PLC BASED IRRIGAION SYSTEM USING SOLAR ENERGY

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Abstract: In PLC based irrigation system using renewable energy source, we are basically controlling the percentage of moisture in soil using Programmable Logic Controller. The soil moisture sensors are work as feedback element and according to signal PLC takes action so that the overwatering and under watering of water is controlled and this result in optimization of water. Thus helps for good crop production as we are controlling proper amount of water required for their healthy growth. In this system we have used valves to turn ON or OFF. Which are easily automated by using PLC. For this we have programmed the PLC to distribute available water to the crop if soil is dry and plant need the water to cultivate maximum crop production with use of available natural resources.

Index Terms - **PLC, Moisture sensor, water content, GSM, Drip Irrigation.**

I. INTRODUCTION

As we all know India is agrarian country and it is immensely based on Agriculutre,which uses fresh water resources like pond,well,river etc. Taking consideration of population growth and increased food demand, we have to do something for irrigation. As the labour cost is increasing and water resources are on the boundary of optimization so to overcome these many problems we need to work smartly.In modern days the changing environmental regulations causes harm to crop. Growth of crop get affected by all parameters, so we should contribute in providing smart irrigation system for us and farmers.[1]

The automated irrigation system is convenient and cost effective for best use of water resources and to increase production of crop.. Using PLC based irrigation system use of water resource can be reduced for different crop. This system provide only required amount of water to crops in agriculture. our automated irrigation system can be utilize for larger green houses also in open fields.

The irrigation procedure in agriculture is significant key in achieving good yields and plant performance Water stress at critical times in the growth of any crop can affect fruit yield or other and quantity. However these plants may not show visual signs of stress, so using this automated irrigation system we can know about all such type of parameters and can manage required things to long term plat health. this work system is able to control pump actions autonomously. By controlling the water content in soil we can provide require amount of water to the crop and thus reduction in unnecessary use of water[2].

The automatic irrigation control appears with soil moisture sensors, water level sensors. Use of this system saves water, also this work gives basic requirements of survival and good production of the plants. Our design system provide healthy environment to the crop by controlling the soil moisture of the soil. This work presents the solution to power this device with renewable energy source.

As our system is basically based on Programmable Logic Controller (PLC) which automatically take decisions rather use of human interface like use of agriculture procedure manually.The system is independent to take decision how and when the water should given the crop field.The propulsion to use PLC is its flexibility not only in case of hardware use but also in case of programming. The main reason behind the use of PLC based system is its features,such as PLC is available in deferent version with variable memory capacity which can be used for different applications.Use of plc reduces the complexity and increases the efficiency of the system. [3]

II.LITURATURE REVIEW

To achieve proper irrigation schedule some of the irrigation systems monitors the soil parameters like humidity, temperature ,water status with different meters using drip, sprinkler irrigation by the automation controller system in various soil. This PLC based irrigation design is proposed to control and monitor real time feedback of system as the plc is real time feedback system as well as efficient due to less human interference. In India recent requirement is Green house based modern agriculuture industries where parameters such as temperature and humidity precisely maintained. In this technology humidity and temperature of plants are precisely controlled. For this GSM is used to report detail about irrigation. Some systems highlight the improvement of soil moisture sensors and temperature sensors which are placed on suitable locations on field to monitor temperature and moisture of soil, the two parameters on which the crop growth depends.[3]

Automatic irrigation system can be control by using two system ZIGBEE and GPRS. But GPRS system has some of the disadvantages like speed, distance factor, reliability so GPRS is not used in our project. Zigbee also have some disadvantage that are low transmission rate and it is only used for smaller distance. [1]

Our day to day methods that are used for irrigation such as sprinkle types are not that much feasible or efficient. The result of using this sprinkle types are lot of wastage of water resources and they can also raise some type of disease that are like fungus formation due to over moisture in the soil. Our automated irrigation system conserve water resources and this is useful for the farm.

Wireless technology and the green house effect has become the popular effect in this technology. People are using advantages of this system into monitoring and controlling the irrigation system. other system such as Remote monitoring which is an excellent method to avoid disturbance of environment and improve capability. In this days Ethernet network , RF module and zigbee wireless network are used to transfer information in remote monitoring system.[4]

III. BLOCK DIAGRAM AND WORKING PRINCIPLE

A) Block diagram

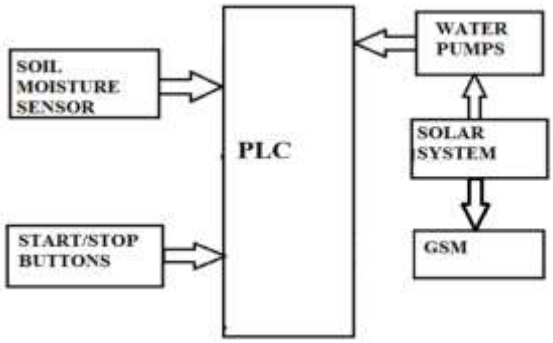

Fig 1.Block Diagram of PLC Based Irrigation System Using Solar Energy

B) Block Diagram Explanation

1. Programmable Logic Controller is a digital computer used for the automation of various electro-mechanical processes in industries. These controllers are specially designed to survive in harsh situations and shielded from heat, cold, dust, and moisture etc. PLC consists of a microprocessor which is programmed using the computer language. A visual programming language known as the Ladder Logic was created to program the PLC.
2. Memory, Input/output, Power supply unit, and programming device.
3. GSM network is used all over the world for remotely handle the signals or the parameters of system from anywhere even though we are not present at that place where system is installed.Not only the transmission and reception of information on central data processing unit is achieved but also GSM system support SMS message service which has capability to send and receive a text message to and from a mobile phone.
4. A submersible water pump is component which is sealed motor close-coupled to the pump body.This complete setup is submerged in the water to be pumped. The important feature of this type of pump is its water corrosion resistance property. But its very impotant that the pump must be deep inside the water,if it is above the water level then it is not of any use.
5. In this our work system soil moisture work principle based on the dielectric constant between two electrode of the sensors.In this system soil moisture sensor is used to detect two conditions of the soil that is dry and wet conditions.If sensor detect the dry condition of the soil then water pump automatically gets ON where as OFF when it detect wet condition of soil.
6. Solar panel is used to generate a grid power required to run the water pump.A solar energy generated by solar panel is stored in the battery and then through battery we use this energy to ON or to run water pump.

IV .Results

Fig 2.working of system

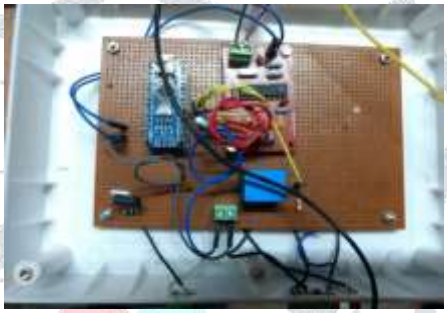

Fig 3.Testing of GSM module

Fig 4.12V and 24 V SMPS used for different components

The evidence of abstract idea hold in this paper for a PLC based irrigation system was tested in the lab.Using soil moisture sensor considering two conditions Dry and Wet we controlled the pump. Hence this system is capable of causing water to flow over lands for nourishing plants and use of solar energy.

Condition	Soil moisture	Water pump status
1	DRY	ON
2	WET	OFF

V. Conclusion

In this paper, we have proposed the design of irrigation system using solar energy. The objective behind this project is to provide better parameters to field and helpful to farmers.

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