AUTONOMOUS FARMING ROBOT WITH PLANT HEALTH INDICATION

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ABSTRACT

Agriculture is very labor intensive field and only field where the robots are not involved. Now-a- days many industries are trying to reduce this human labor by making robots and machines. A vision-based row guidance method is presented to guide a robot platform which is designed independently to drive through the row crops in a field according to the design concept of open architecture. Then, the offset and heading angle of the robot platform are detected in real time to guide the platform on the basis of recognition of a crop row using machine vision. And the control scheme of the platform is proposed to carry out row guidance. Here we are designing a autonomous intelligent farming robot which indicates the plant health by observing the color of their leaves and based on the height of the plant. The robot also notes the surrounding environmental conditions of the plant like temperature, moisture and humidity so that the robot will decide about health of plat and will display on the LCD. The robot has also watering mechanism it will water the plants according to their needs by observing soil moisture and humidity. It will also tell when the cutting process should take place by observing the leaf color.

Keywords*: *Open Architecture, Image Processing, Environmental Conditions, Health.

I. INTRODUCTION

In this project, we are going to make a robot which uses vision based row guidance method to drive through the row crops. Ultimately, a unique system has been described for Plant & Food Research which makes use of a number of electrical and computer systems engineering theories. A prototype robotic arm has to be designed, developed and constructed, which should be integrated with motors, controllable using specific electronic components and custom computer software. A number of sensors are integrated into the robotic system including color, proximity, temperature and humidity systems. The system required the use of vision, with custom algorithms being developed to identify plant growth rates. The entire system will integrated into a fully automated package. This allowed the system to autonomously return to specified sites (i.e. individual plantlets) at set time intervals to identify subtle changes in growth rates and leaf color. This provided the potential for plant nutrient levels and the immediate environment to be routinely adjusted in response to continuous sensing resulting in optimized rapid growth with minimal human input.

II. EXISTING SYSTEM

From the start of human, humans are worked in the farms directly but from the start of 21st century many industries are worked to reduce this human labor by making robots and machines. Many industries developed

machines for the specific task likepicking, harvesting, weeding, pruning, planting, grafting, agricultural classification, etc. And they gradually appear advantages in agricultural production to increase productivity, improve application accuracy and enhance handling safety. Robots are increasingly being used to sort, grade, package and even pick fruit and vegetables. For example, an autonomous wheeled robot has been developed to pick orange from orange-farm using vision to identify both fruit quality and as a means of navigation. The robots are made which observe the leaf color based on RGB color standard and also investigates the chlorophyll a and Lipid contents to investigate the plant health. For this purpose many color sensors and image processing technology is used.

III. PROPOSED SYSTEM

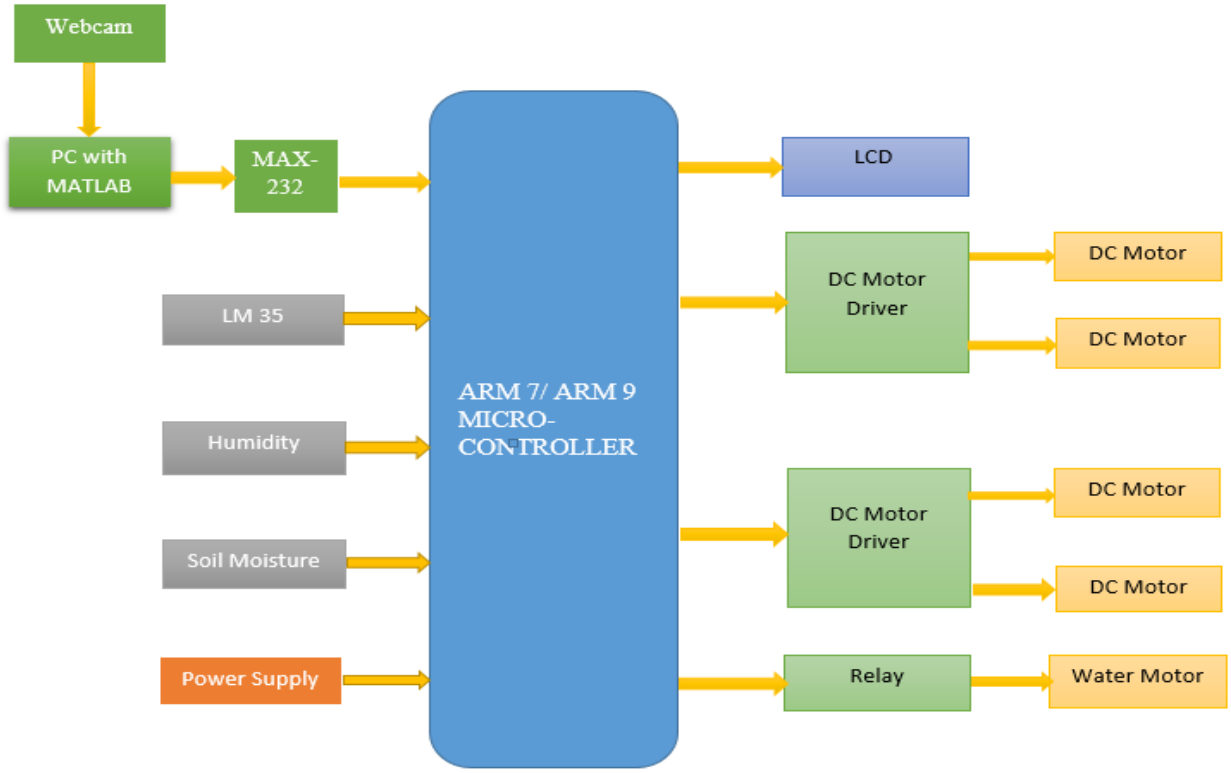

Fig. 1: Block Diagram for Proposed System.

Figure 1 shows the detailed block diagram for the proposed system.

3.1 Block Diagram Description

In this project we are designing the agricultural autonomous Robot which will sense the conditions in real time and then decide which plantation is best suited for that particular field. For this, we are analyzing the field parameters such as, Temperature, humidity, soil Moisture etc. The Robot will also have a Plough to plough the fields, and then a seed dispensing mechanism, Watering mechanism so, in all this is a completely autonomous robot. The main feature of the Robot is the Ability to sense the health of plants using Image processing. For this we are using a special purpose Web-cam which will take photos inside the field and analyze the growth according to the height, colorization of leaves etc. So, based on this we can generate an estimate of percentage of healthy plants in a given crop field. A vision-based row guidance method is presented to guide the robot platform driven along crops planted in row. And the offset and heading angle of the platform are calculated by detecting the guidance row in real time in order to guide and control the platform. Vision-based row guidance is

to use camera to detect and identify crop plants and then to find accurate and stable navigation information from the binary image. The captured image are then processed by using image processing technique, the processed are then converted into voltage levels through MAX 232 level converter and given it to the microcontroller unit. In the microcontroller unit, c language coding is predefined, according to this coding the robot which connected to it was controlled. Robot which has several motors is activated by using the relays. Relays are nothing but electromagnetic switch which ON/OFF according to the control given by the microcontroller unit.

IV. FEATURES

1) **Fully automated system thus reduces the human labor.**
2) As we are making a fully autonomous robot which works on open architecture principle and done lot of work in farms so it reduces human labor.
3) **Saves time.**
4) As we are using machines which works faster than human efforts which definitely saves the time.
5) **More Accuracy.**
6) The system observes different environmental conditions and take actions accordingly which humans can't do accurately.
7) **Low Cost.**
8) We are using sensors and drivers for making this system which are easily available in market and cheap which reduces the cost of system.

V. APPLICATIONS

This system can be used only for agricultural system.

1) It can be used to know the plant health.
2) It can be used for watering.
3) The system also tells at which time cutting process should be done.

VI. FUTURE SCOPE

1) We can increase robots accuracy of detection of leaf color correctly by using high quality camera.

2) **Wire-less System**.
We can make this system wireless by using RF connectors.

3) The system can further modified for picking fruits, and actual cutting process by the system.

VII. CONCLUSION

The proposed system is open architecture so any one can make this type of system using any way or path. The system uses image processing to observe the leaf color which increases further accuracy of the system as it identifies color very accurately than human. The system also observes different environmental conditions such as humidity, soil moisture and temperature which human cannot measure accurately by open eyes to decide the plant health so the accuracy of the system is high. It also involves watering mechanism and cutting process which reduces human labor and we can reduce labor further by modifying the system further for other agricultural work such as picking, harvesting, weeding.

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