

SOIL INSPECTION ROBOT FOR HYPERPONIC PLANTATION

Mr. G.Gunasekaran¹, N.M. Ananthi², K.S. Arulmurugan³, and R.Karthikeyan⁴, R.Rathipriyanga⁵,

¹ Assistant Professor/Department of Electrical & Electronics, Erode Sengunthar Engineering College, Erode, Tamilnadu.

^{2,3,4,5} UG Scholar, Department of Electrical & Electronics, Erode Sengunthar Engineering college, Erode, Tamilnadu..

Our India is agricultural country. In the entire resource of India agriculture plays a vital role. There are so many methods are already implemented in the agriculture domain but in modern technology every system has a problem and it needs another methodology to resolve the problem. By monitoring all the implemented technology we found one thing that the number of sensors used is large and they use the tedious way of identification of parameters. In order to reduce the number of sensors and the difficulty of the detection methods we introduce the rail dripping system along with a new method to grow the plants in a another way called "Hyperponic".The objective of the project is by using the RTOS and PIC controller we can get a new highly efficient way of automatic irrigation system and the requirement of land cultivation also reduced. In future we can easily extend the system for R&D area. The water absorption rate is calculated in this method.by doing this so we can give the betterment to formers life and their economic condition

Index Terms— Hyperponic, RTOS, PIC controller, soil moisture sensor, humidity sensor,I²C

I. INTRODUCTION

India's major source is always dependent on agriculture. India's geographical view 70% of land is agricultural land. Formers were suffered a lot because of water scarcity they spend their money to buy water and given to the plants. They get the profit of their spending on pesticide and manure, they didn't get for the amount that they spend for water.so that they became very weak in economical. The Indian government going to pass the law for their suffering, That is the water tax should be included to the rate of rice this will give the equipment for the farmer economic condition. As an engineer we should do something for the formers to know the amount of water absorbed by the crops and other factors. Then only they can include that exact amount to the rice rate. This will be the proper system for implement that law. And another advantage is the water is not wasted for unnecessary reasons and it is used in the proper manner. This will give the betterment for agricultural field and land cultivation also

II. EXISTING SYSTEM:

The implemented system is called automatic irrigation system. It identifies the various factors such as moisture content, humidity of soil in certain area, temperature, the intruders, water level, and field information. The system send the message to the person. Also it does all the process automatically. They using solar panel for power supply to improve the efficiency of the system. They did this all the method in different ways but the problem in this all method are same. That is they are using too many sensors for large area. The cost of the project also increased as increased in number of sensors. Absolutely it works in excellent manner for water conservation.it doesn't take care about the water absorption factor. Finally those project didn't care about the

land cultivation. Hence to resolve all those problems we are going to this project. The each and every existing model is described below along with their merits and demerits.

The first method of irrigation system was called Agricultural automation system using wireless technologies.In this project they are so many papers are available in the same concept with a different ideas in those projects they were using Zigbee,GPRS,WEB,GSM,WSN and SMS concept of Android phones they were proposed a system along with a different embedded platforms. In those methods they were used for targeted area only & not for a big plantation. The usage of sensors also very high in nature and some methods worked around 2400m².

[2]The second methods of this irrigation system was known as soil moisture and humidity sensor array along with the solar power based irrigation system. This unit using humidity sensor soil moisture sensor, temperature sensor fuzzy logic methods with the different processor and controller unit they subsequently controlled all the field information. The various controllers were Ardino ,PIC,ARM processor.

[3] The third methods are also same that of second method but the difference was the programmable system using LI-FI technology. The speed of the signal transmission is very high. The other procedures are followed as it was in the previous methods.

[4]The fourth methods are smart, cost effective, simple and innovative methods of irrigation system. In this methods they were using the perforated tube or normal PVC pipe with the number of pours are inserted inside the root zone of the plants and the water level could be easily predicted by the former

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there were no other advanced technology was not used in those projects.

[5] The final methods were the implementation of all those technologies in the same project by analyzing all the merits and demerits of each projects. And implemented a In this system of implementation leads to high cost. And it will create a very advantage to the plants because of its accuracy.

III. OVERALL MERITS OF EXISTING SYSTEM:

- Latest technology
- High speed
- Highly efficient
- Power saving is high
- Simple methods

IV. OVERALL DEMERITS OF EXISTING SYSTEM:

- Number of sensors are high
- Need skilled persons
- High cost
- Not flexible
- Land requirement is high
- Same concept with different arrangement
- Not for R&D

V. PROPOSED SYSTEM:

The new invention introduced in the irrigation system called "HYPERPONIC". The system having the "ROBOTIC CAR" with a SINGLE humidity sensor. Each and every plants condition is measured without absence. The changes are made in the both mechanical and electrical setup. The plants are monitored periodically without skilled persons. This setup is the advanced method for already implemented irrigation system. The system is flexible for future extension. The land cultivation problem is reduced by implementing this system. The replacement of the components also very easy and all the components used in this project are having highly speed and accurate.so the system is very useful for both field and research center.

VI. HARDWARE DESCRIPTION:

- Regulated power supply
- Quadruple Half-H drive
- PIC microcontroller
- Bluetooth module
- Soil moisture sensor
- Water level sensor
- Buzzer
- Amplifier & relay circuit
- LCD display
- Motor
- Pump
- Keypad

- Mechanical parts

a) Regulated Power supply:

The power supply may be the battery, direct power supply or may be the solar panel. Here we are using direct and also the converter circuit power supply. Because of sensors and microcontroller unit we are using converter circuit to step down the supply and connect to the various components. The step down transformer also used in this circuit for better performance. Supply system is very much important to the every system, And the all the performance of the system is dependent on the supply power so care should be taken for the supply power.

b) Quadruple Half-H Drive:

The device which is used specifically for motor unit of the system for good power supply for motors and its protection.it has good noise immunity inputs

c) PIC Microcontroller:

The PIC16F877A controller unit is used here because of its easily erasable FLASH technology and it is having the high performance RISC CPU and only 35 instructions are present so it is very easy to program and the speed also high compared to other controllers.

d) Bluetooth Module:

The Bluetooth module is the device which is used for short distance and it is very low cost. We are implementing it for a trial version HC05 is the Bluetooth toggle used here.it is a very easy serial port protocol.is is a-80dbm sensitivity and also uses low power. It is having integrated antenna with edge connector. The software features of this device were auto connecting to the last paired device and easy pairing and auto reconnect .very flexible to use. This device is very important for this project because without this device we can't send the information to microcontroller.

e) Soil Moisture Sensor:

The moisture content of the soil must be checked for certain period of time to take care of the water conservation and also the plant conservation .and also it prevent the plant from the wilting .The prod is having the soil moisture sensor and that sensor is fixed in the robotic car that will transport the sensor to every plant root. Then it will check the moisture content of each and every plant.

f) Water Level Sensor:

It is the sensor which is used to monitor the water level in the tank and also it sends the reading to the microcontroller unit to turn ON or OFF the motor to fill the tank, by using Bluetooth device

g) Buzzer:

The sound alarm circuit used here for protection and give an alert signal to low water level and any other problem

International Journal of Advanced Research in Basic Engineering Sciences and Technology (IJARBEST)**Vol.3, Special Issue.24, March 2017****h) Amplifier and Relay Circuit:**

These circuits are used her for protection and also the signal amplification. The protection may be from the short circuit and over current in the circuit.

i) LCD Display:

The LCD is used for the users to know about the field parameters. This is used to show the statistical data for previous field measures.

j) Pump:

Centrifugal pumps are used hereto transport the liquid into one place to other.it is also used to discharge the large water in the smaller heads.

k) Keypad:

The numeric keypad in the palm sized seventeen key section of a computer is used in this project. It is having the digits, arithmetic keys and special keys to give any input to the controller.

l) Motor:

The small dc motor are used in this project for two purposes one is to run the car and other is to fill the water tank.

m) Mechanical Parts:

The mechanical parts used in this system are railing track for the robotic car. A small car like model with a high mechanical strength to hold the small water tank .The special arrangement need a PVC pipe and iron rod to hold the PVC pipe arrangement and the tripping system may be used.

VII. WORKING OF THE PROPOSED SYSTEM:

The working of the system starts with the motor control of a Robotic car. The car starts by the Microcontroller signal and it is starts to run on the railing route in the field. By reaching the plant the arm of the robotic car with the soil moisture sensor raises and inject it in the root side of the plant.

SOIL MOISTURE SENSOR:

The sensor senses the humidity in the root zone of the plant and sends the signal to the microcontroller by the usage of the Bluetooth Module in the car.

THE WATER LEVEL SENSOR:

It is also used here for the water tank level in the nearby water tank in the field. All the sensing readings are send to the controller by the Bluetooth signal

After sensing the water content in the plant according to the reading the motor is ON and the water is sprayed in the root of plant. This process is continued for every plant. The microcontroller controls all the process in the system and monitor all the systems in the periodic manner so that there is no need of skilled persons in the plant. It also save the data for

every time for future purpose. The small water tank also fixed on the robotic car for spraying water. If the water tank is empty it will create the buzzer sound and it sends to the nearby large water tank and fill the water. After finishing all the process in the field the readings are displaying in the LCD display. The any misbehavior in the system is protected by the protection unit and alarm unit. The process should be continued in the cyclic manner.

VIII. ADVANTAGES OF PROPOSED SYSTEM:

- Easy and Flexible
- Low cost
- Easy to extend in future
- No need of skilled person
- Very accurate reading
- Number of sensors are low
- The replacement is easy
- High speed of communication
- Land cultivation is reduced
- No pollution

IX. EXPECTED RESULT:

The car should be move and stop for each plant root zone and inject the sensor in the soil and measures the water content and sends the reading to the microcontroller with the Bluetooth device and according to the measures the motor ON/OFF and the water level is checked by the sensor and give the alarm when the water level is low all the reading should be monitored and display in the LCD.

X. FUTURE SCOPE:

This system is having high degree of future scope because of this less sensor usage and its low cost. In future we can implement other new features like the WI-FI or LI-FI technology and its covering area can be extended for very long distance with the usage of server system. The system is very useful for Research and Development of Agriculture domain.

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