



# SOLAR BASED SMART IRRIGATION SYSTEM USING ARDUINO

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*Abstract* : The most important feature of the Solar based irrigation system is the detection of content of moisture in soil. If water is present in soil it automatically stops the flow of water and in absence of water it starts water supply. Cost effective solar power can be the answer for all our energy needs in rural area. It is the good solution for the present energy crisis for the Indian farmers. This system consists of solar powered water pump along with an automatic water flow control using a moisture sensor. In villages side where power cut is a problem it is a good solution to use solar panels.

**Keywords:** Automatic irrigation, Solar System, Soil moisture sensor, Arduino program, energy crises.

## Introduction

Solar power is the most natural source of energy in the world. The cost of solar panels has been constantly decreasing which encourages its usage in various sectors. One of the applications of this technology is used in irrigation systems for farming. 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. In this paper we propose an automatic irrigation system using solar power which drives water pumps to pump water from bore well to a tank and the outlet valve of tank is automatically regulated using controller and moisture sensor to control the flow rate of water from the tank to the irrigation field which optimizes the use of water. Solar power is not only an answer to today's energy crisis but also an environmental friendly form of energy. Photovoltaic generation is an efficient approach for using the solar energy.

## RESEARCH METHODOLOGY

Proposed irrigation system mainly consists of two modules- Solar pumping module and automatic irrigation module. In solar pumping module a solar panel of required specification is mounted near the pump set. Then using a control circuit it is used to charge a battery. From the battery using a converter circuit it gives power to the water pump which is submerged inside the well. Then the water is pumped into an overhead tank for storing water temporarily before releasing the water into the field.

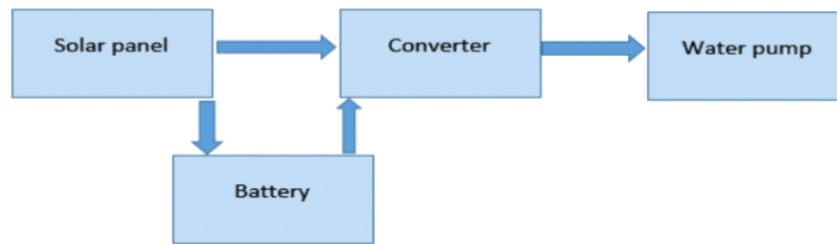
**Solar based Pumping module:-**

Fig. 1: Block diagram of solar pumping module.

**Smart Automatic Irrigation Module:-**

In automatic irrigation module the water outlet valve of the tank is electronically controlled by a soil moisture sensing circuit. The sensor is placed in the field where the crop is being cultivated. The sensor converts the moisture content in the soil into equivalent voltage. This is given to a sensing circuit which has a reference voltage that can be adjusted by the farmer for setting different moisture levels for different crops. The amount of water needed for soil is proportional to the difference of these two voltages. A control signal was given to a stepper motor whose rotational angle is proportional to the difference in voltage. The stepper motor in turn controls the cross-sectional area of the valve to be opened controlling flow of water. Therefore the amount of water flowing is proportional to the moisture difference.

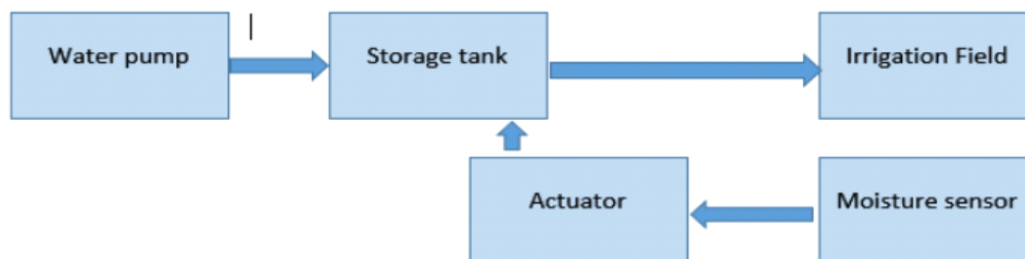


Fig. 2: Block diagram of automatic irrigation module.

**COMPONENT AND SYSTEM REQUIREMENT****Component Required:-**

- **Microcontroller,**
- **12V DC mini submersible pump**
- **Humidity Sensor**
- **LCD**
- **Solar Panel**
- **Relay**
- **Voltage Regulator**
- **Diodes**
- **Capacitors**
- **Resistors**

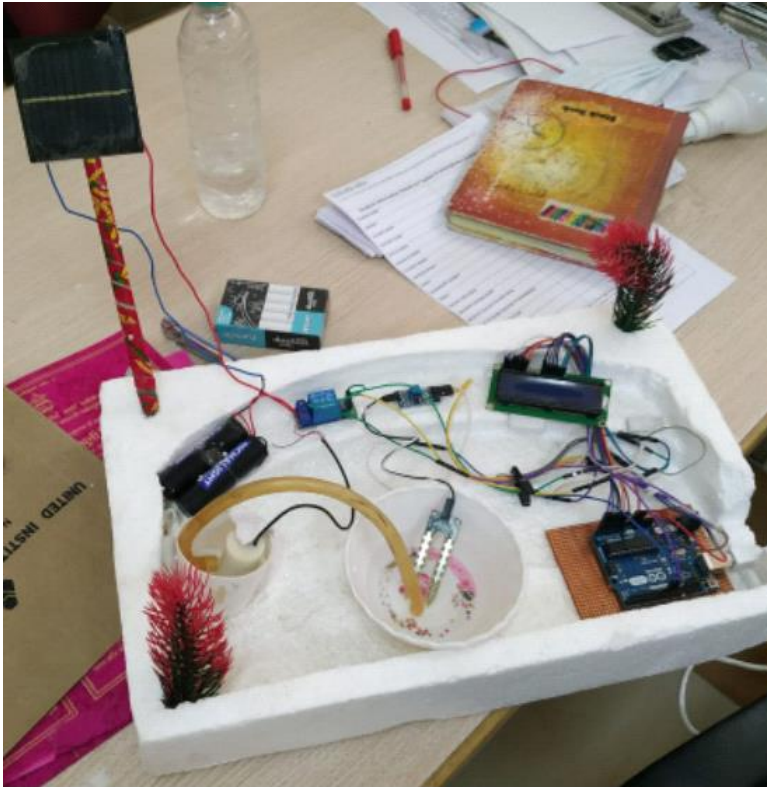
**System Requirement**

- **Arduino uno OS**
- **PCB ECAD**
- **Proteus IoT Controller**
- **Various basic arduino libraries**

## RESULTS AND DISCUSSION :-

Snapshots.

The kit consists of hardware of an automatic irrigation system by sensing the moisture of the soil which the transistor is turned on, the relay coil gets energized and turns on the motor which is displayed on the LCD screen. Figure-19



The result shows here that in presence of water moter is auromatically off. and when there is no moisture in soil then irrigation start.

## CONCLUSION

In our article, we use Arduino, LCD, Solar Cell, Submersible motor, Relay and Soil Sensor for the Project. The main focus of my article is to make an “Automatic Solar Powered Irrigation System”. This makes a person to apply less effort during time of Irrigation and also saves his time, It can easily detect and measure of amount of water in soil and also fulfill the need of water if required. Also, it’s beneficial for environment because Its using Renewable Resources to generate the electricity and also for farmer has he doesn’t depend on Electric bill.

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