National Journal of Advanced Research
ISSN: 2455-216X; Impact Factor: RJIF 5.12
Received: 08-12-2018; Accepted: 12-1-2019
www.allnationaljournal.com
Volume 5; Issue 1; January 2019; Page No. 90-93

Importance of solar powered auto irrigation system in the field of agriculture

Neelam Chouhan[1], Krishan Kumar[2]
[1] Student, Department of Electrical Engineering (EE), Manda Institute of Technology, Raisar, Bikaner, Rajasthan, India
[2] Assistant Professor, Department of Electrical Engineering (EE), Manda Institute of Technology, Raisar, Bikaner, Rajasthan, India

Abstract
The system is a automatic irrigation system where the irrigation pump is worked from solar energy. It winds up monotonous to physically work the irrigation framework and continue observing the water dimension of the dirt. Thus the framework utilizes ssolar power by utilizing photograph voltaic cells rather than commercial power. Sensors are put on the paddy field and these sensors persistently sense the water level and give the message to the rancher illuminating the water level. Without visiting the paddy fields, farmers can get the data about the water level. In view of the water level, a farmers can control the engine by communicating something specific from his phone even from a remote spot Irrigation System running on Solar Power.

Keywords: automatic, irrigation, solar, power

1. Introduction
Solar energy is the energy gotten by getting heat and light from the Sun. Energy from the Sun is suggested as solar energy. Advancement has given different ways to deal with utilize this unlimited resource. It is seen as a green advancement since it doesn't create greenhouse gases. Solar energy is limitlessly open and has been utilized since long both as power and as a source of heat.
Solar boards changes over the daylight in to usable solar energy utilizing N-type and P-type semiconductor material. At the point when daylight is consumed by these materials, the sun powered vitality thumps electrons free from their atoms, enabling the electrons to move through the material to deliver electricity. This procedure of changing over light (photons) to electricity (voltage) is known as the photovoltaic (PV) effect. As of now solar boards convert the greater part of the visible light range and about half of the ultraviolet and infrared light spectrumto usable solar vitality.
Solar energy technologies use the sun's energy and light to provide heat, light, hot water, electricity, and even cooling, for homes, businesses, and industry [3].
These days, farmers in the agribusiness field confronting a great deal of issues in emptying the water into their crops to keep their harvests green particularly in summer season. This is on the grounds that they don't have an appropriate thought regarding the power accessibility. Indeed, even it is accessible; they need to hold up until the field is appropriately watered. Hence, this method checks them to quit doing different acts. In any case, there is an answer, in particular "solar powered auto irrigation system". In the preliminary of solar power based water system framework, PV cells are utilized to deliver electricity that vitality is put away in battery-powered batteries the energy which is created from the batteries is utilized for the framework activity. A water pump is utilized to pump the water from an animal well to a water stockpiling tank [4].

2. Literature Review [11]
Developing ideas for the solar-powered irrigation system was done as exclusively and in a gathering during meetings to generate new ideas. Some exploration was directed before these sessions to see the majority of the parts that would be required in the execution of a irrigation system framework. A portion of these components, for example, a photovoltaic solar board, water pump, and an inverter/controller are essential to the structure prerequisites as they achieve our undertaking and add some control to the framework.
With the significant segments and client necessities as a top priority, practical decay was performed to spread out the basic activities that the different segments would need to perform. The segment with the most adaptability in usage would be the irrigation system framework connected to the water pump. Spray, furrow, flooding, above and subterranean trickle frameworks were the significant ideas examined. While they all have their points of interest and impediments one novel framework is appropriate for the specific atmosphere, crop, cost, and size of the framework being demonstrated.
In 2012, the United States Agency for International Development (USAID), the Government of Sweden (SIDA), the Government of Germany (BMZ), Duke Energy Corporation and the United States Overseas Private Investment Corporation (OPIC (on the whole, the "Founding Partners") consolidated assets to make the "Powering Agriculture: An Energy Grand Challenge for Development" (PAEGC) activity. The target of PAEGC is to help new and manageable ways to deal with quicken the advancement and organization of clean vitality answers for increment horticulture profitability as well as an incentive for farmers and agribusinesses in creating nations and developing areas that need access to solid, reasonable clean energy [11].
The first solar pumps were introduced in the late 1970s. From that point forward, PV water pumping frameworks have

demonstrated critical progressions. The first-generation PV pumping frameworks utilized centrifugal pumps, generally determined by DC engines or variable frequency AC engines, with demonstrated long haul unwavering quality and water powered effectiveness fluctuating from 25 percent to 35 percent. The second era PV pumping frameworks presented positive removal pumps, dynamic cavity siphons and stomach siphons for littler water amounts, for the most part portrayed by lower PV input power prerequisites, lower capital expenses and higher pressure driven efficiencies (Chandel, 2015). This pioneering work was guided in various nations around the globe.

In the late 1970s and early 1980s, various issues were knowledgeable about huge numbers of the pilot sites, as recorded in a World Bank/United Nations Development Program (UNDP) venture on solar pumping (Halcrow et al., 1981).

Current solar pumping innovation utilizes electronic frameworks and insightful programming, which have additionally expanded the yield power, execution and by and large proficiency of SPIS. The key device is currently the electronic controller, which adjusts the accessible power from the solar generator to the solar pump. Other than its controlling capacity, it gives contributions to continuous observing of different parameters, for example, borehole water levels and capacity tank levels, just as pump speed. It utilizes Maximum Power Point Tracking (MPPT) innovation to upgrade the water yield of the siphoning framework. Have costs for PV boards dropped, yet in addition the costs for pumps and controllers – not as significantly as the boards, yet at the same time a diminishing of around 30 percent from the year 2009 to 2017.

3. Irrigation System

Irrigation is the use of controlled measures of water to plants at required interims. Irrigation develops agricultural crops, look after scenes, and revegetate bothered soils in dry territories and amid times of not exactly average precipitation. Irrigatio additionally has different uses in harvest rainfall, including frost protection [5], smothering weed development in grain fields [6] and avoiding soil consolidation [7], interestingly, agribusiness that depends just on direct precipitation is alluded to as downpour encouraged or dry land farming.

Irrigation system frameworks are additionally utilized for cooling domesticated animals, dust concealment, transfer of sewage, and in mining. Irrigation is frequently contemplated together with drainage, which is the expulsion of surface and sub-surface water from a given zone.

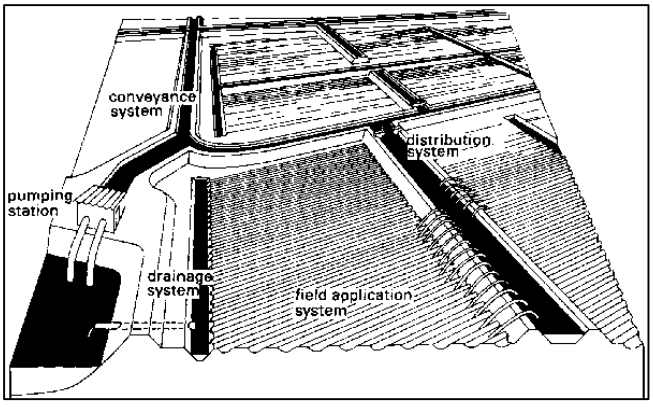

Fig 1: Irrigation System

4. Auto Irrigation System

Space-based solar power basically comprises of three components: Every irrigation framework, for example, drip, sprinkler and surface gets robotized with the assistance of electronic apparatuses and indicators, for example, PC, clocks, sensors and other mechanical devices.

An automatic irrigation framework takes every necessary step effectively and with a positive effect on where it is introduced. When it is introduced in the agricultural field, the water circulation to yields and nurseries turns out to be simple and doesn't require any human help to play out the activities for all time. Some of the time automatic irrigation can likewise be performed by utilizing mechanical machines, for example, clay pots or bottle irrigation framework. It's exceptionally difficult to actualize irrigation frameworks since they are over the top expensive and complex in their structure. By bringing some fundamental focuses into contemplations from specialists' help, we have executed a few activities on automatic irrigation framework by utilizing distinctive advancements [8].

Fig 2: Automatic irrigation system

5. Solar Power Auto Irrigation System

As we probably am aware it is troublesome in agriculture field to control water pumps physically. One needs to remain in fields to turn on and off. In numerous nations where power is principle issue, residents more often than not don't have office of power. All things considered solar power is utilized to control water siphons. In solar power auto water system framework, solar charge controller is utilized to store dc intensity of sun powered boards in batteries. This put away battery is utilized to control water pumps naturally [9].

Solar controlled auto irrigation framework work in the daylight. At the point when the sun sparkles the water, pumping process is a reasonable method for solar energy use all through the mid-year, as the water need is the most elevated. The water siphon which is utilized will give a dependable water source to plantation. For any solar based water pumping framework, the capacity to drive water is an element of three factors like pressure and power. These three basic parts are utilized in this solar powered auto irrigation framework [10].

6. Working of Solar Power Auto Irrigation System [10]

The fundamental target of this solar controlled auto irrigation framework is to build up a irrigation framework in the agriculture field with the assistance of Solar Energy. The required electrical and electronic segments of this proposed

framework are Solar Panel, 8051 series Microcontroller, water pump, an operational amplifier, LCD, Relay, MOSFET (Metal oxide Semiconductor FET), Motor, Diodes, Voltage Regulator, Resistors, Capacitors, LED, Crystal and furthermore Transistors.

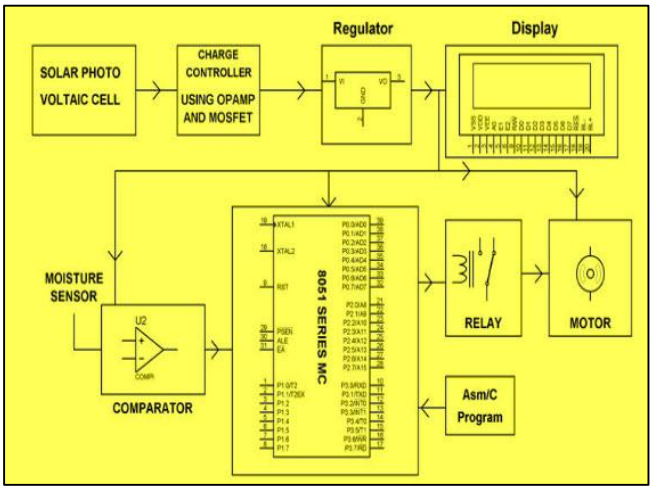

Fig 3: Block Diagram of Solar Power Auto Irrigation System

Solar Panel

Solar boards are structured with solar cells gathered of semiconductor materials. The primary work of solar board is to change over solar energy into DC electrical energy (for the most part of 12V). The required number of cells and furthermore their size relies upon the rating of the load. The group of solar cells can produce most extreme power. Be that as it may, the solar board must place intently at exact angles to the sun beams.

The Source

Water sources are available in different forms like drilled wells, springs, ponds, rivers, etc.

The PV Panels

The PV (photograph voltaic) cells essentially rely upon the span of the water pump. A board values in watts of intensity it can create. This framework ought to be worked with a PV array of capacity, and estimated under some regular test conditions. An adequate of modules in arrangement and parallel could be utilized to secure the important photograph voltaic power array control o/p. The PV modules o/p control which is utilized in the PV array under average test conditions must be a min of 74 watts peak.

Charge Controller

In any solar power framework, a charge controller is a essential device, used to keep up right charging voltages of the batteries. The charge controller work is to control the voltage and current from the solar board. It charges the battery and furthermore prevents the battery charging from over voltage and under voltage circumstances.

Battery

The Battery is an electric device, used to store solar energy and provided to the comparable loads. The utilization of batteries relies upon the load necessity.

Inverter

The primary function of the inverter is to change over the voltage of the battery to AC voltage so as to begin the loads. Along these lines, it causes us to run a few electronic devices, home machines, PCs, and so forth. There are different kinds of inverters existing in the market today. The qualities of common inverters incorporate high transformation frequency, less harmonic substance, and high exchanging frequency, so on.

Power Supply

The power supply of this task contains a stage down transformer, voltage regulator, bridge rectifier. Where the step-down transformer ventures down the 230 volts to 12 volts AC, and a bridge rectifier changes substituting current to direct current, at that point a voltage regulator modifies the voltage to 5V which is utilized for the activity of the microcontroller. In this proposed framework, solar energy is utilized to trigger the irrigation pump.

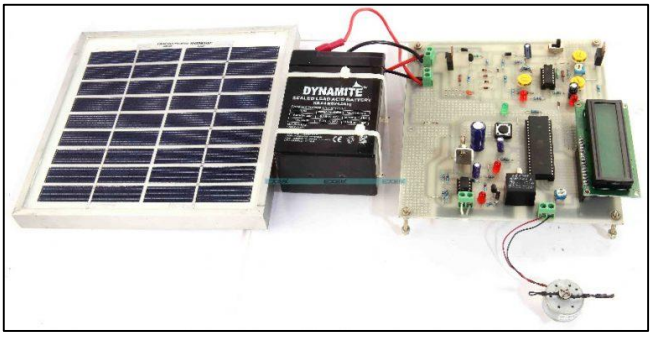

Fig 4: solar powered auto irrigation system project kit

In the proposed framework, solar energy is utilized to trigger the irrigation pump. This task is worked with sensor parts, which are collected utilizing operational amplifier IC. These are structured here as a comparator. Two copper wires are infused into the soil to detect the soil condition, regardless of whether it is dry or wet. A microcontroller in this venture is utilized to control the whole framework by recognizing the sensors. At the point when the sensors sense the soil condition as thirsty, at that point the comparator guides the direction to the microcontroller, and it additionally sends directions to the relay driver IC at that point, it rehashes the engine to drive water to the crops. Here the comparator capacities as an interface between the microcontroller and detecting course of action.

A microcontroller in this undertaking is utilized to control the whole framework by detecting the sensors. At the point when the sensors sense the soil condition as thirsty, at that point the comparator guides the direction to the microcontroller, and it likewise sends directions to the relay driver IC at that point, it rehashes the engine to drive water to the crops. Here the comparator capacities as an interface between the microcontroller and detecting game plan. The soil and the water pump status are appeared on the LCD which is interfaced to the microcontroller. Thus, when the moisture sensor detects the state of the soil as wet, at that point the microcontroller sends the guidelines to the transfer to turn off the engine. Besides, this venture can be created by interfacing it with a GSM modem to pick up power over the motor switching operation.

The soil and the water pump status are appeared on the LCD which is interfaced to the microcontroller. Also, when the moisture sensor detects the state of the soil as wet, at that point the microcontroller sends the directions to the transfer

to turn off the motor. Moreover, this venture can be produced by interfacing it with a GSM modem to pick up authority over the motor switching operation.

7. Conclusion

By utilizing this investigation, it advances the utilization of water by lessening the human intervention of farmers. The excess energy which is created from the solar board can likewise be given to the networks with a straightforward adjustment in the circuit. This examination will accommodating for designing understudies.

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