



SOLAR POWERED WATER DESALINATOR PURIFIER SYSTEM

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Abstract: Lack of fresh drinking water in isolated communities is one of the common problems around the world. The availability of pure drinking water is only 0.5% of total freshwater demand. The fresh drinking water situation in most countries is alarming especially in isolated regions. Most of the isolated and rural regions are using underground water for drinking and cooking. To address this issue, a small pure drinking water system is proposed that uses available solar energy. The system is designed with a reverse osmosis process for rural or isolated communities to facilitate the pure drinking water demand in the regions. The utilization of renewable energy resources intimately relates to sustainable development. Rapid increase in population and industrial development have propelled water resources to the forefront of challenges facing modern societies. We are presenting a design proposal for a solar powered RO water purification system.

INTRODUCTION

Only 3% of the water available on earth is fresh water. Two thirds of this fresh water is present in frozen glaciers. On an average over 1.1 billion people over the globe lack proper access to any fresh water reserves and over 2.7 billion people face scarcity of water at least once a month. But fortunately, as we know 71% of earth's surface is water and 97% of that water is sea water. So here we develop a portable solar powered seawater desalination as well as water purifier to solve the water problem with a smart innovative concept. The Project consists of a solar powered RO water purification system. It is a mobile device designed to purify sea water. It has been found that sea water temperature has a strong influence both on chiller and HD desalinator performance: the lower is the water temperature, the higher are the chiller capacity and the rejected heat, therefore improving also fresh water productivity. It is a Combination of heat sources and combination of processes. Recent developments present desalination systems including most significant filter combined with reverse osmosis, heat source being a thermal power plant, but coupling with solar resource can be imagined. This project proposes a small pure drinking water system which uses solar energy. The system is designed with reverse osmosis process for isolated communities to facility pure drinking water demand in the regions.

METHODOLOGY

A. Purification system:

First, we pour water into the tank through basin to remove large objects like threads, particles of lead and other solid particles, plastic. Next, a mini pump is used to drive the water to pre filtration chamber. In this, larger particles like sand, dirt and other sediments are removed. It also protects RO membrane which get clogged due to the sediments and chlorine. Next is sediment filter which is used to remove particulate matter, small particles of dust, sand and other small particles. It is mainly used to remove turbidity from the water. After these are the carbon filters –

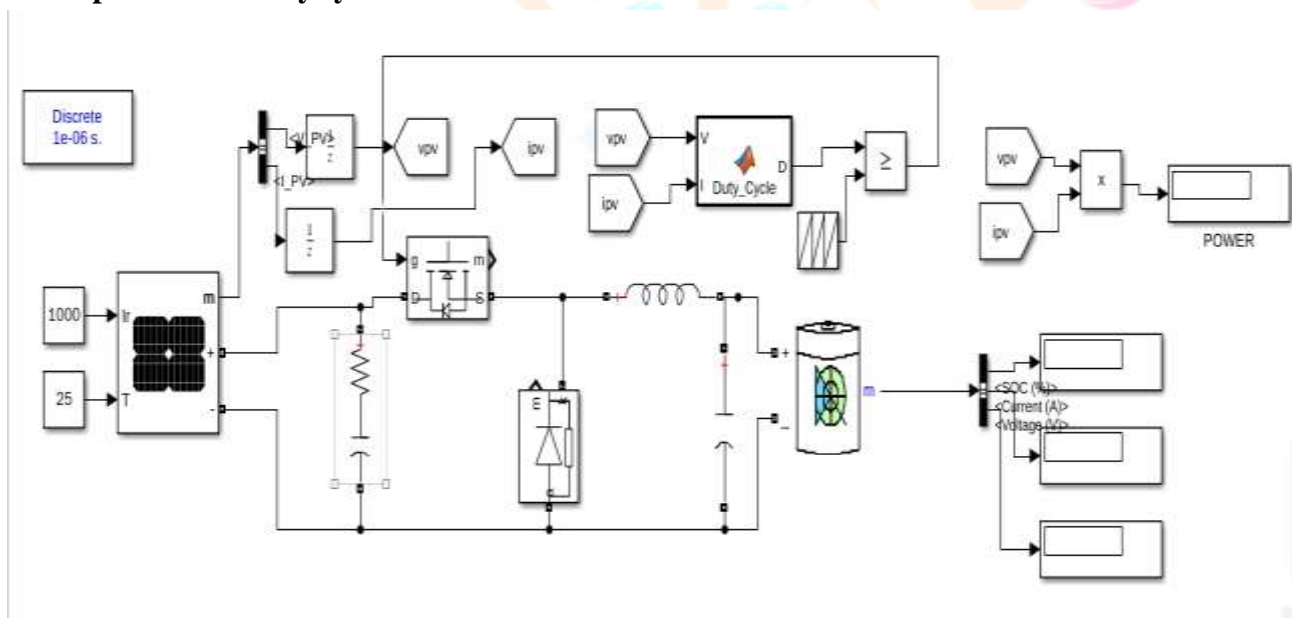
A. Pre-carbon filter removes organic impurities and chlorine. It is very effective in removing bad taste and odors from the water.

B. Next, we use a powerful pump motor to drive water with pressure to the post-carbon filter which comprises of nano-silver activated carbon block. It is useful in enhancing taste of water.



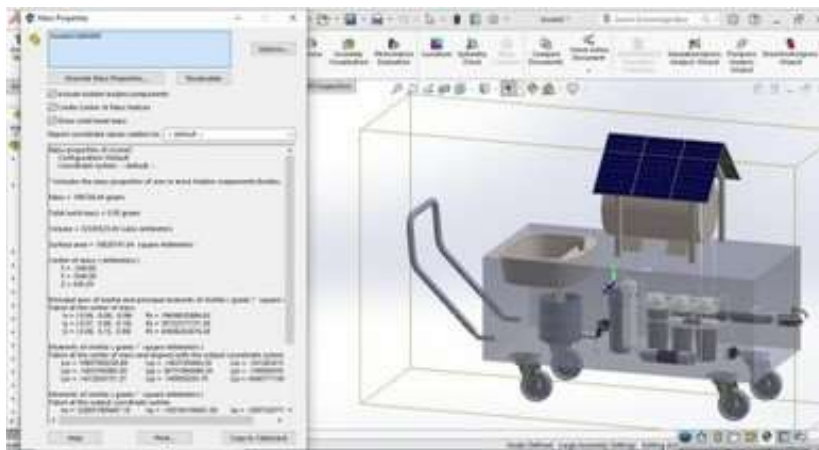
From there water goes to RO membrane in which water molecules are forced through a 0.0001 micro membrane by using water pressure which removes majority of dissolved solids like salt and other substances. Next up is the alkaline chamber, alkaline water has higher pH value than tap water which neutralizes acids in blood, boosts metabolism, helps body absorb more nutrients more effectively by helping balance PH of water. After this, the water is stored in the overhead water tank. So, whenever the tap is opened the water comes out from the tank. Between the flow of water from tank to tap it passes through a Ultraviolet chamber which removes bacteria and other viruses.

B. Solar powered battery system:



This is the battery system which is being powered by solar panels, so firstly a constant block is used to provide constant input to the PV array, also a RC branch is connected in parallel with the PV array. Mosfet, diode and inductor function as a buck converter, battery used is a lead acid type and the bus selectors used are to measure the parameters like SOC, Current, Voltage, also display blocks are used to see the values, bus selector to the PV panel are added to measure the output voltage and output current for the MPPT algorithm. Unit delay and go to blocks are added to perform its function in the circuit, power gui block works in discrete time mode and a duty cycle function block is used, also a relational operator block is used to provide the gating pulse and the repeater sequence is used to provide switching frequency and a product block is used to measure the output power of the system and display block to see the readings.

MATERIAL PROPERTIES



TESTING & RESULTS

Solar powered battery charging system:

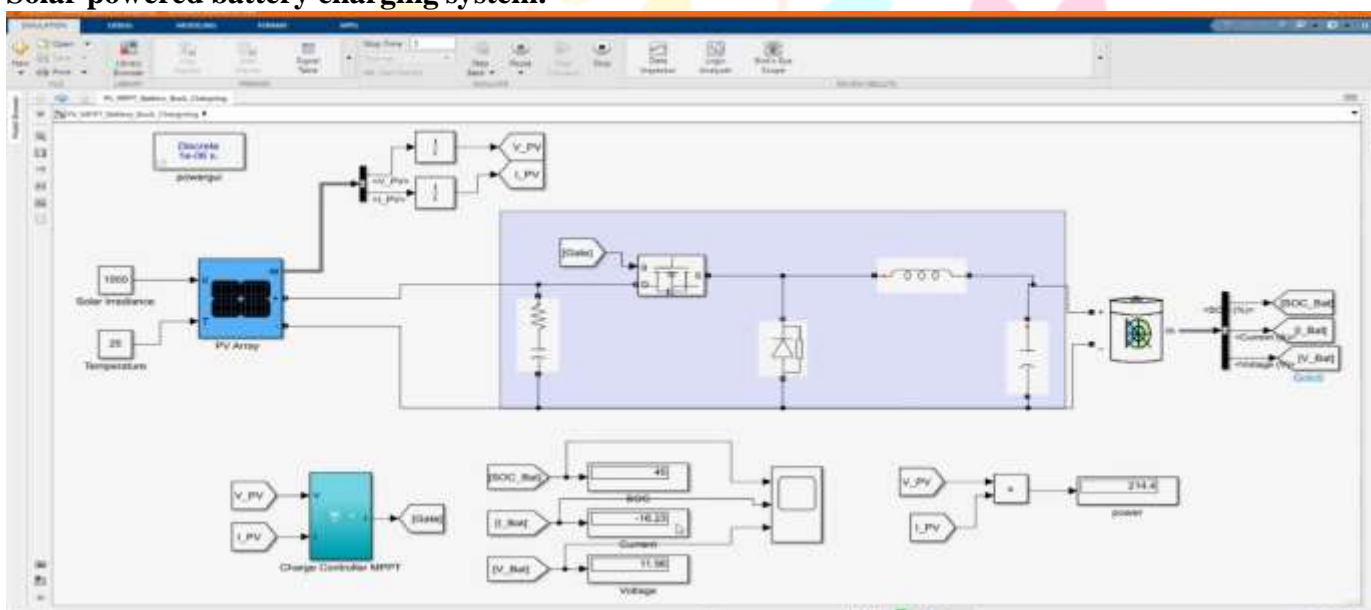


Fig.A When the rays falling on the PV array panel is at standard rate.

PV INTENSITY	POWER	SOC	CURRENT	VOLTAGE
When the rays falling on the PV array panel is at standard rate.	213 kw	45.01	-16.26	12.04
When the rays falling on the PV array panel is at under moderate.	107.7 kw	45.02	-8.282	12.04

ADVANTAGES

1. Ability to Purify Seawater.
2. Solar Powered | No External Power Needed.
3. Multiple Stage Purification.
4. Wheel Portable Design.
5. Quiet Operation.
6. Easy To Use.

LIMITATION

Requires timely Maintenance.

APPLICATIONS

1. Used for water purification during floods, water scarcity.
2. Used for desalinating salt water which then can be used for drinking purposes.

CONCLUSION & FUTURE SCOPE

Our project can be used in variety of water purification processes and as well can be transported with ease. The mobility of the system makes it possible for a regular person to use it with ease. The maintenance work doesn't require much expertise so users can learn it easily. The solar powered based system eliminates additional operating costs. Our project can help people who are stranded in natural calamity or have a water scarcity by desalinating and purifying the water which is contaminated into drinking water. It is also easy to assemble with a few basic equipments, hence it is possible to assemble it any remote location.

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