Automatic Weed Detection and Plantation of Crops in Agricultural Field

D.Sathish Kumar1, M.Santhana raj2, R. Ramesh Krishnan3, U.RakeshKishen4, S.Ravieendaran 5, A.Natarajan6,

[1, 2]Assistant Professor (Sr.G.), Dept. of EEE,
KPR Institute of Engineering and Technology,
Coimbatore, Tamil Nadu.

[3, 4,5,6],UG Student, Dept. of EEE,
KPR Institute of Engineering and Technology,
Coimbatore, Tamil Nadu.

ABSTRACT

This article provides an overview of worldwide development and current status of precision-agriculture technologies based on literatures generated mainly during the past years. Agricultural robotics is the logical proliferation of automation technology into bio systems such as agriculture, forestry, green house, horticulture etc. Presently a number of researches are being done to increase their applications. The main goal of this paper is to develop a robot for the plantation and the weed detection purpose. Accordingly in the initial step, Seed is dropped automatically and then the crops and weeds are classified according to features extracted. And finally plantations of crops are done by means of robot. A brief discussion is being done about the types of robots which increase the accuracy and precision of the agriculture.

KEYWORDS:- Agriculture, Robotics, Technologies, Plantation, Feature extraction.

1. INTRODUCTION

India having agriculture as its backbone has less labours to harvest the crops in agricultural field. Hiring a labour to do harvest at a reasonable price is a tiring one. Although there are few mechanical equipment for the plantation of crops, it requires labours to handle these mechanical equipments. This eventually becomes an extravagant resource affecting the income of the farmer.

Nowadays due to water scarcity, the crops seeds are sprayed in a particular location. After a month the crops will grow for a certain level along with the weeds near the crop. So in order to separate weed and crop we are using weed detection technique using image processing and they are collected in the separate box. Collected crops are taken from the box with the help of gripper and are planted in the field for the further growth.

Our idea makes the work easier by designing an *AUTOMATIC WEED DETECTION AND PLANTATION OF CROPS ROBOT* that could perform three operations. The three operations are dropping seeds, weed detection and plantation of crops. These works are performed by a single robot in the field. The seeds are first dropped using mechanical gear arrangement and robot is controlled with the help of arduino microcontroller, which actuates the gripper which are used to plant the crops in the field. The weed detection is done with the help of image processing technique.

2. EXISTING SYSTEM

In the existing system for classify the weed and crop there are many algorithm are used such as colour property, topological property, wavelet transform, three-wide band interference filter but the classification accuracy is less. The main difference between the proposed system and the existing system is classification accuracy.

ALGORITHM	ACCURACY
Spectral reflectance property	86%
Colour property	49 to 97%
Topological property	84 to 90%
Texture feature	33 to 77%
Wavelet transform	87 to 93%
Pattern matching algorithm	92 to 96%

Table 1; **Various Algorithms and its Accuracy**

3. PROPOSED SYSTEM

This agrobot performs three operations and the operations are seeds dropping, weed detection and plantation of crops.

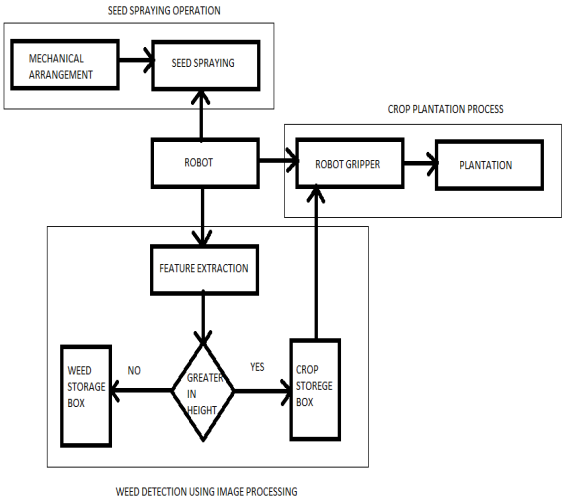

Fig. 1. Functional Block Diagram

3.1. Seeds dropping

The design is simple, economical, rigid and user friendly. Mechanical arrangements are done to drop seeds in the field.Robotic wheels are programmed with the help of arduino microcontroller so that it can be able to move in any directions. The seeds are placed in the tray which has some holes in it. So as the robot is moving in certain directions the seeds will drop in those areas and finally the seeds are allowed for a month to grow.

3.2. Weed detection

After a month the crops will grow for some certain length along with weeds. During that time using image processing the weeds should be detected and crops alone are collected using gripper and are stored in the box.

In the proposed system there are three main parts first one is IMAQ, second one is pattern matching and finally the report generation. It is shown in the below figure 1.

The main objective of this paper is to introduce a new weed controller using the pattern matching algorithm. For much machine vision application the first step is the pattern matching algorithm. This algorithm needs to maintain its capability to locate the template pattern even though the image is changed. In this the test image is acquired by the any type of digital camera such as web cam etc.., first step for the weed detection is image acquisition. After that the output of the image acquisition is given as the input for the pattern matching algorithm. According to that report generation tool kit is generate the report in word and excel.

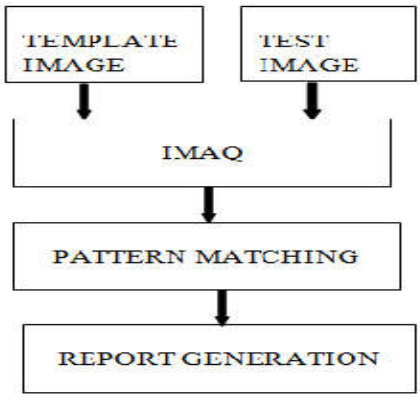

Fig 2.Flow Chart

3.2.1. IMAQ

IMAQ means image acquisition which can be through any category of digital cameras such as web camera etc., the camera shall be perpendicular to the ground and it was above the ground of 1.30 meters height. In this height all the test image was covered and that is suitable for weed detection. In this IMAQ both the test image and the template image are the input images. The test image is a image in which we want to search for a template image. The template image is nothing but an image gives the details which want to separate.

3.2.2. Pattern Matching

NI Vision builder provide the pattern matching algorithm. Pattern matching algorithm must able to locate the template image in a test image if the test image is scaled or rotated. In this it need to set the parameter such as curve parameter, matches, minimum score match pixel etc.., after that search for a template pattern in an test image in which curve parameter and the matches are clusters. There are many pattern matching algorithm in vision builder here I use the IMAQ Match Geometric Pattern 2 VI.

3.2.3. Report Generation

Report generation is one of the tool kits in the vision builder. By using the report generation tool kit we can able to generate the report in the Microsoft word as well as the excel sheet. Here the data generated is the random value. If the value is generated by the report generation tool kit then the inspection or test image have the template image. If suppose the value is not generated by the report generation tool kit then the test image does not have the template image.

4. EXPERIMENTAL RESULT

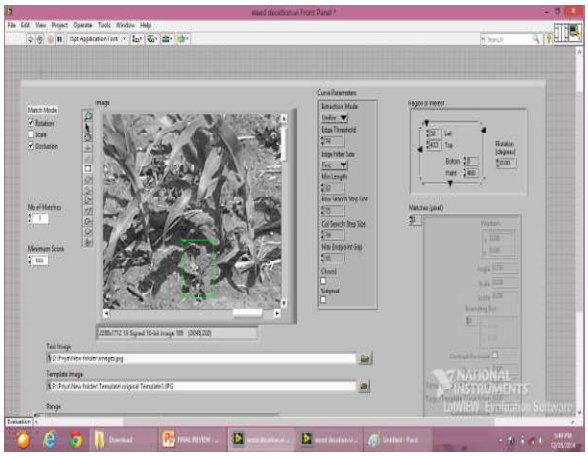

Fig 3.Front panel for weed detection

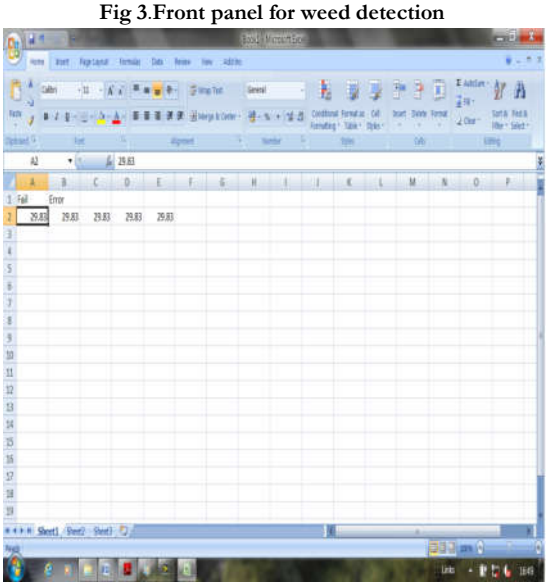

Fig 4.Report generation in Excel

5. PLANTATION OF CROPS

After weed detection the crops will be stored in the separate box and the collected crops are planted in the field with the help of gripper which is connected with the servomotor. These servomotors are used for the speed control and position control of the robotic arm and the gripper. The gripper is programmed using arduino microcontroller and the actions that are programmed will get executed and finally the crop is again planted in the field for the further growth.

6. FUTURE ENHANCEMENT

Camera image has to be taken and fed to the system. Then the image is processed and the information from the system is given to the robot gripper through arduinomicrocontroller. Finally processing and verification will be done. Then we extend our prototype to agricultural field.

7. CONCLUSION

The application of new popular robotic technologies for agricultural guidance systems will augment the realization of agricultural vehicle automation in the future.In agriculture, the opportunities for robot-enhanced productivity are immense – and the robots are appearing on farms in various guises and in increasing numbers.

REFERENCES

1. *Amruta A. Aware, Kavita Joshi. "Wavelet Based Crop Detection And Automatic Spraying Of Herbicides". (Feb 2015).*
2. *S. Jane Morton. "A review of the National Weed Detection Project".*
3. *Muhammad Asif, Samreen Amir, Amber Israr. "A Vision System for Autonomous Weed Detection Robot". (June 2010).*
4. *Priyadharshini.S, Sathishkumar.B.S. "Developing a real time smart herbicide sprayer robot and automatic weed detection system". (Jan 2015).*
5. *SajjadYaghoubi, Negar Ali Akbarzadeh. "Autonomous Robots for Agricultural Tasks and Farm Assignment and Future Trends in AgroRobots".*