Intelligent Autonomous Farming Robot

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Abstract: *Developed agriculture needs to find new ways to improve efficiency. One approach is to utilize available information technologies in the form of more intelligent machines to reduce and target energy inputs in more effective ways than in the past. This paper represents designing an 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, so that the robot will decide about health of plant and will display on the LCD.*

Keywords: ARM7, Image processing, Irrigation Robot

1. Introduction

In Agriculture sector plants or crop cultivation have seen fast development in both the quality and quantity of food production, however, the presence of pests and diseases on crops especially on leaves has hindered the quality of agricultural goods. If the presence of pests on crops and leaves is not checked properly and the timely solution is not provided then the quality and quantity of food production will be reduced, which results in upsurge in poverty, food insecurity and the mortality rate [6].In the current generation most of the countries do not have sufficient skilled man power specifically in agricultural sector and it affects the growth of developing countries. So it's a time to automate the sector to overcome this problem. In India there are 70% people dependent on agriculture. So we need to study agriculture. 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.

2. Literature Survey

DTMF is used which converts the desired frequency in to analog signals which is received by DTMF Decoder and given to AT89S52microcontroller.The microcontroller is used for controlling the robot according to the frequency received by the DTMF receiver. To control the devices from remote place we are using a DTMF technique [1].R. Pydipati etal. Offered algorithms which were based on image processing for the purpose of feature extraction and classification. Color co-occurrence methodology was used for extracting features, which uses both the color and texture of an image to draw unique features of the input image. Though, there are crucial drawbacks to this methodology.[2].

Santanu Phadikar et al. explained a system in paper for detection of diseases taking into reference various diseases in rice plants. Image growing and segmentation techniques were used to detect diseased portions in the plants. In this features of the images were extracted using Zooming algorithms. Self Organize Map (SOM) neural network is utilized for classifying of the diseased rice leaves.[3]

Shen Weizheng, et al. has performed an image processing based method for grading the leaf spot disease in plant leaves.[4] They performed an analysis on all the influencing factors that were present in the process of segmentation. Otsu Method was used to segment the leaf regions. In the HSI color system, H component was chosen for segmentation of the diseased spot. [5]
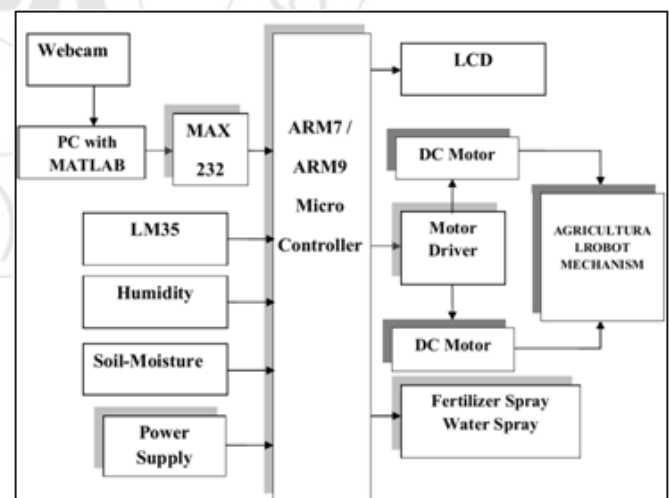
3. Proposed System

Figure 1: Block Diagram of Farm Robot

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.

4. Result

Figure 2: Leaf of Grapes

This image of grape leaf is captured through the web cam connected to ARM 7 Hardware.
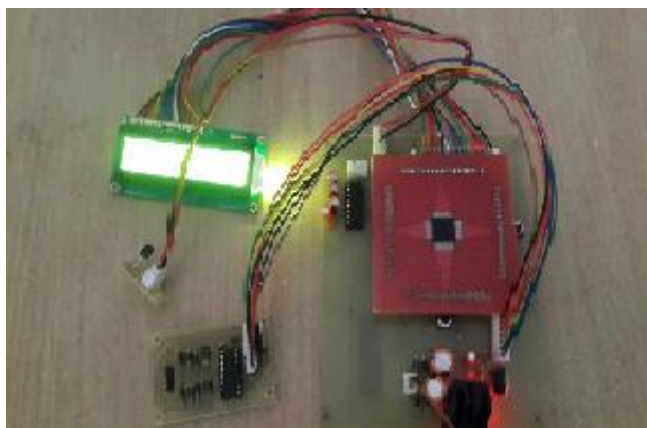

Figure 3: Hardware of ARM 7 & Result

With the help of web cam we took photo of grape leaf And then this image is detected by ARM 7 hardware and result is displayed on LCD with the help of programming. This system also detect temperature of atmosphere. And Result is displayed on LCD. Which can be helpful for maintaining the required temperature for particular plant

5. Conclusion

This paper gives the progress made towards achieving a future autonomous farming system. This system detecting the plant .The system also observes different environmental conditions such as temperature which human cannot measure accurately by open eyes, which will be helpful to maintain suitable temperature for plant. With the help of image processing technique we can differentiate between healthy and unhealthy plant and will take suitable preventive care.

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