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Agriculture Based Automatic Pesticides Spraying Robot For Crops

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ABSTRACT

One of the important occupation in a developing country like India is agriculture. It is very important to improve the efficiency and productivity of agriculture by replacing laborers with intelligent machines like robots using latest technologies. We tried to implement like new strategy to replace humans in various agriculture operation like detection of presence of pests, spraying of pesticides, spraying of fertilizers, etc. there by providing safety involves designing a prototype which use simple cost effective equipment like raspberry pi, camera, dc motors and terminal equipment which is an aid to the farmers in various crop field activities.

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I. INTRODUCTION

Agriculture is very important in Indian economy. It provides employments to over 60% of the population , In India cotton cultivation is done on a very large scale. Maharashtra is a traditional producer of cotton with production of 29.78% of total cotton production in India. Over 80% of production of cotton is produced by Khandesh, Vidarbha and Marathwada. Plant diseases detection and its management is a challenging task. Generally diseases are seen on leaves or stems of the plant. In this paper we present a approach to detect the grapes leaves diseases using image processing techniques . From reference , Control System Design of Spraying Robot Wang Fujuan College of Electical & Information Engineering XuChang University XuChnag, China, we examined that, about 80-90% of the diseases found on grapes leaves. Here we are detecting four diseases on grape leaves . So our study of interest is only on grape leaves not on entire plant.

The terms pesticides refers to variety of compounds like insecticides, fungicides, herbicides and others. The farmers suffers from various adverse effects of spraying pesticides like infertility, sterility, long term brain damage, respiratory disorder ;like asthama, bronchitis etc. This paper provides a solution to the health issues that arise due to the spraying of pesticides. The diseases found on grape leaves are detected in following steps. The image of the diseases leaf is acquired using a camera. Various pre-processing techniques like RGB to GREY, thresholding, boundary detection , cropping , segmentation , feature extraction analysis are performed. ANN is used as a classifier for testing the input image with the image already stored in database.

II. LITERATURE SURVEY

A lot of research has been done in digital image processing to improve the quality and quantity in agriculture production all over the world.

1.IEEE paper- Agriculture robotic vehicles based pesticides sprayer with efficiency optimization Authors: Aishwarya. B.V, Archana G UG Scholar

The developed system involves designing a prototype which uses simple cost effective equipments like microprocessors, wireless camera, various motors and terminal equipments which is an aid to the farmers in various crop field activities. This system involves usage of PIC Micro controller to control the movement of robot with the help of joystick (transmitter) and a receiver. The

wireless camera mounted on the top of the vehicle tracks the path taken by the robot.

2. IJECE journal Paper- Solar Powered Semi-Automatic Pesticide Sprayer for use in Vineyards ,Authors: Ahalya , Muktha , Veena , Vidyashree , Rehna
This paper presents a semi-automatic pesticide sprayer system which operates using solar power. The semiautomatic sprayer is a three wheeled vehicle which sprays pesticide in any given vineyard with almost nil human assistance. The vehicle is powered using an onboard solar powered battery which brings down the running cost. The control of the vehicle is achieved using an inbuilt microcontroller unit which is programmed to respond to the zigbee wireless device .Microcontroller used in this paper is AT89S52.

3.IJERMS Paper- Degarmo , Materials and Processes in Manufacturing (9th ed.) ,Authors: , E. Paul; Black, J T.; Kohser, Ronald A.
This paper deals with the exposition of how robotics can be applied to various phase of agriculture. One of the most important occupations in developing country like India is agriculture. It is very important the efficiency and productivity of agriculture by replacing labours with intelligent machine like robots using latest technologies. The paper proposes a new strategy to replace humans in various agricultural operations like detection of presence of pests, spraying of pesticides, spraying of fertilizers etc thereby providing safety to the farmers and precision agriculture.

III. PROBLEM STATEMENT

To design automatic spraying robot to implement the spraying method for crops to reduce the human efforts and to avoid continuous spraying caused ny mechanized non selective in which human drives a tractor.

IV. OBJECTIVES

1. To design automatic spraying robot for crops.
2. To capture an image using camera and to detect infected crop area.
3. To spray the pesticides on the infected area of crop.

V. PROPOSED WORK

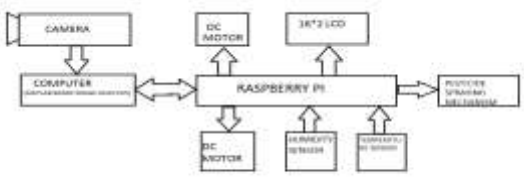

Fig.1. Proposed system

A. Database: Various image of grape leaves are collected and stored in database for training and testing. Database consist of image of normal and diseased leaves.

B. Image acquisition and preprocessing: The very first step is to acquire the images of grape leaves by a camera. Various image preprocessing operations like RGB to gray, thresholding , boundary detection, cropping is done for further processing and analysis..

C. RGB to HSV: First RGB image of leaves are converted into Hue, Saturation, value color space representation. Color model is the popular model because it is based on human perception. Hue is a color attribute that refers to the dominant color as perceived by an observer. Saturation refers to the relative purity or the amount of white light added to the hue and intensity refers to the amplitude of light.

D. Segmentation: After the HSV values of the leaf is extracted, the image is then segmented into number of blocks of equal size. In this approach block size of 10*10 is taken. So the blocks which are having more information are used for further analysis.

E. Feature extraction: In the proposed approach, color is the desired feature. In this phase, RGB values are converted to Hue, Saturation and Value for further analysis.

F. Classification: Here classification of input image is done by comparing with various images in database. In this proposed work ANN is used as a classifier. ANN usually called neural network (NN) is a mathematical model or computational model that is inspired by the structure and/or functional aspects of biological. A neural network consists of an interconnected group of artificial neurons and it processes information using a connectionist approach to computation.

VI. SPECIFICATIONS

1. DC MOTOR

Parameter	Value	Unit
Input Voltage	12	V
Speed	26	Rpm
Torque	588	mNm
Weight	160	G
Power	1.1	W
Diameter	37	mm
Length	27	mm

2. CAMERA

- Still resolution 1.3MP
- Weight 3gm
- Optical Size 1/4 inchs
- Vedio mode 720 p60

3. L293D IC

- SUPPLY VOLTAGE RANGE 4,5V TO 36V
- 600-mA Output Current capability per driver
- Separate input logic supply
- Thermal shutdown
- Internal ESD protection

4. RASPBERRY PI

- SoC: Broadcom BCM2837
- CPU: 4*ARM Cortex-A53, 1.2GHz
- RAM:1GB LPDR2(900)
- Networking: 10/100 Ethernet, 2.4GHz 802.11n wireless
- Bluetooth : Bluetooth 4.1 Classic, Bluetooth low energy
- Storage: microSD
- GPIO: 40-pin header, populated
- Ports: HDMI, 3.5mm analogue audio-vedio jack, 4*USB 2.0, Ethernet, Camera serial interface, Display serial interface

5. ARDUINO
   - Operating Voltage: 5v
   - Input voltage:7-12v
   - Input voltage: 6-20v
   - Digital I/O pins:14
   - Analog Input Pins: 6

VII.RESULT AND DISCUSSION

The operative results obtained with robotic selective spraying of diseases symptoms were quantitatively assessed through:

a) The sensitivity of selective treatment, i.e. the capability of covering real targets.

b) The capability of avoiding excess of unnecessary spraying.

c) The pesticides reduction of selective treatment, which expresses the reduction of used pesticides in comparison of a conventional uniform spraying distribution operated at same application rate. As one specific and illustrative result, blue chart in figure shows a disease spots as detected by system and corresponding spraying operated by robot. These result are compared with the “good truth” in the red chart which shows in the disease symptoms labeled by a plant pathologist by a visual inspection conducted prior to robotic pass, and the computed minimal spot spraying necessary to treat all the disease foci. The obtained reduction in pesticides use compared to conventional homogenous spraying of canopy was 84%. For this specific scenario, a potential spraying reduction

of 6% could have been attained by actuating the minimum number of spraying spots necessary to treat disease symptoms actually detected by the plant pathologist.

VIII. CONCLUSION

We have examined that how efficiently the grape leaf disease detection is possible with various image processing techniques. Recognizing the disease and spraying pesticides is the main purpose of purposed work. In future work van be extended to detect more number of disease in grape plants. Also over usage of pesticides can be avoided with proper control. Health issues related to farmers can be reduced by automatic spraying of pesticides. The result obtained above shows that and rust are the most occurring disease in grape plant. The efficiency of the purposed work is about 84%. This is a quite simple, accurate and robust method to detect grape diseases. This model can help to improve the productivity of grape in India.

IX. REFERENCES

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