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Smart Irrigation System

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ABSTRACT: The key objective of the paper is to monitor the soil's moisture content during its dry and wet conditions with the aid of a moisture sensor circuit, calculate the corresponding relative humidity and irrigate it based on its nature using a PC based Lab VIEW system, IOT, GSM and an automatic water inlet setup which can also monitor and record temperature, humidity and sunlight, which is constantly modified and can be controlled in future to optimize these resources so that the plant growth and yield is maximized. A record of soil moisture, temperature, rainfall is maintained in a database for backup. This backup is used for weather forecasting and directs the farmers regarding the type of crop to be cultivated in future. IOT gives the whole information to the operator about the irrigation. In this paper, we experiment for different soils suitable for different crops in various climatic parameters that govern plant growth and allow information to be collected at high frequency and with less labor requirements.

KEYWORDS: Soil moisture, irrigation, Lab VIEW system, IOT, GSM.

I. INTRODUCTION

Aim is to develop a wireless three level controlled smart irrigation system to provide irrigation system which is automatic for the plants which help in saving water and money. The main objective is to apply the system for improvement of health of the soil and hence the plant via multiple sensors. Appropriate soil water level is a necessary pre-requisite for optimum plant growth. Also, water being an essential element for life sustenance, there is the necessity to avoid its undue usage. Irrigation is a dominant consumer of water. This calls for the need to regulate water supply for irrigation purposes. Easy to install methodology to monitor and indicate the level of soil moisture that is continuously controlled in order to achieve maximum plant growth and simultaneously optimize the available irrigation resources on monitoring software Lab VIEW and the sensor data can be seen on Internet. In order to replace expensive controllers in current available systems, the Arduino Uno will be used in this project as it is an affordable microcontroller. The Arduino Uno can be programmed to analyze some signals from sensors such as moisture, temperature, and rain. A pump is used to pump the fertilizer and water into the irrigation system. The use of easily available components reduces the manufacturing and maintenance costs. This makes the proposed system to be an economical, appropriate and a low maintenance solution for applications, especially in rural areas and for small scale agriculturists. C.Nagarajan et al [1,3,4] has studied this research work enhanced to help the small-scale cultivators and will be increase the yield of the crops then will increase government economy.

II. SMART IRRIGATION SYSTEM USING ARDUINO

AIM-This paper design a model of automatic irrigation system which is based on microcontroller was used only for source of power supply. Various sensors are placed in paddy field. Sensors sense water level continuously and give the information to farmer through cellular phone. Farmer controls the motor using cellular phone without going in paddy field. If the water level reaches at danger level, automatically motor will be off without conformation of farmer The aim

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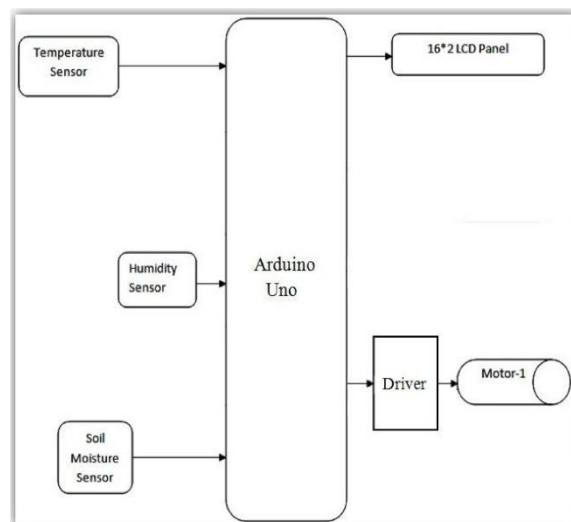
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of this paper is to modernize agriculture technology by programming components and built the necessary component for the system. The system is real time based and extracts the exact condition of paddy field. There is one central node used which to control other node. The main function of RF module is to pass the message to the node and operate the system.

III. BLOCK DIAGRAM



1.SOIL MOISTURE SENSOR:

Soil moisture sensor's Analog pin is given to port A- pin 3 of the RIO. 2.Its Vcc pin is given to the common terminal on the bread board which is given to port A- pin 1(+5V) of the RIO and its GND terminal is given to port A- pin 11/pin 12.

2.TEMPERATURE SENSOR:

Temperature sensor's Vcc pin is given to the 5V pin (in Port C) of the RIO and its GND terminal is given to the common ground on the bread board which is connected to the AGND (Analog ground) pin of the RIO. 2.An analog input is fed to AI0 (0+) pin and AI0 (0-) is given to AGND probably through a common ground on the bread board.

3.HUMIDITY SENSOR (DHT11):

A Humidity sensor also called a hygrometer, measures and regularly reports the relative humidity in the air. A humidity sensor senses relative humidity. This means that it measures both air temperature and moisture. Relative humidity, expressed as a percent, is the ratio of actual moisture in the air to the highest amount of moisture air at that temperature can hold. The warmer the air is, the more moisture it can hold, so relative humidity changes with fluctuations in temperature. The most common type of humidity sensor uses what is called "capacitive measurement This system relies on electrical capacitance, or the ability of two nearby electrical conductors to create an electrical field between them. The sensor itself is composed of two metal plates with a non-conductive polymer causes minute

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changes in the voltage between the two plates. The changes in voltage are converted into digital readings showing the amount of moisture in the air.

4. ARDUINO MICRO-CONTROLLER:



Arduino is an open-source prototyping platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. We can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so we use the Arduino programming language (based on wiring), and the Arduino Software (IDE), based on Processing. The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector. The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less damage the board. The recommended range is 7 to 12 volts.

5. POWER LED INDICATOR:

Just beneath and to the right of the word "UNO" on your circuit board, there's a tiny LED next to the word "ON" (11). This LED should light up whenever you plug your Arduino into a power source. If this light doesn't turn on, there's a good chance something is wrong. Time to re-check your circuit.

6. VOLTAGE REGULATOR:

The voltage regulator (14) is not actually something you can (or should) interact with on the Arduino. But it is potentially useful to know that it is there and what it's for. The voltage regulator does exactly what it says - it controls the amount of voltage that is let into the Arduino board. Think of it as a kind of gatekeeper; it will turn away an extra voltage that might harm the circuit. Of course, it has its limits, so don't hook up your Arduino to anything greater than 20 volts.

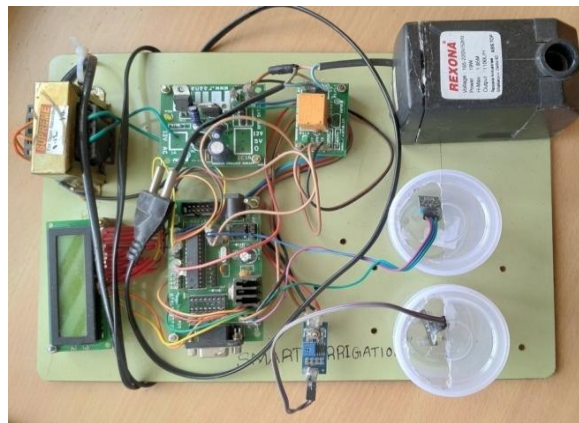
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IV. HARDWARE IMPLEMENTATION



V. ADVANTAGES

- Relatively simple to design and install.
- It is safest system and no manpower is required.
- The system helps to farmer or gardener to work when irrigation is taking place, as only the area between the plants are wet
- Reduce soil erosion and nutrient leaching.
- The system need smaller water sources, as it consumes less than half of the water
- Fertilizers can also be provided by using the system.
- PH content of the soil is maintained through the suggestions which helps for healthy plant growth

VI. CONCLUSION

This paper involves establishing a contemporary design technique of monitoring and controlling the moisture level of soil using Lab VIEW. Providing comprehensive tools that need to build any measurement or control application in dramatically less time. The project also includes rain sensor, which is very important in the project to avoid unnecessary power wastage. No longer only are farmers able to generally use much less water to grow a crop, they're able to increase growth yields and the satisfactory of the crop by using better management of soil moisture at some point of vital plant growth degrees. Embedded system for computerized irrigation of an agriculture subject gives an able solution to assist web page- precise irrigation control that permits producers to maximize their productivity whilst saving the water.

VII. FUTURE SCOPE

We can interface LCD screen in order to display the current status of the soil moisture content levels, percentage of water utilized to water the plant, duration of time for which the water pump is ON, etc. We can also show the graphical representation of the moisture content levels in the soil. To improve the efficiency and effectiveness of the system, the following recommendations can be put into consideration. Option of controlling the water pump can be given to the farmer. The farmer may choose to stop the growth of crops or the crops may get damaged due to adverse weather conditions. In such cases farmer may need to stop the system remotely. The idea of using IOT for irrigation can be

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extended further to other activities in farming such as cattle management, fire detection and climate control. This would minimize human intervention in farming activities.

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