

Solar Powered Auto Irrigation System with Water Purifier

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Abstract— Sunlight is one of the most abundant renewable energy resources available on earth and using it in our day to day life can be a boon to humanity. Using solar power in work will help us in saving non-renewable energy resources. Solar power auto irrigation system with water purifier is answer to Indian farmer. This is a smart technique which will control the irrigation system along with water purification for farmers and to other people living around.

Key words: Water Purifier, Solar Powered

I. INTRODUCTION

Scarcity of electrical energy is increasing day by day and in this era use of renewable energy is a boon to sustain non-renewable resource for future generation. Using solar energy as a power source can be an aid to polluted environment. To use this energy we need to convert this energy from solar to electrical form and device used for this conversion is called as photovoltaic cell.

Photovoltaic cell is a portable device used for solar to electrical energy conversion. Use of renewable energy is important as it gives no harm to our environment and also saves our non-renewable energy resources. This can be very beneficial for rural areas which remain dark due to lack of electricity supply and can be used for purpose like irrigation, water purification and many more common uses. This paper gives a new methodology to save non-renewable resources, environment and human beings. Problem like drinking water, electricity etc can be reduced through this technique, it can reduce problems faced by farmers and people living in rural and urban areas. This project shows different approach of using solar energy for irrigation, water purification for drinking purpose and for various household works.

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II. HARDWARE REQUIREMENTS

8051 series Microcontroller
Op-Amp
LCD
Solar Panel
MOSFET
Relay
Motor
Voltage Regulator
Diodes
Capacitors
Resistors
LED
Crystal
Transistors
Purifier
Battery

Table 1: Hardware Requirements

III. LITERATURE REVIEW

At the age of 19 Alexandria Edmond Becquerel gave the concept of photovoltaic effect and he built the world's first photovoltaic cell in his father's laboratory in 1839. In 1888 a physicist Aleksandra Stoletov built first cell based on the photoelectric effect discovered by Heinrich Hertz in 1887.

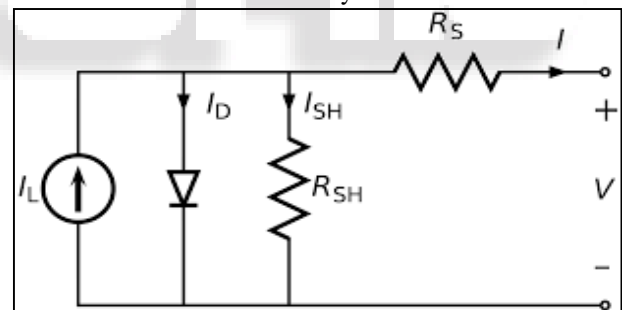


Fig. 1: Basic solar panel diagram

Year passed away and many theories were discovered but suddenly revolution came in this field when Albert Einstein proposed quantum theory of light that explained the photoelectric phenomenon in a landmark paper, and received the Nobel Prize for physics.

In 1897, Frank Shuman, an engineer from U.S. started commercial use of solar energy by a small demonstration solar engine. He built first solar power station in Egypt.

With growing technology our needs is also increasing and hence to maintain the balance we need to use renewable energy resource to Osave non-renewable energy resources. Now a day's electricity and clean water is a serious problem to concern in rural as well as urban areas. Urban areas somehow manage these problem due to presence of availability of sources and supply but in rural

area electricity and drinking water is still a problem various methodologies are used like use of generators, inverters etc. Due to less availability of electricity and water, development rate of rural area is very slow and to increase development rate using solar power as energy source can be helpful resource in our day to day work.

IV. HARDWARE METHODOLOGY

A. Photo-Voltaic Sizing

various sizes of solar modules generate various amount of power. The peak watt completely depends on the surface area of the panel and condition of climate. Calculation of sizing of PV can be done by following steps:

STEP 1: Determination of total load connected: Total Load Connected = [Rating of D.C pump * usage time] + [Remaining Components Power Rating* usage time]

STEP 2: Determination of total energy by PV panel: Total solar panel energy required= Total Load Connected + Losses included

STEP 3: Determination of total solar panel required: Total no. of solar panels = Total WP of solar panel capacity needed/ Rating of the PV Panel

B. Sizing of Battery

Capacity of battery is calculated in the form of Ah(ampere-hour) or we can say the storage capacity of battery can be determine in the form of Ah(ampere –hour) by following steps:

STEP 1: Calculation of total Load Connected: Total Load Connected = Sum of all appliances (power rating of each device * usage time

V. DIAGRAM

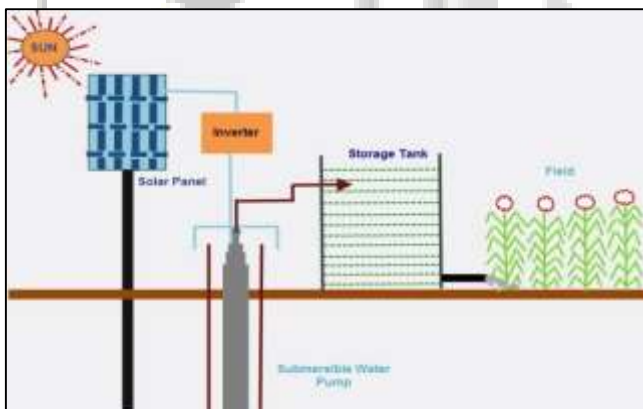


Fig. 2: Solar powered auto irrigation system

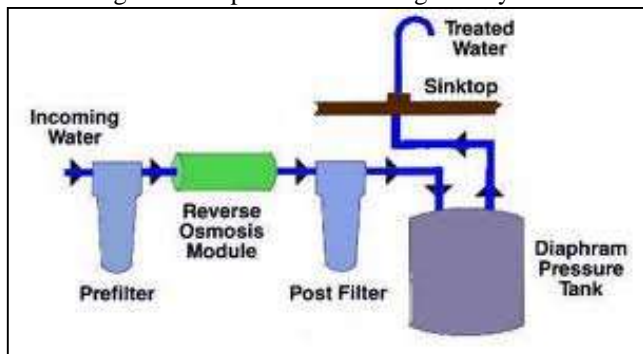


Fig. 3: Solar powered water purification

VI. PROPOSED WORK

In the solar irrigation system first the solar panel will extract the maximum energy from the sunlight, this energy will go to the charge controller which controls the current and voltage and charges the battery and also stops the battery from overcharging and undercharging.

This regulated energy will be stored in the battery then it will be passed through inverter as it is DC power, inverter will convert it into AC power supply. It will go to the AC motor and motor will run the pump that will pull the water from the borehole and transfer it to water tank then using the outlet it will be sprinkled in the field. As we are combining two methodology, thus if the irrigation is not required, the charge stored in the battery can be used for the water purification purpose in which we have polluted water it will be passed through reverse osmosis ,it is a technology that is used to remove the major contaminants from water. It has its own setup in which water is passed from pre-filter.

Then pushing it under pressure through semi-permeable membrane, we get treated water. The elements that are removed from RO techniques are dust particles, salts, colloids and many more.

This water still has some impurities so we will pass it from the UV lamp. In UV lamp ultraviolet rays are passed through treated water. UV rays are invisible form of electromagnetic rays, it has shorter wavelength then visible light as well as has enough energy that it can break the bonds between atom and molecules. In this way we get the pure water in purified water tank. Therefore in this way both process will run together through solar energy.

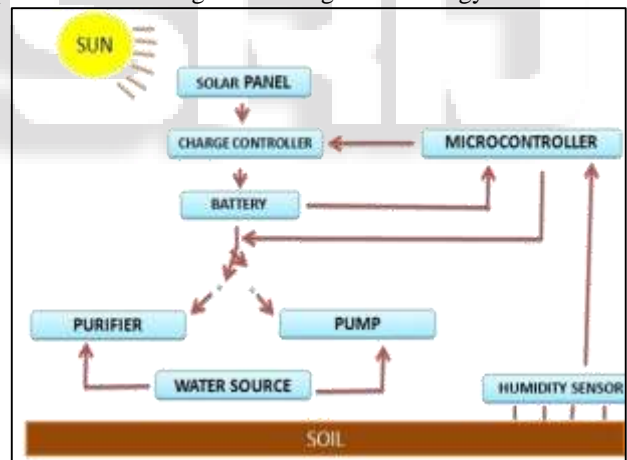


Fig. 3: Block diagram of proposed work

VII. CONCLUSION

By using the automatic irrigation system it optimizes the usage of water by reducing wastage. Solar pumps also offer clean solutions with no danger of barehole contamination. The excess energy produced using solar panels can also be used for water purification purpose. Water purifier powered by solar energy provides the human with distill water & extends the human life. As we are using same solar panel for irrigation system and purifier so it's a sort of hybrid system that makes the work easier. The modification done in this project that two systems are controlled by single solar panel is usable for both home and agricultural use. The investment in implementation of this system is more but

overall benefit is high and it is highly economical. Power stored in battery can be used for other household uses.

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