AUTOMATIC IRRIGATION SYSTEM USING MOISTURE,TEMPERATURE , HUMIDITY

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ABSTRACT

This paper presents the idea of automatic irrigation method and the following research sustains this idea .Automatic irrigation control system has been design to facilitate the automatic supply of adequate of water from a reservoir to field. The task of automatic irrigation is done through assistance of soil moisture sensors. In the project, apart from soil moisture sensor, Humidity and temperature sensors are also used to make the process more advance. The electricity required by components is provided through solar panels hence this liberates us from interrupted power supply due to load shedding. The water content is constantly judged and whenever moisture level of soil gets low, the system sends a signal to motors asking them to turn on. The motors automatically stop after soil reaches its maximum upper threshold value which is decided by user. Every time the motor starts or stops automatically, the user will get a status about the operation. The major advantages of the project include avoidance from water wastage, growth of plants to their maximum potential, less chances of error due to less labor and uninterrupted supply of water due to solar energy.

Keyword : - *Soil moisture sensor ;Temperature sensor; Solar panels.*

1. INTRODUCTION

In some countries, agriculture is considered as one of the major source of economic progress. The income of many countries depends directly on agricultural advancement. Moreover, the continuous increase in the population of a country demands more innovations in food production technology. The factors affecting agricultural progress must be studied thoroughly to obtain maximum results. The significant building block of agriculture is the irrigation system. In other words, the efficiency of irrigation system may induce ample effects on agriculture. Irrigation process should provide water to soil consistently when it is needed and stops water flow as well, when soil has soaked enough water. The excess of water in the crops is of no good, not only water is wasted but it also destroys crops. Considering India, whose economy is mainly based on agriculture requires efficient and modern methods for water provision in the crops fields. The failures caused through manual methods of irrigation has let us to think about some advance method which can be relied upon. Anything which is cost effective, labour saving and energy saving is considered efficient. Hence in this proposed system, a method which uses very less or no labour (runs on its own) has been recommended, saves electricity and is easy to use .

2. PROPOSED SYSTEM

The proposed system is automatic irrigation system. The automaticity means that it turns itself on and off depending upon the moisture requirement. This automatic behaviour of irrigation is achieved using different sensors which sense and tell the user if water is required or not and how much water will be enough for soil so that water wastage is also avoided. The errors which may arise when manual irrigation is used are also rectified for the most part using this method. The major source of electricity in India is through thermal electric power but this source has not paid the country with requisite amount of electrical power hence there is shortage of electricity which is not good for process of irrigation as motors need uninterrupted supply of electricity. As electricity deficiency is a major problem of India, so the system is made more flexible through using solar energy.

3.SCOPE

The countries where agriculture has a big impact on economy demand a highly effective way of irrigation. A timely and consistent irrigation is need of the hour in such countries. Where lack of water is not tolerated by soil during irrigation, the excess of water provision is also not recommended for crops flourishment. Hence a feasible irrigation for any land requires suitable amount of water with minimum amount of delays. Today's world demands improved methods as compared to the old ones to carry out processes faster and the world is moving towards automation of every process. In the proposed system, automatic irrigation system has been suggested which detects the soil moisture level and programmed in a way that if water level goes below necessary amount, it automatically starts the pumps to supply water. In this way, maximum results are attained out of the fields and water wastage is also reduced to significant level .

4. METHODOLOGY

The technique used for automatic irrigation discussed in this paper is adopted after reviewing and analyzing the literature.

4.1Hardware and Software components

The process has to be done both on software and hardware.

The required equipment is as follows:

1. PC with Arduino software
2. Arduino Mega 2560
3. Soil moisture sensor (YL 69)
4. Humidity sensor (DHT11)
5. Temperature sensor (LM35)
6. GSM module (SIM900D)
7. Relays
8. Solar panels
9. LCD 20*4 display

10. DC motors

11. DC fan

4.2Arduino Mega 2560

Arduino is genesis of the proposed system. The center of all operations taking place in the system. Components are connected to Arduino through different ports and are dependent on its instruction. Arduino Mega 2560 has been used because of its versatility. It has 54 digital I/O ports. There are 16 analog inputs, 4 UART's, 16 MHz crystal oscillator, USB port, power port, reset button and ICSP header. The flash memory is 256 Kb and EPROM memory is 4 Kb [4]. All the data from sensors comes directly in Arduino which processes it and sends the signal forward. The Arduino commands further process whether to start or stop the motors. Basically, the code is being fed into Arduino will judge the moisture condition of soil and decides if motors need to be turned on or off. The code is written on Arduino software and transferred to the device using USB cable. C language is used in code and threshold values for upper and lower points are defined in the code. Basically, the code tends to keep the water content in between its threshold, if it crosses either value, the status of motor will be changed .

4.3 Sensors

The participation of sensors in automatic irrigation is most important. They play vital role to make the system automatic. Without them, the process cannot be imagined as automatic. Three different sensors have been used. These three sensors measure three different parameters. The sensors include:

i. YL 69

ii. DHT11

iii. LM35

YL 69 is the soil moisture sensor. They sense the water content in soil. These are most important as the information forwarded by them is most relative regarding water requirement. The sensor has two prongs which are submersed in the soil. It has 4 ports. Ports are for GND, VCC and outputs for analog and digital values . DHT11 is the humidity sensor. They detect the water content in atmosphere. The high humidity may increase dampness in soil. LM35 is the temperature sensor. They judge the temperature of environment. The advantage of LM35 is its feature that it always gives temperature in Celsius further calculations are not required to convert output to get temperature in Celsius. The latter two sensors are used to make the system more reliable. These two sensors are left in open environment. They constantly give the value of temperature and humidity. When the temperature or humidity level of environment alter, it may affect the moisture level of soil so to eradicate any changes that may fluctuate the process of irrigation these sensors send signal to Arduino to take some action. In the design, if humidity level goes above our defined value then to mild its effect the Arduino sends signal to DC fans located near the sensors. The DC fans automatically turn on themselves and kept on running until normal conditions are achieved .

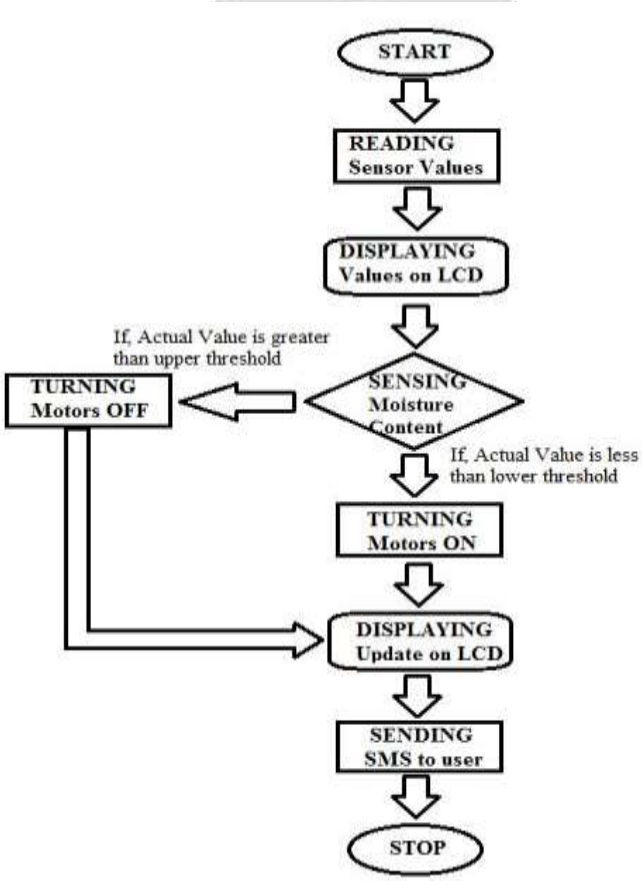
4.4 Photo Voltaic Panels

Solar panels are used to liberate irrigation from the shackles of load shedding. The requirement of water is judged and information is transmitted to the solar circuit which modifies its configuration such that it provides enough DC power to drive the pumps and fulfill the assigned task. This method is not only power efficient but also proves to be cost effective when considered in long run. The solar irrigation process proves to be of great worth to the irrigation cites which are far from grid stations .

5. WORKING PRINCIPLE

The basic working principle of the system is easy to understand. The system is divided into smaller circuitries. First one is solar circuit, it provides DC power to the components when power is needed by them. Second circuit is the sensor network. Moisture sensors are submersed into soil and connected back with the main system. The sensors give values of moisture content of soil and these values can be seen on LCD. Another circuit is the GSM module. This is also connected with Arduino and is responsible of sending information of every operation taking place to the user.

In the code, there are basically two threshold values i.e upper and lower. The code carries these two values and are defined by user. The actual value of water content in soil is read by the moisture sensors which are submersed in soil. The code compares this value with the two user defined threshold values.



6. CONCLUSION

Automatic irrigation control system has been designed and constructed.The use of automatic irrigation method would allow us to save the excess water which may be wasted during manual methods. Further it improvises the process of irrigation and makes it a reliable one and also helps to eliminate the stress of manual irrigation and irrigation control at same time conserving water supply. The provision of water to the fields is done in a more effective way using this technique. Moreover, electricity issue can also be resolved by using solar energy . This improvisation in food production technology greatly enhances the opportunities to increase the economic growth in India. The proposed system can save a lot of water and electricity hence economically favorable

7. REFERENCES

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