

**International Journal of Engineering Research in Electronics and Communication
Engineering (IJERECE)
Vol 4, Issue 2, February 2017**

Autonomous Robot for Agrilife

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Abstract:— This paper represents the system which perform high speed operation for an advanced agricultural process which consist cultivation based on the robotic platform. The robotic system is an electromechanical system while the artificial system which is driven by the DC motor which has four wheels. Depending upon the crop, considering particular rows & specific columns the watering operation is performed. The robot will sense the crop on both sides and after detection of crop it will shower them equally and at a proper distance. For which proximity sensor would be used. Assembly language is used for programming the microcontroller. Microcontroller is the heart of the system which is used to control and monitor it with help of the DC motor.

Keywords:-- Agricultural robot, proximity sensors, DC motor & microcontoller.

I. INTRODUCTION

Looking towards the current generation many of the countries are not developed in skilled man power specifically into the agricultural field which affect in the growth of the developing countries. It is high time now to overcome this problem and so it is time to automate the agricultural field. In India 70% of population feed on agriculture and even we know that monsoon is a major problem in some state of India. The innovative idea of our project is to automate the process of watering the crops mainly for the cotton crops and to decrease the human work and speed up the production. Watering of plant will be done with the help of sprinklers at the end using the microcontroller. It completes its process and comeback to its position. This whole process is controlled by the microcontroller which is the heart of this robot. The other methods of watering the crops are manual one which require more time and there is shortage of man power. Basically, small farmers are the main focus as they are the ones who gets affected the most, in order to increase their production and decrease in failure this robot will be a live savior. As the new robots are getting smaller and smarter their price would also be affordable even for the small farmers.

Sr No.	Parameter	Manual	Tractor	Robot
1.	Man power	More	Moderate	Less
2.	Time required	More	Less	Less
3.	Distance between plants	Not fixed	Not fixed	Fixed
4.	Wastage of plants	Moderate	More	Less
5.	Energy required	High	Very high	Less
6.	Pollution	No	More	No

Need: The main purpose of Automation is to reduce the man power in our country; the phraseology in all industrial firms generally consist of electric, electronic as well as mechanical components. Autonomous innovation would save a lot of tedious time and help in speeding up the production. A manual farmer requires more time so this is the time to automate the process of watering.

II.EXISTING METHOS

i) Drip Irrigation

Drip irrigation is a form of irrigation that saves water and fertilizer by allowing water to drip slowly to roots of many different plants, either into soil surface or directly

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onto the root zone through dripper. Indeed it is one of the beneficial methods it consist of some drawbacks

1. Initial cost is more than any system.
2. The maintenance of these systems is very high and unaffordable for small farmers.

ii) Surface Irrigation

Surface irrigation is defined as group of application technique where water is applied and distributed over the soil surface by gravity. It by far most common form of irrigation throughout the world and has been practiced in many areas virtually unchanged for thousands of years. Disadvantages:-

1. Water required is more than any other system of irrigation.
2. Sometimes its excess use may damage the growth of crops.

Looking towards the situation of irrigation in the agricultural field the small farmers are facing a huge problem. Talking about the cotton farmer he either waits for the monsoon to come or starts cultivating before the first rain and due to the rainfall issues in India especially in Maharashtra the distance between first and second rainfall is huge either it rains a lot or it does not rain for a long time. In this situation when the farmer gathers lots of water from the first rain it could be easier for him to water the crops so that they don't get damaged incase of water shortage. Human power is less and other systems are expensive for the farmers to afford this robot will definitely help them to reduce their efforts and lead to increase in production.

III. PROPOSED WORK

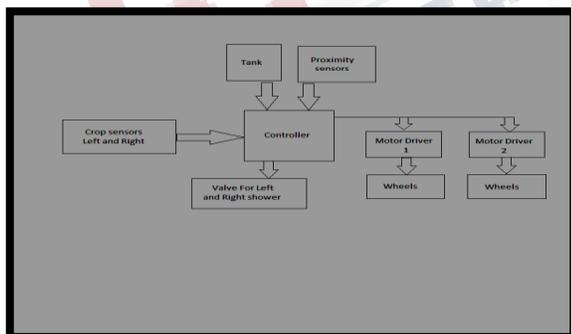


Figure 1

The block diagram in the proposed system (Fig.1) in which the robot consist of PIC16F877a microcontroller,

acting as heart of this robot. While the sensors (left, right and front) and LCD are the supporting elements for the controller. The Proposed system integrates multiple operations into a single robot. The wheels are connected with sprinklers to water the crops and to spray the pesticides whenever required. The proximity sensor detects the crop and water them. IR sensor detects the obstacle in its pathway. To check level of water temperature sensor and for pesticides the sharp sensor are used. If there is insufficient water then the alert buzzer will produce the sound and let the farmer know about it. There will be motors which will move the wheels in forward and backward direction as needed.

The block diagram can be discussed as follow:

Proximity Sensors- Proximity sensors are sensors able to detect the presence of near by object without any physical contact. Proximity sensors obtain electromagnetic field or a beam of electromagnetic radiation and looks for changes in the field or written signal. The object being sensed is obtained referred to as the proximity sensors target. We are using this sensor to detect obstacle. The maximum distance that is sensor can detect is defined nominal range. Some sensors have adjustment of nominal range. We are using this sensor to detect any kind of obstacle or dyke which is made at the edges of farm in order to control flow of water or show the end of farm.

Crop Sensors Left/Right- The use of crop sensor technology in grains, cereals and other production is one technique to increase plant health and yield potential. Crop sensors measure the need of your crop and provide application rate recommendation for agrochemicals in real time to maximize your profit. Crop sensors use a red edge light wave to scan plants. The crop sensors also detect the plants on left and right side, they will water the plant only if it is present on any of side.

Valve For Left And Right Shower- As we are using sprinkler on both the sides of the robotic car we have to use valve on both end of pipe. If plant is detected then the valve get open the shower the plant.

PIC16F877a- The PIC microcontroller PIC16f877a is one of the most renowned microcontrollers in the industry. This controller is very convenient to use, the coding or programming of this controller is also easier. One of the main advantages is that it can be write-erase as many times as possible because it use FLASH memory technology. It has a total number of 40 pins and there are 33 pins for input

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and output. It is used in remote sensors. It controls the movement and overall function of the robot regarding the irrigation purpose.

IV. ALGORITHMIC IMPLEMENTATION

1. Start
2. Initialisation of all input and output sensors and the LCD is set to ON mode.
3. Start switch is pressed.
4. The robot moves in the forward direction.
5. If obstacle detected it will wait and avoid the obstacle.
6. If not, then move further.
7. When robot will detect crop on both sides it will water them with left/right sprinklers.
8. It will work until it completes the process.
9. End

V. RESULTS

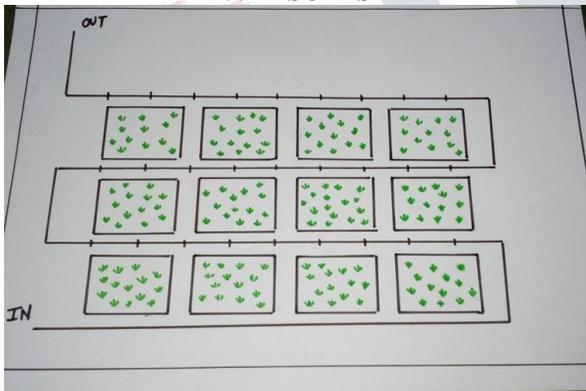


Figure 2

As shown in the fig 2 is a replica of a field. The IN section is the entrance of the robot it will enter for watering purpose of crops. The robot travels through the field detecting the crops. Once it finds the junction that is the crop it will start watering in their particular area. The water tank will be placed over the robot. The robot will continue his process till it reach the end of the field that is OUT. In this way the whole field gets sufficient water and even there is no manual work needed.

VI. FUTURE SCOPE

As future scope we can use solar panels over the robot so that it will simultaneously water the plant and the battery will get charged due to the solar energy. We can even use an arm over the robot with a camera over it which will be helpful for picking purpose like cotton, mushrooms etc.

VII. CONCLUSION

Watering process for the cotton crop with an ease and reducing the manpower is implemented by using this autonomous robot. This robot will help in farming process and can be more enhanced by designing a chain roller it can be an application real time agriculture.

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