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Solar Based Smart Irrigation System

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ABSTRACT: The aim of this project is to reduce the usage of water and manpower in irrigation systems. The sensor is the key part of this system that analyzes if the plant needs moisture or not. If the sensor figures out that the plant needs moisture, then our solar panel comes into the game. Once the sensor finds that the plants need water, the motor receives the signal. By capturing the signal, the motor starts pumping water with the help of current from the solar panel. In this way, the usage of water is only done for the need and the usage of excess water reduces.

I. INTRODUCTION

Solar Energy is the most abundant source of energy in the world. Solar powered irrigation system can be a suitable alternative for farmers in the present state of energy crisis in India. This is a green way for energy production which provides free energy once an initial investment is made. Smart irrigation controllers monitor weather, soil conditions, evaporation and plant water automatically by adjusting the water schedule to actual conditions of the site. This System conserves electricity by reducing the usage of grid power and conserves water by reducing water losses. There are two major components one is soil moisture sensor and other is solar energy, maintained the irrigation in the field. If the required level of water is not provided then the plant will die and results in low production. Hence there is a need to provide exact amount of water to the right place. This can be achieved by soil moisture sensor. The moisture sensor is used to provide proper irrigation according to crop requirement. By the use soil moisture farmer of can provide optimum water to their crop which increase production as well as quality of crop.

II. PROBLEM STATEMENT

In India, agriculture field is irrigated by manually in most of the cases. This system is time consuming and required lots of labor for observing the health and productivity of crop. This system is much more costly than automatic system when considering the labor's salary. The farmer himself has to check the wet level of the land and has to make a Judgment whether the field has need of water or not. This way of carefully looking at the wet level is not accurate and this drawback can be eliminated by using soil moisture sensor which is been used in our architecture.

III. WORKING OF SYSTEM

An Automatic irrigation system using solar power which drives water from bore well to tank and the outlet valve of tank is automatically regulated using controller. Inverter Plays major role in this system because it changes one form of energy DC from solar panel to AC source to water pump the generated power range will be from 250V to 600V. Soil Moisture Sensor is used to sense the land humidity level and to control the flow rate of water from tank to the irrigation field which optimizes the use of water. It proves that the use of water can be diminished. The use of solar power in this system is significantly important for organic crops.
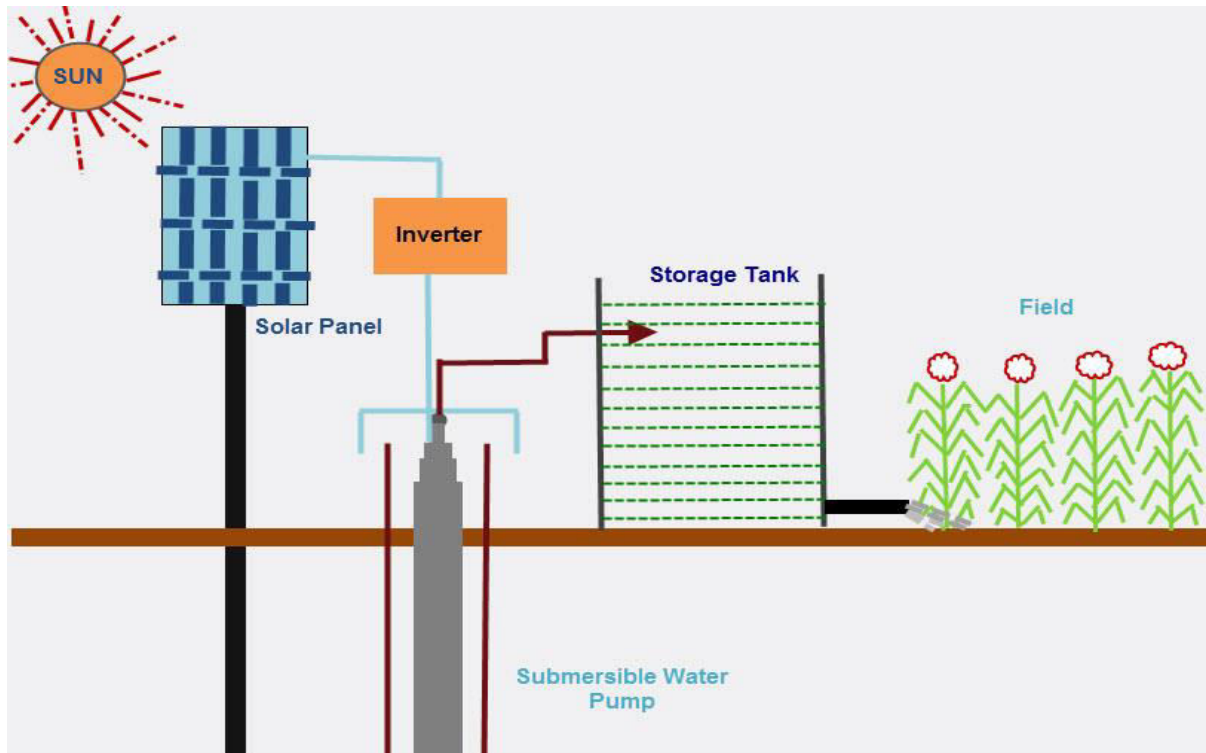
IV.COMPONENTS

A.SOLAR PANEL

A PV module is an assembly of photovoltaic cells mounted in a framework for installation.Photovoltaic cells use sunlight as a source ofenergy and generate direct current electricity.

A Collection of PV modules is called a PV Panel, and a system of Panels is an Array.Arrays of a photovoltaic system supply solar electricity to electrical equipment.The electricity generated by the semiconductor is called direct current (DC) and can be used immediately or stored in a battery.

B.BATTERY

Electrical batteries are blend of one or more electrochemical cells, used to transfer chemical energy into electrical energy. In this proposed system, batteries are used for storage of electricity produced by solar panels. The stored energy further used for operation of the irrigation system.

C.INVERTER

An inverter converts the DC electricity from sources such as batteries or fuel cells to AC electricity. The electricity can be at any required voltage; in particular it can operate AC equipment designed for mains operation, or rectified to produce DC at any desired voltage.

D.ARDUINO

Arduino is an open source electronic platform based on easy to hardware and software. With the Arduino ,we can design and build devices that can interact with its surroundings. The Arduino ,boards are basically a tool for controlling electronics in this we use Arduino uno R3 microcontoller   as main controller.
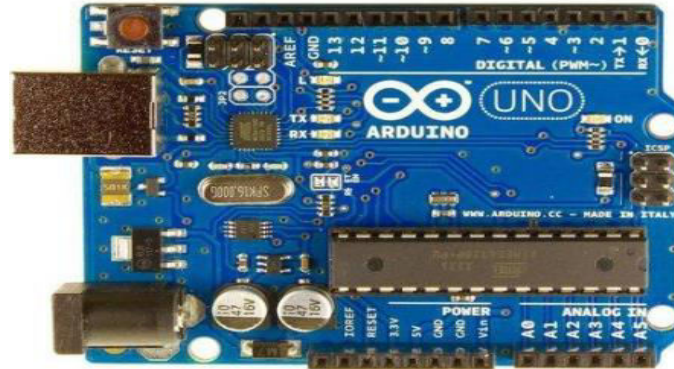
It is useful option for beginners and as well as high end application developer.

E.SOIL MOISTURE SENSOR
Soil moisture sensors usually refer to sensors that estimate volumetric water content. This device used to convert the physical parameters in to an electric signals. The function of this sensor is to sense the content of the moisture in the soil. These sensors required very low power and having high resolution. This gives the capacity to make numerous estimations (i.e. hourly) over a drawn out stretch of time with insignificant battery utilization.
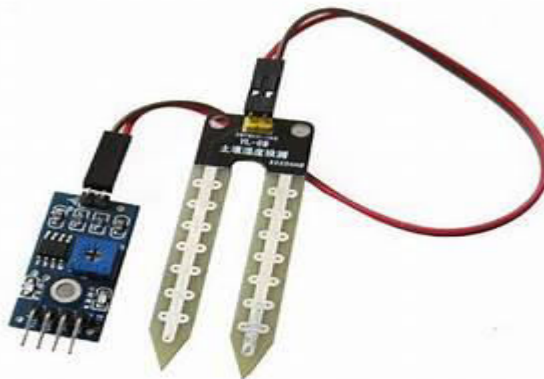
F.WATER PUMP
Pump is a standard mechanical device used to force a liquid or a gas to move forward inside a pipeline or hose using suction or pressure or both.It is also used to compress gases or force air into inflatable objects such as tires.It creates suction to produce pressure causing the liquid to rise to a higher altitude.

G.RELAY

It is electromagnetic switch use to control the electrical devices. In our proposed system,two relays are used for switching. One relay is used for switching between microcontrollerand solenoid valve and another relay is used for switching between microcontroller and water pump. Relay is acts as transmitter. Most of the relay uses an electromagnet to activate a switching mechanism mechanically.

H.SOLENOID VALVE

solenoid valve help to control the flow of liquid or gas. These valves are incorporated into the equipment so that the equipment can be used safely and efficiently.solenoid valve does is use a plunger to open or close the valve, either allowing the liquid to flow through or sealing it off without any leaks.

I.FLOATING TYPE SENSOR

Float level sensor is a kind of continuous liquid level measurement sensor.Also called as float level switch, float level gauge , float level transmitter.Float level sensors are continuous level sensors.Float level gauges use magnetic floats as measuring elements.Magnetic float that rises and falls as liquid levels change.
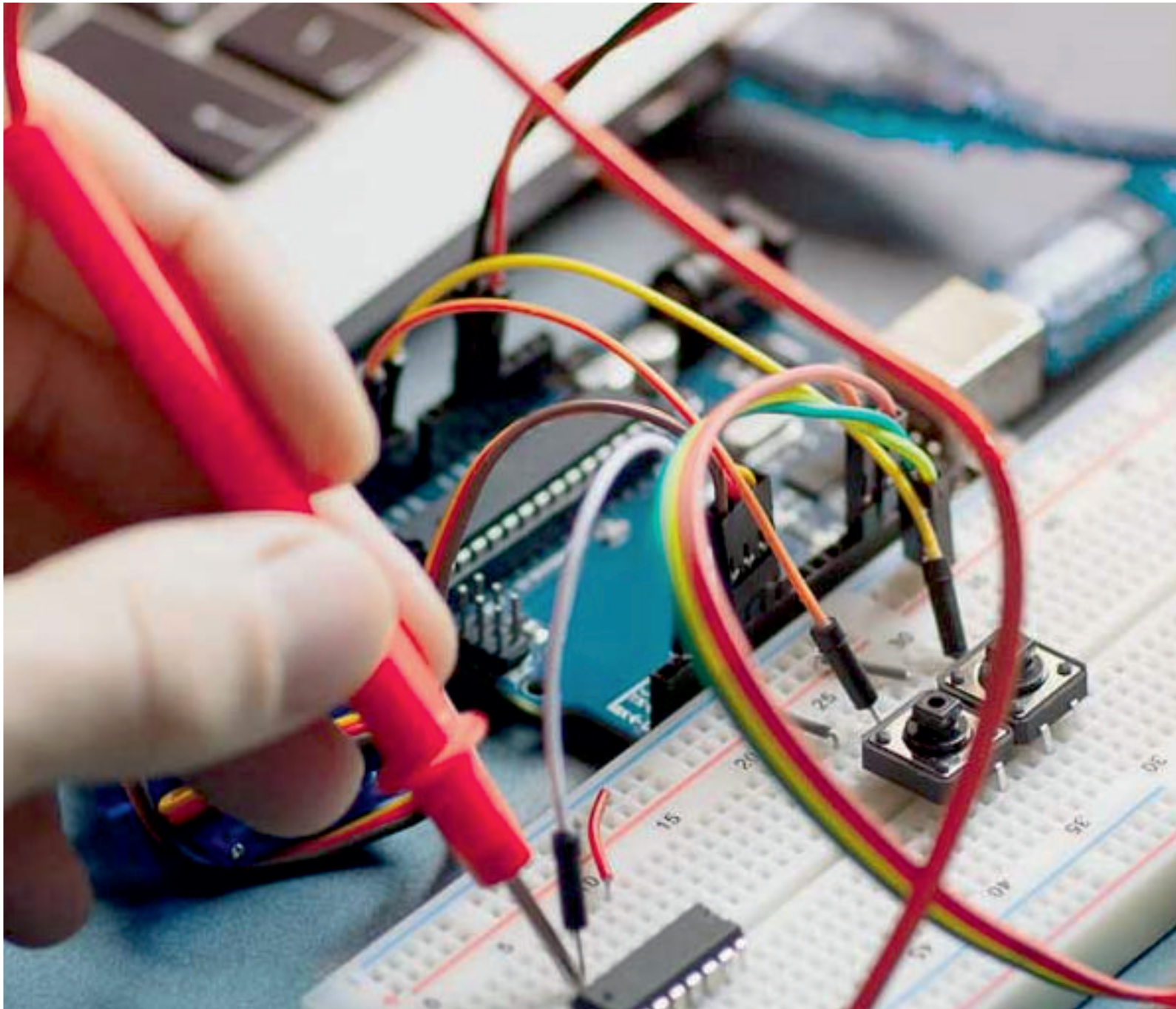
V.CONCLUSION

This innovative smart irrigation system is very beneficial for government as well as farmers. This is one of the best solution for energy crisis and water consumption. The smart irrigation system reduces the human intervention during the irrigation of field and also optimizes the water usages. Once the system is installed, unutilized energy produced by the solar PV can also be linked with grid system which can be revenue source for farmers. Hence, SIS is motivating farming in India and at the same time it is giving solution for the energy crisis. Despite the fact that it required high initial investment for implementation of SIS but in the long run this system is more economical than the conventional irrigation method. Government should also demonstrate this type of innovative system to motivate the farmers for adopting such type of system.

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