
- The effect on farmers will be reduced.
- Easy to handle.
- Low maintenance, cost-effective technology.

➤ *Disadvantages*
- Electronic components need to be handled carefully.
- The efficiency of the battery is low.

➤ *Future Scope*

    The robot movement can be made completely automatic by arranging different sensors for the robot. The battery efficiency can be improved by using solar power.

VI. CONCLUSION

    Thus this robot plays an important role in agriculture by reducing the effect of farmers, other plants and the environment due to chemicals spraying. As this robot sprays at a particular plant which is affected and at a height based on the plant there will be no effect on healthy plants and also soil and environment. The most important farmer will not be exposed to chemicals while spraying as the robot will be controlled from outside the field. Thus we can improve farmers' health and also efficiency in production.

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