ARDUINO BASED AUTOMATIC CROP IRRIGATION

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ABSTRACT

In this project an automation of farm irrigation and soil moisture control by Arduino using soil moisture sensor and L293D module. This automatic irrigation system senses the moisture content of the soil and automatically switches the pump when the power is on. A proper usage of irrigation system is very necessary because the main reason is the shortage of land reserved water due to lack of rain, spontaneous use of water as a result large amounts of water goes waste.

For this reason, we use this automatic plant watering and soil moisture monitoring system and this system is very useful in all climatic conditions. India is the agriculture based country. Our most of peoples are completely depended on the agricultural harvesting. Agriculture is a source of employment of majority Indians and has great impact on the economy of the country. In dry areas or in case of lacking rainfall, irrigation becomes difficult. So, it needs to be automated for proper watering a plant and handled remotely by farmer.

When soil goes dry pump will start watering. The aim of the implementation is to reduce water use and automatic irrigation can be used for save time and low power monitor device. The aim of the implementation this project was to demonstrate that the automatic plant irrigation can be used to reduce water use, and save your time

II. INTRODUCTION

Irrigation is the application of controlled amounts of water to plants at needed intervals. Irrigation helps to grow agricultural crops, maintain landscapes and revegetate disturbed soils in dry areas and during periods of less than average rainfall[1]. Irrigation also has other uses in crop production, including frost protection, suppressing weed growth in grain fields and preventing soil consolidation[3]. In contrast, agriculture that relies only on direct rainfall is referred to as rain-fed or dry land farming. Irrigation systems are also used for cooling livestock, dust suppression, disposal of sewage, and in mining. Irrigation is often studied together with drainage, which is the removal of surface and sub-surface water from a given area[4].

Irrigation of plant is usually a very time consuming activity to be done in a reasonable amount of time, it requires a large amount of human resources. Water is one of the sources that are used excessively. Many irrigation is one of the method to water the plant. This method represents massive losses since the amount of the water is in excess of plant needs. The excess water evacuated by the holes of the pots in the green house. The contemporary perception of water is that of a free renewable resource that can be used in abundance. It is therefore, reasonable to assume that it soon become a very expensive resource everywhere.

An automated irrigation system refers to the operation of the system with no or just a minimum of manual intervention beside the surveillance.Almost every system (drip, sprinkler, surface) can be automated

with help of timers, sensors or computers or mechanical appliances.It makes the irrigation process more efficient and workers can concentrate on other important farming tasks.On the other hand, such a system can be expensive and very complex in its design and may needs experts to plan and implement it. An automated irrigation system refers to the operation of the system with no or just a minimum of manual intervention beside the surveillance.

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III. METHODOLOGY

Automatic irrigation system is a prototype for system of irrigation or watering automatically based on the arduino microcontroller integrated with proximity sensors, DC motor , Relay, LCD display and the pump.The soil moisture sensor senses the moisture present in the soil and gives the output to Arduino. The output of the sensor will be from 0-1023. The moisture is measured in percentage, therefore we should map these values to 0-100.Whenever the moisture value is lower than the value we have set inside our code as the threshold value, the relay will turn ON and the valve will turn open and whenever the moisture value is lower than this threshold value, the relay will relay will turn OFF and the valve will get closed.

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IV. SOIL SENSOR

Soil moisture sensors measure the volumetric water content in soil.[1] Since the direct gravimetric measurement of free soil moisture requires removing, drying, and weighting of a sample, soil moisture sensors measure the volumetric water content indirectly 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.

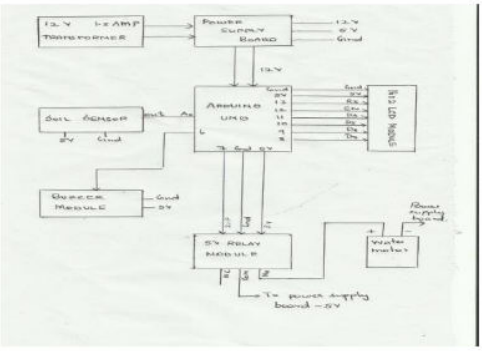
The relation between the measured property and soil moisture must be calibrated and may vary depending on environmental factors such as soil type, temperature, or electric conductivity. Reflected microwave radiation is affected by the soil moisture and is used for remote sensing in hydrology and agriculture. Portable probe instruments can be used by farmers or gardeners.

Soil moisture sensors typically refer to sensors that estimate volumetric water content. Another class of sensors measure another property of moisture in soils called water potential; these sensors are usually referred to as soil water potential sensors and include densitometers and gypsum blocks.

V. WORKING OF SENSOR

The Soil Moisture Sensor uses capacitance to measure dielectric permittivity of the surrounding medium. In soil, dielectric permittivity is a function of the water content. The sensor creates a voltage proportional to the dielectric permittivity, and therefore the water content of the soil. The sensor averages the water content over the entire length of the sensor. There is a 2 cm zone of influence with respect to the flat surface of the sensor, but it has little or no sensitivity at the extreme edges. The Soil Moisture Sensor is used to measure the loss of moisture over time due to evaporation and plant uptake ,evaluate optimum soil moisture contents for various species of plants ,monitor soil moisture content to control irrigation in greenhouses and enhance bottle biology experiments.

VI. CIRCUIT DIAGRAM



VII. ADVANTAGES

- Automation eliminates the manual operation of opening or closing valves.
- Possibility to change frequency of irrigation and fertigation processes and to optimise these processes.
- Adoption of advanced crop systems and new technologies, especially new crop systems that are complex and difficult to operate manually
- Use of water from different sources and increased efficiency in water and fertiliser use.
- System can be operated at night, water loss from evaporation is thus minimised
- Irrigation process starts and stops exactly when required, thus optimising energy requirements.

VIII. CONCLUSION

The primary application for this project are farmer and gardeners who do not have enough time to water their crops which also covers those farmers who are wasteful of water during irrigation. As water supplies become scarce and polluted, there is a need to irrigate more efficiently in order to minimize water use and chemicals leaching, is an advance in soil. Water sensing make the commercial use of this technology possible to automate irrigation. Management of vegetable production aware, research indicates the different sensor. Types perform under all conditions with no negative impact on crop yields with reduction in water .Use range as high as 70% compared to traditional practices.

This project has enormous potential and may be used in other ways, due to its cheap and cost efficient designs

- Use it as a home automation controller, by adding the few more 240 v relays.
- Remotely performed jobs.
- User float switch in a tank, so that the system automatically shuts the pump down, once the reservoir is full.
- Use it in conjunction with a solar panel, so that the entire system is eco-friendly.

XI. REFERENCES

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