AUTOMATIC IRRIGATION SYSTEM USING ARDUINO

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Abstract- *Nowadays, the increase in population has led to water scarcity in most parts of the world. Large amount of water is wasted in agriculture. Water wastage here is mainly due to water logging during irrigation. So, there is a need to switch to alternative methods for irrigation. This paper proposes an automatic plant irrigation system that uses Arduino board and a microcontroller. It automatically senses the moisture content of the soil and decides whether irrigation is needed or not. After analyzing the values, it provides adequate amount of water to the crop. The pump automatically switches on and provides water when the soil is dry. Similarly, when the soil is wet, the pump switches off and no water is given to the crop. This not only conserves water that is otherwise wasted but also ensures better crop growth as only the required amount of water is given to the crop. The system that is proposed in this paper also uses a wireless module to control the system from faraway places.*

Keyword: Arduino Uno, IoT, microcontroller, moisture sensor, sensors, wireless module

1. Introduction-

Irrigation is a mock form used for watering the crops. It is used in areas where there is minimal amount of rainfall. It helps the crops to grow and stay vigorous. To avoid food scarcity, it is very important to endorse the agriculture sector. Physical irrigation can be done using sprinkler systems, water buckets and cans. One of the major downside of manual irrigation system is that the amount of water needed by the crop is incalculable. This results in a lot of water wastage. Due to this the crops growth is hindered to a lot of extent. Hence there is a need to bring about some changes in the existing technology. This paper establishes a system which helps to lessen the water wastage as well as eradicate the need of manpower. This system works by sensing the moisture content in the soil using the probes and then decides whether to pump the water or not and thereby saves a lot of time.

2. Necessity of the Project-

Population is increasing day by day and hence our natural resources are exhausting swiftly. It is our accountability as an individual to help and save our natural resources. Water scarcity is the main muddle in today's era. Agriculture sector is budding r rapidly and hence a lot of water is needed for irrigation. A large amount of water is unnecessarily wasted while irrigating the fields due to water logging. The growth of the crop is also stalled since; passable amount of water is not given to the crop. So, an automatic plant Irrigation system will aid to save a lot of water and will safeguard vigorous growth of the crop. This will also eliminate the necessity of workers on the field and also saves a lot of time.

3. System Overview

The paper is based on an automated system which is used for watering plants. The system supplies water to the plant automatically when it's required. The sensors sense the moisture content of the soil by sending current through the soil and measuring its output (resistance). Water conducts electricity, so less resistance means that there is water present in the soil. Whenever there's more resistance, it means there is less water in the soil.

Hardware details –The project includes an Arduino Uno board which is used to control all the things happening in the system. The paper uses a miniature model and can be further extended by increasing the number of sensors. The sensors used are FC-28. It can be used both in analog and digital format. The Wireless module used is ESP8266 Wi-Fi Module which is compatible with Arduino Uno. The pump used is a 12v DC motor pump and can easily supply the water to the plant without much delay.

Software details-The IDE used is Arduino IDE. It is much easy and simple to program the Arduino board using this IDE. It provides us with a number of libraries which makes it easier for us to connect different components to the Arduino board. It also makes it easier to operate those components. The default value for the soil moisture sensor FC-28, is set as 0-1023. 0 means no need for water and 1023 means there is no water and requires immediate supply of water. A threshold value is set and according to which the motor supplies water to the soil. The system is supposed to work automatically.

4. System Architecture

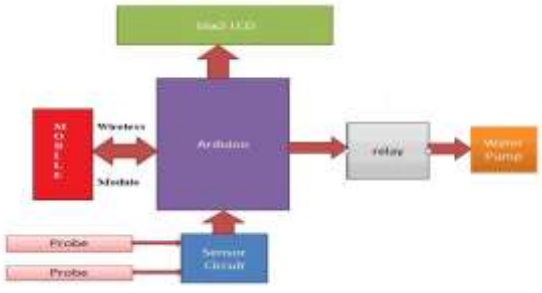

Fig- System Architecture

4.1. SENSOR CIRCUIT

It comprises to two conducting metal probes which are used to sense the moisture content in the soil.

Fig- FC-28

4.2. RELAY

It is used to switch the pump on and off.

Fig- Relay

4.3. WATER PUMP

A 12v dc motor is used with the pump. The pump is turned on and off automatically with the help of the relay. The values of the moisture content are read by the Arduino board and are compared with the reference value and thereby motor driver circuit is activated.

4.4. WIRELESS MEDIUM

It is used to operate the entire system by using a mobile application. It displays the moisture content of the soil and it is used to switch on and off the system from distant places.

Fig – Wireless Medium

4.5 LCD

It is used to exhibit whether the system is working accurately or not. It is positioned near the Arduino board and displays the values of the moisture content which are perceived by the metal probes.

5. ADVANTAGES

This system does not require the presence of farmers at the field as it can be operated from anywhere. Also, the application that it uses displays the moisture content and amount of water being given to the crop. This suppresses the need of manpower and also saves a lot of time. The proposed system also has another advantage that it only provides passable amount of water to the crop thereby saving water that is otherwise wasted due to water logging. The crops also benefit from this and better crop yield is achieved.

6. RESULT

Two different soils are used to test the model of automatic plant irrigation system. The moisture content of both the soils are sensed and matched with the reference values. In the first soil, the moisture content as sensed by the probes is less, so the pump automatically provides water to the crop till it reaches the limit. Coming to the second soil, the soil is already wet, i.e. moisture content is high. In this case, no water is provided to the crop. Thus, the system functions according to the values sensed from the soil till it reaches the limit.

7. CONCLUSION

An automatic plant irrigation system using Arduino is designed in this project. The prototype of the model worked properly when tested on different soils. The components that we use in the system are readily available and easy to operate. Thus, this system acts as an effectual method of irrigation. It is far better than the manual irrigation process which requires a lot of manpower and time. By using the app, the farmer can operate the system from distant places. The farmer can utilize this time in other significant activities. Also, the major issue of water scarcity is dealt with. No amount of water is wasted in the process of irrigation. Thus, this system can be very useful in areas where water is in short supply. As the required amount of water is provided to the crop, the crop growth is better. Farmers can thus benefit from the enhanced crop yields. The project is tested for different types of soils and it works properly. The future work of the system can include the addition of temperature sensors and a more powerful motor to pump water to the fields. Thus, the large-scale implementation of the project can also be done.

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