INTELLIGENT AGRICULTURE SYSTEM USING IOT

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ABSTRACT

Irrigation is one of the traditional practiceand involves higher percentage of labours in daily agriculture sector. To water the automatically, sensors and microcontrollers are available to determine when the plants needs water.

Automation involves improving the speed and production, reduction of cost, effective use of resources . It consists of a soil moisture sensor; an LCD display to show the moisture percentage and pump status; a relay module which is used to control the on and off switch of the water pump; and water pump, tank pump; and a notification module to send the status of pump to farmers. The sensors like soil moisture sensor, water level sensor,an LCD display to show the moisture percentage and pump status are connected to the microcontroller. Thus the output of these sensors are fed into the Arduino UNO. The main role of this project is to develop a microcontroller system to irrigate the plants automatically and the information is sent to the farmers.

Keywords- IOT,Soil moisture sensor, Waterlevel sensor ,Notification module

INTRODUCTION

Agriculture provides the major contribution to our Indian economy and India holds second across the world in farm outputs. As of 2018, 50 % of Indian work force depends on agriculture and it contributes about 17 % - 18 % to our country's GDP.In India, most of the irrigation system is manually operated. Water scarcity is increasing rapidly and our country isin a situation to save each drop. Thus traditional method of irrigation can be replaced by automated irrigation by using the current technologies.In this technique, the soil moisture sensor is kept near the roots of the plants and this sensor senses the moisture and transmits the information to the microcontroller which controls the flow of water to the plants.

In the manual operation when the farmer fails to turn off the motor, it leads to wastage of electricity andwater. To overcome these flaws, the motor can beturned ON and OFF automatically by the Smart Irrigation System. This motor operation mainly dependsupon the soil condition and moisture condition. Todetermine the above parameters, sensors like soil moisture sensor, ultrasonic sensor, GSM module is used. In addition for better cropping system, soil conditions are updated on regular basis by monitoring moisture level of the field area. This will improve the cultivation .

PROBLEM STATEMENT

Water management is paramount in countries withwater scarcity This also affects agriculture, as a large amount of water is dedicated to that use.

Thus, studies aimed at saving water usage in the irrigation process have increased over the years. To avoid these problems and to improve the growth of the plants automated irrigation system isdeveloped. Therefore our aim is to develop intelligent irrigation system to water the plants andto inform the user through the message. It also helps the user about the water level present in tankand it also gives the soil moisture content of the soil.

PROPOSED SYSTEM

1. Arduino Uno: The Arduino is the central core ofthis project as it controls all the hardware that are attached to it. The sensors like soil moisture sensor, water level sensor and the temperature sensor are connected to the microcontroller. Thus the output of these of these sensors are fed into theArduino UNO.
2. Soil moisture sensor: This sensor is used todetectthe moisture level of the soil. When the soil is having water shortage, the module output is at high level, otherwise the output is at low level. The sensor acts based on the resistance. If the resistancevalue is low this shows the high moisture content in the soil. If resistance is high this shows the dryness of the soil. This signal is given to the Microcontroller and this makes the relay to be operated.
3. Liquid crystal display: The LCD screen is used to show the moisture level of the soil and the pumpstatus.
4. Relay module: It is used to control the on and off of the watering pump. The relay plays a major role in this irrigation system since it provides the necessary information for the pump whether the pump has to be turned or not. These relays acts asswitches opens and closes whenever it is needed.
5. Water pump: A pump is a component which consists of a motor which converts the electrical energy to mechanical energy. This rotational movement increases the pressure of the water in the tank or well. Since the pressure is high it takesthe water from the well and it is used in the agricultural land.
6. GSM module: With the help of GSM the information regarding the ON and OFF state of thepump can be sent to the user.
7. Water level sensor: It detects the levels of water in the tank. Water level sensor is placed in the tank to determine the water level. The reference value isgiven to the sensor as the minimum required level. If the water level goes below the reference level it gives the information about the water level to the user.

APPLICATIONS

- Precision Farming
- Agricultural Drones

- Livestock Monitoring
- Smart Greenhouses
- High Quality Products

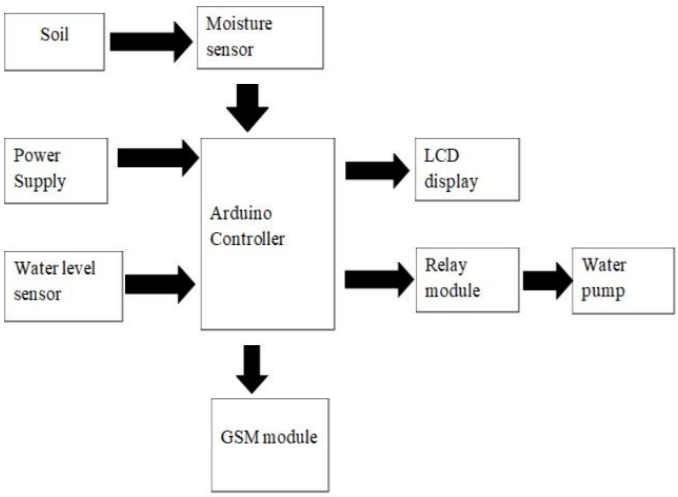

Fig.No:1 Block Diagram

On receiving the signal from the soil moisture sensor the Microcontroller gets analog signal which is converted into digital signal. The program is already done in the Microcontroller and the signal is given to the relay circuit. Based on the signal given to the relay circuit the motor gets turned ONor OFF.

Once the temperature is low the soil becomes wet, the voltage is higher than that of the reference voltage then low signal goes to the Microcontroller ["logic 0"] which makes the motor to turn OFF and it stops pumping the water. The voltage is obtained from the comparator which is present inside the sensor. When the sensor is placed in the field there will be conductivity. When there is good conduction that implies the presence of moisture content, as water is the good conductor ofelectricity.

Then, the signal is passed and the motor is turned OFF by necessary signals. And when there is no conduction has indicates the absence of water content hence the motor is turnedON by necessary signals generated by the Arduino.When the control signal is sent to turn on the motor, the relay switch is closed and the motor is connected to the circuit and the water ispumped to the plants. Similarly if the control signal is to turn OFF the motor, then the relay switch is opened and the motor isnot given supply so the motor is turned OFF. Thus the necessarywater is provided to the plants when they are in need, this is done according to the program burned in the Arduino. Here the frequent monitoring is not required.

GSM: Global System for Mobile Communication which ismainly used for mobile communication. With the help of GSMthe information regarding the ON and OFF state of the pump can be sent to the user. To transfer the message to the user this GSM module uses the TDMA technique

Relay: The relay plays a major role in this irrigation system since it provides the necessary

information for the pump whether the pump has to be turned or not. These relays acts as switches opens and closes whenever it is needed.

Pump:A pump is a component which consists of a motor which converts the electrical energy to mechanical energy.Thisrotational movement increases the pressure of the water in the tank or well. Since the pressure is high it takes the water from the well and it is used in the agricultural land.

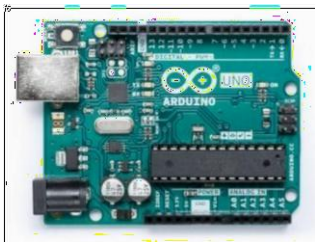

Fig.No:2 Arduino UNO

Fig No:2 describes Arduino UNO. Arduino plays a key role in this irrigation system. The output of all the sensors has been provided as the analog inputs to the Arduino. This Microcontroller converts analog inputs into digital outputs. These digital output signals are connected to relay. The output is again provided to GSM Module. These digital outputs are generated from the program which is alreadr burned in the Microcontroller.

Fig No: 3 describes the soil moisture sensor. Soil Moisture sensor senses the moisture level in the soil. This moisture level sensor acts based on the resistance. If the resistance value is lowthis shows the high moisture content in the soil. If resistance is high this shows the dryness of the soil. This signal is given to the Microcontroller and this makes the relay to be operated.

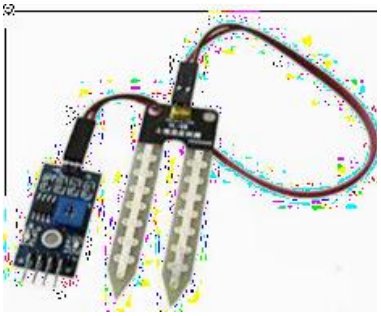

Fig.No:3 Soil Moisture Sensor

Fig No:3 measure the volumetric water content by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content. The relation between the measured property and soil moisture must be calibrated and may vary depending on environmental factors such as soil type, temperature, or electric conductivity.

Fig No:4 detects the levels of water in the tank. Water levelsensor is placed in the tank to determine the water level. The reference value is given to the sensor as the minimum required level. If the water level goes below the reference level it gives the information about the water level to the user.

Fig.No:4 Water Level Sensor

ADVANTAGES

1. The whole irrigation process is automated
2. Labour work required during irrigation using the traditional method is eliminated.
3. A large amount of water is saved during irrigation using automated system as compared to irrigation using the traditional method.
4. Crops receive essential amount of water, based on thesensor values, exactly when there is need for it

CONCLUSION

The intelligent irrigation system can be widely used soas to reduce the wastage of water and to provide the healthy plants and agriculture. In our project the motorcan be turned ON and OFF automatically by using relaywhich controls this operation. The plants get the required amount of water from the water tank or water storage that is connected to the motor. Proper monitoring of water level to the plants is done by this project. It provides correct amount of water to plants whenever it is necessary. The health and growth of theplants can be maintained. Men work and labor cost is reduced as the farmers are not required to continuouslycheck for the irrigation process. The water wastage hasbeen reduced which has many economic benefits hencethis project gives benefit in economic side too. In orderto avoid water issues in agriculture intelligent Irrigationwill be the best solution.

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