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# Analysis on Automatic Solar Power Irrigation System

Bukke. Prasannalakshmi

Research Scholar, Department of EEE, JNTUA, Anantapur, Andhra Pradesh, India.

**Abstract:** Agriculture technology is changing swiftly. This paper deals with design of sun based totally automobile irrigation machine. This gadget includes solar powered water pump at the side of an automatic water flow manipulate the use of a moisture sensor. It's far the proposed answer for the present power disaster for the Indian farmers. This machine conserves strength with the aid of lowering using grid strength and conserves water through decreasing water losses

**Keywords:** Solar panels, Irrigation system, Moisture sensor etc.

## I. INTRODUCTION

It is not unusual to use diesel to energy turbines in agricultural operations. Whilst the systems can offer power wherein needed there is some huge drawbacks consisting of fuel has to be transported to the generator's location, which may be quite a distance over some difficult roads and landscape. Their noise and fumes can disturb farm animals. Fuel costs add up, and spills can contaminate the land. for plenty agricultural desires, the opportunity is sun power. Present day, nicely-designed, easy to-keep sun systems can offer the power this is needed where its miles wished, and whilst it is wanted. Those are structures that have been tested and proven round the arena to be value-effective and dependable, and they are already raising levels of agricultural productivity worldwide.

In India most of the strength generation is carried out by conventional strength sources, coal and mineral oil-based totally power flora which contribute closely to greenhouse gases emission. Setting up of new electricity plants is inevitably dependent on import of exceedingly unstable fossil fuels. For this reason, its miles essential to tackle the electricity disaster via sensible utilization of abundantly to be had renewable electricity assets, such as biomass power, sun electricity, wind strength, geothermal power and Ocean energy. The projection for irrigation water demand essentially depends on irrigated place, cropping pattern, powerful rainfall, and soil and water quality. though our us of a claims to have evolved in terms of science and technology, erratic energy supply or complete breakdown for hours together has almost grow to be habitual nowadays. If this be the case for city dwellers, consider the farmers residing in far off villages. They need power for irrigating their vegetation, or lights their farm animals sheds. What can they do? The reasons for having massive gap among requirement and ate up strength could be the wastage of electrical power. The foremost cause may be that the power provided for agricultural needs is throughout the night time hours. Farmers turn on the pump motor and depart it „on“ for the whole night time. Farmers do not trouble to exchange off the pump motor whilst the land is full of enough water degree. This is the principle source of wastage of electrical energy from the grid.

## II. METHODOLOGY

Inside the sun pumping gadget photovoltaic cells are use because the power adopter from the sun which converts the solar electricity into dc electric supply. This dc electric power is saved within the battery or rate the battery of 12v dc. This battery deliver is then regulated by way of the regulator which has output of 5v dc. This 5v deliver is given to the microcontroller and liquid crystal display which operate on the 5v dc supply. Moisture sensor is use to experience the soil condition, that's a copper strip.

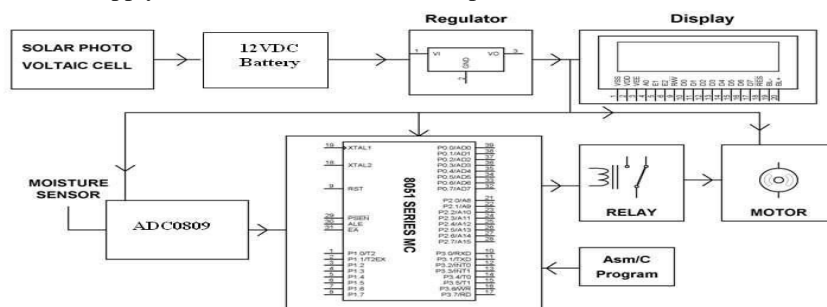


Fig.2.1 Block Diagram Of Solar Power Irrigation

This moisture sensor feels the continuity of the moisture inside the soil. This device feels the moisture content material in soil and sends a signal to the analog-to-digital converter which converts an analog signal into a digital signal. The output from the ADC is checked or controlled by using the microcontroller. The controlled signal is displayed on the liquid crystal display. If the microcontroller gives the signal that moisture continuity is much less or the soil is dry, then this signal is given to the relay, which is located as a switch or starter of the pump. After getting the signal, the relay gets a function and the pump is started. As the moisture continuity will increase, the soil is adequately wet. On the other hand, the signal is given to the microcontroller from the ADC, which again gets the signal from the moisture sensor. And the pump will stop running. In this way, the solar power irrigation pump is operated by using the use of solar power.

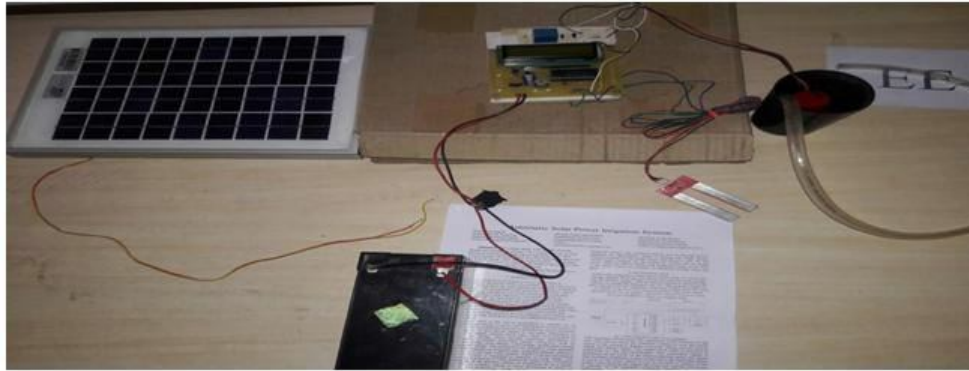


Fig. 2.2 Actual View of Solar Power-Irrigation.

### III. COMPONENT DESCRIPTION

#### A. Components

- 1) **Solar panel:** A sun panel is about of solar photovoltaic modules electrically linked and hooked up on structure. A photovoltaic module is a packaged, connected assembly of solar cells. The sun panel may be used as a aspect of a larger photovoltaic device to generate and supply power in industrial and home applications.
- 2) **Battery:** Are energy storage device which can be especially use for powering small transportable gadgets. Right here we use battery for storing strength from sun panel. This strength use for water pumping.
- 3) **Soil Moisture Sensor:** The Soil Moisture Sensor Module reads the quantity of moisture present within the soil surrounding it. Perfect for monitoring a lawn or your pet plant's water stage. This sensor uses the 2 probes to skip contemporary thru the soil then reads the resistance to decide the moisture level. Seeing that water conducts strength, the better the water content material, the less difficult it for the electrons to move. Similarly the soil is in dry circumstance reasons the contemporary do not pass without problems, the driving force the soil the more resistance the electrons face. The various resistances translated to an analog output.
- 4) **Relay:** A relay is an electrically operated switch. Contemporary flowing through the coil of the relay creates a magnetic area which draws a lever and modifications the transfer contacts. The coil modern-day can be on or off so relays have two switch positions and they are double throw (changeover) switches.
- 5) **DC motor:** electrical device are changing strength. Motor take electrical strength and convey mechanical energy. Electric motor use in water pumping utility. Surface pumps, located at or near the Water surface, are used generally for transferring water through a pipeline. Some surface pumps can develop high.

Heads and are suitable for moving water distances to high elevations. The rated voltage of motor in model is 12 V and the rated current is 0.5A.

#### B. Microcontroller & ADC

The 8051 microcontroller is a low-power, high-overall performance sixteen-bit micro controller. The microcontroller construct in rom, ram output input ports, serial ports, timer interrupts and clock circuit. A microcontroller is a whole computer manufacture on single chip. Microcontroller is use as motor controller in irrigation gadget. The input output, memory and on chip peripherals of microcontroller are selected depending on the utility. Microcontroller are power full digital processor, the diploma of manage and programmability they offer drastically complements the effectiveness application. An electronic incorporated circuit which transforms a signal from analog (non-stop) to virtual (discrete) form. Analog alerts are directly measurable portions. Virtual signals

most effective have two states. For virtual computer, we discuss with binary states, zero and 1. The ADC 0809 records acquisition issue is an analog to digital converter which converts the analog signal to digital signal.

3.1.716\*2 liquid crystal display display: it is a flat panel show, digital visible show, or video show that uses the mild modulating homes of liquid crystals. Liquid crystals do not emit mild immediately. LCDs are to be had to show arbitrary pics (as in a preferred-purpose laptop display) or constant pics which can be displayed or hidden, which include preset words, digits, and 7-phase displays as in a virtual clock. They use the equal fundamental era, besides that arbitrary pics are made from a massive number of small pixels, even as different displays have large factors.

C. Specification of components

SRNO	COMPONENT	SPECIFICATION
1	Solar Panel	5w
2	Battery	12V,7.2Ah
3	DcMotor	12v
4	Moisture Sensor	4.2v,35mA
5	Relay	12V
6	Microcontroller	8051

1) Software

a) Embedded C

b) We have used  $\mu$  Vision Keil assembly language editors of software to program in assembly language.

IV. CALCULATIONS

A. PV Sizing

Different size of PV modules will produce different amount of power. To find out the sizing of PV module, the total peak watt produced needs. The peak watt (WP) produced depends on size of the PV module and climate of site location. To determine the sizing of the PV modules, calculate as follows:

- 1) STEP1: Calculation of Total Load Connected Total Load Connected= [D.C Pump Power Rating\* Time of usage] + [Remaining Components Power Rating\* Time of usage]
- 2) STEP2: Calculation of Total PV Panels Energy Needed Total PV panels energy needed=Total Load Connected + Losses
- 3) STEP3: Calculation of Total Wp Of PV Panel Capacity Needed Total Wp of PV Panel Capacity Needed=Total PV panels energy needed No of Illumination hours
- 4) STEP4: Calculation of No. Of PV Panels Required No. of PV panels=Total WP of PV panel capacity needed Rating of the PV Panel

B. Battery Sizing

The Amp-hour (Ah) Capacity of a battery tries to quantify the amount of usable energy it can store at a nominal voltage. All things equal, the greater the physical volume of a battery, the larger its total storage capacity.

- 1) STEP1: Calculation of total Load Connected Total Load Connected= Sum of all appliances (power rating of each device\* Time of usage)
- 2) STEP2: Calculation of Battery (Ah) Total Load Connected\* Days of Autonomy Battery Losses\* Depth of Discharge \* N.B.V

V. FUTURE ENHANCEMENT

We completed our project successfully with the available sources. But the results and modifications are not upto the expectations. This can be further improved by incorporating the following modifications to obtain better results.

- 1) Solartracker2.GSMsystem
- 2) Waterlevelindicator4.Buzzersystem

VI. CONCLUSION

By means of implementing this gadget varies gain for farmers. Including mitigate the terrible distribution management, human attempt and load shading. In this gadget via the usage of automobile irrigation optimized use of water by means of lowering losses





and wastage of water and reducing inter motion of farmers. The large amount of power produce by way of using sun panel this energy use for water pumping and remaining strength can also given to the grid with small amendment on this device. This gadget easily applied for nicely and environmental friendly. There may be a high capital investment required for this system to be carried out however in long run this system is economical.

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