

Smart Solar Irrigation System

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Abstract: -- The given paper offers a design of irrigation system based on microcontroller. Solar power is used as a source of power for controlling general system. The sensor is placed on the field and these sensors constantly sense the water altitude and the message can give to the farmer informing the water altitude without visiting the fields. The answer to all our energy needs costs beneficial solar power. Smart solar irrigation systems can effectively use by all farmers of India. This system comprises the solar power water pump along with a self-regulating water flow control by using a moisture sensor. It is the suggested solution for the existing water crisis for the Vidarbha farmers. This system preserves electricity by reducing the consumption of grid power and preserve water by reducing water dissipation.

Keywords— Smart solar irrigation, solar energy, solar pump, moisture sensor, energy crisis.

I. INTRODUCTION

Solar energy is the greatest ample source of energy in the world. The solar power is an solution for today's energy crisis. It is a environmental friendly form of energy. Photovoltaic generation is an organized approach by using the solar energy. Nowadays solar panels are extensively utilized for regulating road lights, water heaters powering and to encounter household loads. The cost of solar panels has been continuously reducing which motivated its utilization in different sections. The implementation of this technology is used in irrigation structure for agriculture. Solar power irrigation structure can be a satisfactory substitute for farmers in the present State of energy crisis in Vidarbha. We suggest an automatic irrigation structure using solar energy which drives water pumps from bore well to a tank and the outlet valve of tank is automatically control by using controller. The moisture sensor is used to manage the flow of water from the tank to the irrigation area which optimizes the use of water.

Literature and Background Study:

Numerous researchers have worked with automatic water sprinkling or irrigation system. They opted for different metrics determining the soil condition and quantity of water. They also discussed about different sources of power for the sensors. This paper design a model of automatic irrigation system which based on microcontroller. Solar power was used only for source of power supply, various sensors are placed in paddy field. The aim of this paper is to modernizing agriculture technology by programming components and build necessary component for the system. In this paper a similar system discussed that will water to agricultural land. An irrigation system was developed to optimize water use for agricultural crops. Th system has a

distributed wireless network of soil moisture and temperature sensors placed in the root zone of the plants.

The Suggested Solution:

In this suggested system we use the solar energy from the solar panel to automatically pump water from bore well straight into a ground level storage container depending on the power of sunlight. The standard technique involve pumping of water from bore well into a well and from this well onto ground by using another pump, This system uses only a sole step energy utilization where the water is forced into a ground level tank, from which the flow of water into the field can be controls by using simple valve implementation.

System description:

Suggested irrigation system mostly consists of two modules- Solar pumping module and automatic irrigation module. In solar pumping module a solar panel of required designation is mounted nearby to the pump set. Then the control circuit is used for charge a battery. By using a converter circuit from the battery, it offers power to the water pump which is immerse inside the well. For collecting water momentarily before circulating the water into the field, the water is pumped into an elevated tank In smart solar irrigation module the water outlet valve of the tank is electronically controlled.

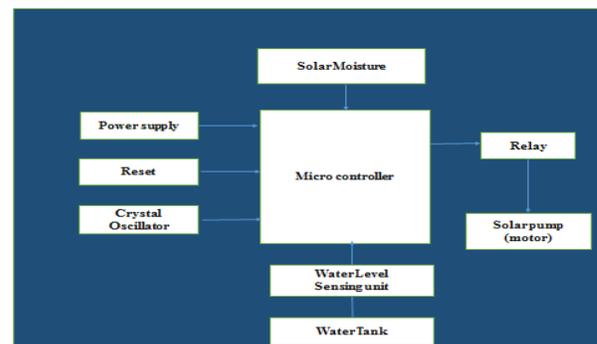


Fig.1. block diagram of smart solar irrigation system

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Moisture sensor :

For sensing the level of moisture content available in the irrigation field a moisture sensor is used. Moisture sensor has a level identification module in which we can place a referral value. Soil moisture sensor probe shown in Fig. 2. By using the soil moisture sensor the soil moisture content and moisture level can be found.



Fig. 2: Soil Moisture Sensor probe.

Solar Charge Controller:

A solar charge controller helps in charging a battery using solar panels. There are two types of solar charge controller MPPT type and PWM type. MPPT (Maximum Power Point Tracking) charge controller generates approximately 10% to 25% more power as compared to PWM charge controller. The high voltage MPPT charge controllers offers wide input voltage range from solar panel array and help in harnessing 15% to 25% more power than the PWM charge controllers.

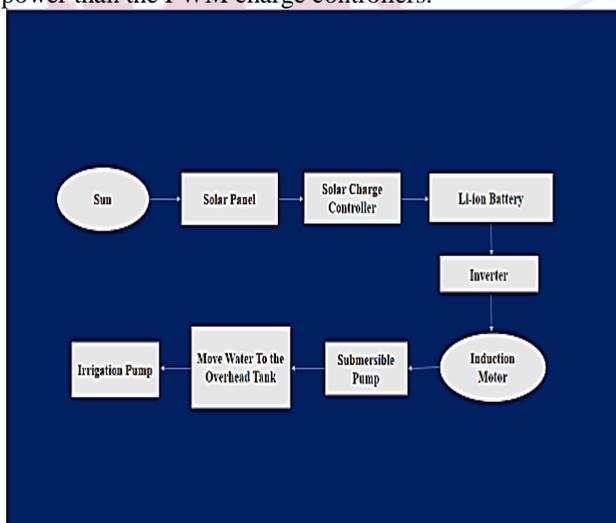


Fig. 3: solar pumping module

Automatic valve regulation:

For an automatic valve control we are using a stepper motor as an actuator control of the valve which is connected to the outlet valve of the tank. With the help of moisture sensor signal and a controller, a control pulses is given to the driver circuit that excites the stepper motor. So this way the outlet valve is slowly opened or closed depending upon the amount of moisture present in the soil of the field. When the soil moisture content reaches the required value, the valve is fully closed and power to driver circuit is killed and controller is put into sleep mode for low power consumption.

Advantages:

1. By using the smart solar irrigation system it minimizes the utilization of water by reducing wastage.
2. Due to excessive flow of water in the crop, the soil lose it's fertility . So this paper will prohibited the lose of fertility.
3. Solar pumps also offer clean solutions with no danger of borehole contamination.

II. CONCLUSION

By executing the suggested system there are various benefits for the government and the farmers. The excess energy produced using solar panels can also be given to the grid with small modifications in the system circuit, which can be a source of the revenue of the farmer, thus encouraging farming in India and same time giving a solution for energy crisis. Proposed system is easy to implement and environment friendly solution for irrigating fields. The system was found to be successful when implemented for bore holes as they pump over the whole day. Solar pumps also offer clean solutions with no danger of borehole contamination. The system requires minimum maintenance and attention as they are self starting. To further enhance the daily pumping rates tracking arrays can be implemented. This system demonstrates the feasibility and application of using solar PV to provide energy for the pumping requirements for sprinkler irrigation.

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